

1981

# Internal accounting control evaluation and auditor judgment; Auditing research monograph, 3

Theodore J. Mock

Jerry L. Turner

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**AUDITING RESEARCH MONOGRAPH**

**3**

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**INTERNAL  
ACCOUNTING  
CONTROL  
EVALUATION  
AND AUDITOR  
JUDGMENT**

**by Theodore J. Mock  
and  
Jerry L. Turner**

**AICPA**

American Institute of Certified Public Accountants

# Statement of Policy

This auditing research monograph has not been approved, disapproved, or otherwise acted on by the Auditing Standards Board, the membership, or the governing body of the American Institute of Certified Public Accountants. Therefore, the contents of the study, including the recommendations, are not official pronouncements of the Institute.

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Auditing research monographs are published by the Auditing Standards Division of the American Institute of Certified Public Accountants as a part of the Institute's technical research program. The monographs are intended to provide background material and informed discussion that should help in reaching decisions on significant auditing problems.

Individuals and groups are invited to express their views with supporting reasons on the matters in this monograph. Comments, which should be sent to the director of auditing research, will be treated as public information unless a writer requests that his comments be confidential.

AUDITING RESEARCH MONOGRAPH

# 3

## INTERNAL ACCOUNTING CONTROL EVALUATION AND AUDITOR JUDGMENT

by **Theodore J. Mock**  
University of Southern California  
and  
**Jerry L. Turner**  
Peat, Marwick, Mitchell & Co.

Published by the  
American Institute of  
Certified Public Accountants, Inc.  
1211 Avenue of the Americas  
New York, N.Y. 10036

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1211 Avenue of the Americas, New York, N.Y. 10036

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# Foreword

This is the third in the auditing research monograph series published by the Auditing Standards Division of the American Institute of Certified Public Accountants. The series was undertaken in the belief that research would be helpful in approaching and solving significant practice problems related to the audit function.

One of the primary objectives behind publishing Auditing Research Monograph 3 is to stimulate additional research pertaining to matters of interest to the Auditing Standards Board. I believe that *Internal Accounting Control Evaluation and Auditor Judgment* will achieve this objective.

In my opinion this monograph represents a highly valuable contribution to the accounting profession. Using sound research methods, the monograph addresses a pervasive practice problem. Moreover, its authors combine the research methodological skills of academicians with the problem identification skills of practitioners.

New York, N.Y.  
December 1980

DAN M. GUY  
Director of Auditing  
Research

# Preface

This monograph summarizes selected portions of a comprehensive empirical study of internal accounting control evaluation and auditor judgment. The study was initiated by Peat, Marwick, Mitchell & Co. and was undertaken by the Audit Research Group, Department of Professional Practice—Accounting and Auditing. We are indebted to Peat, Marwick, Mitchell & Co. for sponsoring the research and in particular to Dr. Richard B. Lea (now on the faculty of Boston University) and Mr. Robert K. Elliott for initiating the project and providing criticism and assistance during its execution. Ms. Susan Sporer provided valuable research assistance, particularly in the content analysis phase of the study, and Peter D. Jacobson provided useful editorial comments.

One research element was a protocol study of auditor decision-making, which was conducted with the able assistance of Dr. Stanley F. Biggs of the University of Wisconsin, Madison. Research assistance on the latter portions of the research was provided by Ms. Deanna A. Daniels of the University of Southern California through the Center for Accounting Research.

To each of the above, we wish to express our sincere gratitude. In addition, we would like to acknowledge the American Institute of Certified Public Accountants and Douglas R. Carmichael for providing the means for publishing the research results.

THEODORE J. MOCK, Palos Verdes, California  
JERRY L. TURNER, Denver, Colorado

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# 1

## Introduction and Overview

Under present generally accepted auditing standards, auditors study and evaluate internal accounting control to determine the nature, extent, and timing of audit procedures that must be performed in developing an opinion on the financial statements. However, there are no explicit professional guidelines to apply when making such determinations. Little is known about how auditors make such judgments, yet they are fundamental to an audit.

Understanding the auditor's judgment process may lead to methods of aiding the auditor in evaluating audit evidence. It seems unlikely that significant improvements will be forthcoming without some general agreement on how auditors reach decisions about how much audit evidence is appropriate in different internal control situations. Now there is no general agreement. In fact, research findings to date raise some puzzling issues. Ronald A. G. Weber found, for example, that even though a simulation decision aid improved auditors' perceptions of a system's error characteristics (their perceptions were more accurate), the decision aid had no significant effect on their subsequent audit plan.<sup>1</sup> Edward J. Joyce, on the other hand, found that "different auditors might agree on the quality of internal control in a given situation, yet disagree on how to incorporate that evaluation in a judgment of what audit work to plan and perform."<sup>2</sup> As a result, their recommendations varied widely.

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1. Ronald A. G. Weber, "Auditor Decision Making: A Study of Some Aspects of Accuracy and Consensus, and the Usefulness of a Simulation Decision Aid for Assessing Overall System Reliability" (Ph.D. diss., University of Minnesota, 1977).

2. Edward J. Joyce, "Expert Judgment in Audit Program Planning," *Studies on Human Information Processing in Accounting*, Supplement to vol. 14 of the *Journal of Accounting Research* (1976): 53.

Because of the importance of evaluating internal accounting controls and limited previous research, an extensive research project was designed. The primary purpose of the project was to obtain empirical evidence on the effect of changes in internal accounting controls and differences in guidance on auditors' decisions on the extent of audit tests. Specifically, the test was intended to address the following kinds of questions: Do auditors respond to different evidence of the effectiveness of internal controls by effecting corresponding changes in sample size recommendations for audit tests? Do they consider the same factors (cues) in making their decisions? Of the cues they perceive as influencing their decisions, which do they reference most frequently, and which are statistically related to their decisions? Are their decisions influenced by explicit guidance on appropriate decision-making considerations? What behavioral factors and heuristics influence their judgment process?

These questions are addressed in detail in the following chapters of this monograph. However, some of the more significant findings of the research are as follows: Auditors do respond systematically to different evidence of the effectiveness of internal accounting controls. Specifically, when given improved compliance test results, they increased their reliance and reduced the related extent of substantive tests. However, a great deal of variability among auditors was observed in both the specific sample sizes recommended and the underlying rationale given for those sample sizes. The complexity of the internal accounting control evaluation task was evident in two significant areas. First, many factors were identified in the subject's sample size rationale documentation. Second, variation was observed in their interpretation of these various factors, such as the nature of the audit test, the relevance of the internal accounting control strengths, and the amount of reliance they were willing to place on those controls. The research also permitted the study of various other factors, such as the effect of providing the auditor with explicit guidance and the effect of behavioral factors.

# 2

## The Development of Professional Standards Related to Internal Accounting Control Evaluation

Although the study and evaluation of internal accounting controls may appear to be a problem of fairly recent development, auditors have contended with the problem for over half a century. Since the early part of the twentieth century, auditors have taken internal accounting control systems into account when designing audit programs. As early as 1917, Robert H. Montgomery noted that "if the auditor has satisfied himself that the system of internal check *is* adequate, he will not attempt to duplicate work which has been properly performed by some one else."<sup>1</sup>

Of course, such reviews of internal accounting controls were not required by professional standards, and no formalized guidance really existed. Audit testing developed initially because of the inability to cope with increased transaction volume. It was not until after the McKesson and Robbins investigation that the impetus existed to require the auditor to relate the evaluation of internal accounting controls to the extent of other testing. This should be borne in mind when the following summary of early literature is reviewed.

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1. Robert H. Montgomery, *Auditing: Theory and Practice*, 2d. ed., rev. and enl. (New York: Ronald Press Co., 1917), p. 50.

## Early Literature

One of the earliest references in professional auditing literature to the need to review internal accounting control was in the 1929 publication titled *Verification of Financial Statements (Rev.)*. This was a revision by the American Institute of Accountants of a pamphlet printed in the April 1917 issue of the Federal Reserve Bulletin and reprinted in 1918 for general distribution under the title *Approved Methods for the Preparation of Balance-Sheet Statements*. The first paragraph stated the following:

The scope of the work indicated in these instructions includes a verification of the assets and liabilities of a business enterprise at a given date, a verification of the profit-and-loss account for the period under review, and, incidentally, an examination of the accounting system for the purpose of ascertaining the effectiveness of the internal check.<sup>2</sup>

The pamphlet briefly approached the relationship between internal accounting control (internal "check") and the audit program further in the first paragraph:

The extent of the verification will be determined by the conditions in each concern. In some cases the auditor may find it necessary to verify a substantial portion or all of the transactions recorded upon the books. In others, where the system of internal check is good, tests only may suffice. The responsibility for the extent of the work required must be assumed by the auditor.<sup>3</sup>

In 1936 a revision of the 1929 pamphlet was prepared by the American Institute of Accountants and was published by the Federal Reserve Board under the title *Examination of Financial Statements by Independent Public Accountants*. In this publication the importance of internal accounting control evaluation was emphasized in the first sentence:

This pamphlet deals with the accountant's examination of the balance sheet of a business enterprise at a specified date and of the profit and loss and surplus accounts for the period under review, and also with his review of the accounting procedure for the purpose of ascertaining the accounting principles followed and the adequacy of the system of internal check and control.<sup>4</sup>

It was in the 1936 pamphlet that internal control was defined for the first time:

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2. Federal Reserve Board, *Verification of Financial Statements (Revised)* (Washington, D.C., 1929), p. 1.

3. *Ibid.*

4. American Institute of Accountants, *Examination of Financial Statements by Independent Public Accountants* (New York: AIA, 1936), p. 1.

The term "internal check and control" is used to describe those measures and methods adopted within the organization itself to safeguard the cash and other assets of the company as well as to check the clerical accuracy of the bookkeeping. The safeguards will cover such matters as the handling of incoming mail and remittances, the proceeds of cash sales, the preparation and payment of payrolls and the disbursement of funds generally, and the receipt and shipment of goods. These safeguards will frequently take the form of a definite segregation of duties or the utilization of mechanical devices.<sup>5</sup>

The pamphlet emphasized the judgments required on the part of the auditor in restricting audit tests on the basis of effective accounting controls.

The detailed scrutiny and check of cash transactions of large companies can be performed *more economically* by permanent company employees. Where such a check is provided, the accountant will modify his program accordingly. Where the internal check and control are necessarily limited or severely restricted the examination to be made will be more comprehensive in character but no examination should be regarded as taking the place of sound measures of internal check and control, except in cases where the organization is so small as to make adequate internal check impracticable. Except in the case of a small business, the cost of a detailed audit would be prohibitive, and the problem is to develop a general system of examination under which reasonably adequate safeguards may be secured at a cost that will be within the limits of a prudent economy. In the large majority of cases a detailed audit is not justified and the accountant relies on various test-checks of the records. The extent of the examination and of these test-checks is essentially a matter of judgment which must be exercised by the accountant, based on his experience, on his knowledge of the individual situation and on the extent of the internal check and control.<sup>6</sup>

As a final comment on internal check and control, the pamphlet suggested audit procedures that the auditor should consider if the system of internal check and control was not adequate:

In the case of a company of limited size or one having a highly restricted system of internal check and control a more detailed examination . . . may be necessary to determine the substantial accuracy of the profit and loss statement. This may take the form of a more extensive test of vouchers, a test of the payrolls and an analysis of expense accounts or such other procedure as the accountant believes will be most effective in the particular circumstances. As the financial statements as a rule are not intended for wide distribution, more details are usually included in the profit and loss statement.<sup>7</sup>

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5. *Ibid*, p. 8.

6. *Ibid*, p. 9.

7. *Ibid*, p. 36.



## Development of Standards

By 1939 the auditing profession had grown rapidly. The American Institute of Accountants, realizing that the complexities of modern businesses were increasing the diversity of conditions encountered by the auditor, formed its committee on auditing procedure. The task of the committee was to review auditing procedures and related questions. Instead of revising previous documents, the committee chose to issue Statements on Auditing Procedure (SAPs), which either modified or superseded parts of the 1936 pamphlet.

Statement on Auditing Procedure 1, *Extensions of Auditing Procedure*, issued in 1939, presented some of the underlying concepts of the auditing profession that later became a framework for generally accepted auditing standards. One of the concepts discussed was that of internal accounting control evaluation:

It is the duty of the independent auditor to review the system of internal check and accounting control so as to determine the extent to which he considers that he is entitled to rely upon it.<sup>8</sup>

As in the 1936 pamphlet, SAP 1 emphasized the role of the auditor's judgment in audit program design:

It is worthy of repetition that the extent of sampling and testing should be based upon the independent auditor's judgment as to the effectiveness of internal control, arrived at as the result of investigations, tests, and inquiries. Depending upon his conclusions in this respect, the independent certified public accountant should extend or may restrict the degree of detailed examination.<sup>9</sup>

Statement on Auditing Procedure 1 also provided a recommended report form, which, in the first paragraph, described the scope of the examination, including a specific reference to the system of internal control:

We have examined the balance-sheet of the XYZ Company as of April 30, 1939, and the statements of income and surplus for the fiscal year then ended, have reviewed the system of internal control and the accounting procedures of the company and, without making a detailed audit of the transactions, have examined or tested accounting records of the company and other supporting evidence, by methods and to the extent we deemed appropriate.<sup>10</sup>

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8. American Institute of Accountants, "Extensions of Auditing Procedure," *Journal of Accountancy* 68 (December 1939): 379.

9. *Ibid.*, p. 384.

10. *Ibid.*, p. 385.

The wording of the paragraph was not mandatory, however, and many auditors deleted the reference to the system of internal control in their reports.

The Securities and Exchange Commission (SEC) recognized the importance of the auditor's relationship with internal control evaluation in 1940, when it issued Regulation S-X. This regulation stated that the independent auditor was permitted to give due weight "to an internal system of audit regularly maintained by means of auditors employed on the registrant's own staff."<sup>11</sup> Regulation S-X was amended in 1941 to require that "In determining the scope of the audit necessary, appropriate consideration shall be given to the adequacy of the system of internal check and control."<sup>12</sup>

In 1947 the committee on auditing procedure reiterated its requirement that auditors use their study and evaluation of internal accounting controls to guide their planned testing. The special report, titled *Tentative Statement of Auditing Standards—Their Generally Accepted Significance and Scope*, defined auditing standards grouped as (1) general standards, (2) standards of field work, and (3) standards of reporting. The second standard of field work was as follows:

There is to be a proper study and evaluation of the existing internal control as a basis for reliance thereon and for the determination of the resultant extent of the tests to which auditing procedures are to be restricted.<sup>13</sup>

The report also included a discussion of the auditor's study and evaluation of internal controls, including the role of testing such controls and the need for auditors' judgments in evaluating the controls.

The membership of the Institute approved the report summary of auditing standards in September 1948.<sup>14</sup> A year later, at the 1949 annual meeting, the membership approved Statement on Auditing Procedure 23, which was later incorporated in the formal standards as the fourth standard of reporting.

The approval of auditing standards created a need for a modification of the standard report. Because such a report was assumed to be issued within the framework of generally accepted auditing standards, certain phrases were deemed superfluous. As a result, Statement on Auditing Procedure 24 was issued, which amended the report by excluding any

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11. Securities and Exchange Commission, Regulation S-X, *Form and Content of Financial Statements* (Washington, D.C.: U.S. Government Printing Office, 1941, as amended to and including February 5, 1941), p. 3

12. *Ibid.*

13. American Institute of Accountants, *Tentative Statement of Auditing Standards—Their Generally Accepted Significance and Scope* (New York: AIA, 1947), p. 11.

14. AICPA, Statement on Auditing Standards 1, *Codification of Auditing Standards and Procedures* (New York: AICPA, 1973), Appendix A.

reference to the examination of the system of internal control and to the omission of a detailed audit of the transactions.

The scope paragraph of the revised accountant's report then read as follows:

We have examined the balance-sheet of X Company as of December 31, 19— and the related statement(s) of income and surplus for the year then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records, and such other auditing procedures as we considered necessary in the circumstances.<sup>15</sup>

## Refining the Definition

In 1949 the committee on auditing procedure published the results of an analytical study that was "directed particularly to the consideration of the nature and characteristics of internal control and to the delineation of the respective spheres of interest and responsibility of management and the public accountant. . . ."<sup>16</sup> This study discussed the elements of a properly coordinated system, reported on the relationships of management and the public accountant to the internal control system, and provided a graphic illustration of internal control. It defined internal control this way:

Internal control comprises the plan of organization and all of the coordinate methods and measures adopted within a business to safeguard its assets, check the accuracy and reliability of its accounting data, promote operational efficiency, and encourage adherence to prescribed managerial policies. This definition possibly is broader than the meaning sometimes attributed to the term. It recognizes that a "system" of internal control extends beyond those matters which relate directly to the functions of the accounting and financial departments. Such a system might include budgetary control, standard costs, periodic operating reports, statistical analyses and the dissemination thereof, a training program designed to aid personnel in meeting their responsibilities, and an internal audit staff to provide additional assurance to management as to the adequacy of its outlined procedures and the extent to which they are being effectively carried out. It properly comprehends activities in other fields as, for example, time and motion studies which are of an engineering nature, and use of quality controls through a system of inspection which fundamentally is a production function.<sup>17</sup>

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15. American Institute of Accountants, Statement on Auditing Procedure 24, *Revision in Short-Form Accountant's Report or Certificate* (New York: AIA, 1948), ¶7.

16. American Institute of Accountants, *Internal Control: Elements of a Coordinated System and Its Importance to Management and the Independent Public Accountant* (New York: AIA, 1949), p. 5.

17. *Ibid*, p. 6.

The study enumerated the following characteristics of a satisfactory system of internal control:

- A plan of organization that provides appropriate segregation of functional responsibilities.
- A system of authorization and record procedures adequate to provide reasonable accounting control over assets, liabilities, revenues, and expenses.
- Sound practices to be followed in performance of duties and functions of each of the organizational departments.
- A degree of quality of personnel commensurate with responsibilities.<sup>18</sup>

The report indicated that the public accountant's review of the system of internal control had two potential benefits. First, the review would enable the auditor to determine the reliance that could be placed on the system and, by adjusting other audit procedures accordingly, an opinion on the financial statements could be expressed. Second, where the review indicated apparent weaknesses, recommendations for possible corrective measures could be conveyed to management. In connection with the secondary aspect of the review, the report indicated that the effectiveness of the organizational plan, the division of responsibilities, and such special control procedures as budgetary controls, reports, analyses, and cost systems were among the areas that the public accountant should review.

Evaluating a system of internal control was discussed specifically in the concluding section of the report:

The committee wishes to make it clear that neither the preceding discussion of internal control nor the illustrative charts, which comprise the appendix, purport to set forth any formula or pattern by which the effectiveness of a particular system may be measured. The problem, of course, is much too complex for any such treatment.<sup>19</sup>

Experience over the next few years determined that the definition provided in the 1949 *Internal Control* report was not easily interpreted and, possibly, placed greater responsibility on the auditor than might be required under generally accepted auditing standards. Accordingly, the committee on auditing procedure issued Statement on Auditing Procedure 29, *Scope of the Independent Auditor's Review of Internal*

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18. *Ibid.*

19. *Ibid.*, p. 21.

*Control*, in 1958. It held that there were two types of internal controls, accounting and administrative controls. These were defined as follows:

- (a) Accounting controls comprise the plan of organization and all methods and procedures that are concerned mainly with, and relate directly to, the safeguarding of assets and the reliability of the financial records. They generally include such controls as the systems of authorization and approval, separation of duties concerned with record keeping and accounting reports from those concerned with operations or asset custody, physical controls over assets, and internal auditing.
- (b) Administrative controls comprise the plan of organization and all methods and procedures that are concerned mainly with operational efficiency and adherence to managerial policies and usually relate only indirectly to the financial records. They generally include such controls as statistical analyses, time and motion studies, performance reports, employee training programs, and quality controls.<sup>20</sup>

The committee reiterated that the selection of auditing procedures, the timing of such procedures, and the determination of the extent to which they should be followed depended largely upon the auditor's judgment of the adequacy and effectiveness of the internal controls. Such judgment resulted from the study and evaluation, including testing, observation, investigation, and inquiry, of those internal controls that appeared to influence the reliability of the financial records. The committee continued by indicating that accounting controls, as defined previously, generally bore directly and importantly on the reliability of financial records and would, therefore, require evaluation. Administrative controls, on the other hand, ordinarily related only indirectly to the financial records and thus would not require evaluation but could be evaluated in some particular circumstances.<sup>21</sup>

In 1963 the committee on auditing procedure issued Statement on Auditing Procedure 33, *Auditing Standards and Procedures*, which consolidated and replaced the following previous pronouncements: *Internal Control* (1949), *Generally Accepted Auditing Standards* (1954), *Codification of Statements on Auditing Procedure* (1951), and Statements on Auditing Procedure 25–32 (issued on various dates after 1951). Statement on Auditing Procedure 33 was essentially a codification of earlier committee pronouncements.

The next authoritative pronouncement on the evaluation of internal controls was SAP 49, *Reports on Internal Control*, issued in 1971. This statement recognized that auditors were furnishing reports on their evaluations of internal control for use by management, regulatory

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20. AICPA, Statement on Auditing Procedure 29, *Scope of the Independent Auditor's Review of Internal Control* (New York: AICPA, 1958), ¶15

21. *Ibid.*, ¶16.

agencies, other independent auditors, and the general public. Because of the technical nature and complexity of internal accounting control and the consequent problem of understanding reports thereon, questions had been raised about whether such reports served a useful purpose for all people to whom they might be issued.<sup>22</sup> The committee concluded that if such reports were issued the risk of misunderstanding could be reduced by adopting a form of report that described in reasonable detail the objective and limitations of internal accounting control and the auditor's evaluation of it. To present such information, the following format was recommended.

We have examined the financial statements of ABC Company for the year ended December 31, 1970 and have issued our report thereon dated February 23, 1971. As a part of our examination, we reviewed and tested the Company's system of internal accounting control to the extent we considered necessary to evaluate the system as required by generally accepted auditing standards. Under these standards the purpose of such evaluation is to establish a basis for reliance thereon in determining the nature, timing, and extent of other auditing procedures that are necessary for expressing an opinion on the financial statements.

The objective of internal accounting control is to provide reasonable, but not absolute, assurance as to the safeguarding of assets against loss from unauthorized use or disposition, and the reliability of financial records for preparing financial statements and maintaining accountability for assets. The concept of reasonable assurance recognizes that the cost of a system of internal accounting control should not exceed the benefits derived and also recognizes that the evaluation of these factors necessarily requires estimates and judgments by management.

There are inherent limitations that should be recognized in considering the potential effectiveness of any system of internal accounting control. In the performance of most control procedures, errors can result from misunderstanding of instructions, mistakes of judgment, carelessness, or other personal factors. Control procedures whose effectiveness depends upon segregation of duties can be circumvented by collusion. Similarly, control procedures can be circumvented intentionally by management with respect either to the execution and recording of transactions or with respect to the estimates and judgments required in the preparation of financial statements. Further, projection of any evaluation of internal accounting control to future periods is subject to the risk that the procedures may become inadequate because of changes in conditions, and that the degree of compliance with the procedures may deteriorate.

Our study and evaluation of the Company's system of internal accounting control for the year ended December 31, 1970, which was made for the purpose set forth in the first paragraph above, was not designed for the purpose of expressing an opinion on internal accounting control and it would not necessarily disclose all weaknesses in the system. However, such study

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22. AICPA, Statement on Auditing Procedure 49, *Reports on Internal Control* (New York: AICPA, 1971), ¶15.

and evaluation disclosed the following conditions that we believe to be material weaknesses.<sup>23</sup>

The preceding paragraphs were to be followed by appropriate descriptions of the material weaknesses, recommendations for improvement, comments concerning corrective action taken or in process, or other comments appropriate in the circumstances.

Statement on Auditing Procedure 49 was supplemented in 1972 by SAP 52, *Reports on Internal Control Based on Criteria Established by Governmental Agencies*. Statement on Auditing Procedure 52 dealt more specifically with reports on internal control based on "criteria established by agencies in reasonable detail and in terms susceptible to objective application."<sup>24</sup> The statement specifically allowed the auditor to express a conclusion, based on the agencies' criteria, concerning the adequacy of the procedures studied. The auditor's report could also identify any condition that was believed not to be in conformity with such criteria and that was determined to be a material weakness. A material weakness was defined as follows:

either (a) a condition in which the auditor believes the organization's prescribed procedures or the degree of compliance with them does not provide reasonable assurance that errors or irregularities in amounts that would be material in relation to the amount of the applicable grant or program would be prevented or detected within a timely period by employees in the normal course of performing their assigned functions, or (b) a condition in which the auditor believes the lack of conformity with the agency's criteria is material in accordance with any guidelines for determining materiality that are included in such criteria.<sup>25</sup>

Statement on Auditing Procedure 54, *The Auditor's Study and Evaluation of Internal Control*, clarified the definition of internal control contained in SAP 33. Statement 54 discussed a wide range of topics, including the following:

- The purpose of the auditor's study and evaluation.
- A revised definition of accounting and administrative controls.
- The study and testing of the system.
- The evaluation of the system.
- The correlation of the study and evaluation with other auditing procedures.

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23. *Ibid*, ¶124.

24. AICPA, *Statement on Auditing Procedure 52, Reports on Internal Control Based on Criteria Established by Governmental Agencies* (New York: AICPA, 1972), ¶1.

25. *Ibid*, ¶14.

In reviewing the auditor's study and evaluation of internal control, SAP 54 reiterated that the purposes were to establish a basis for reliance thereon and to determine the nature, extent, and timing of audit tests to be applied to the examination of the financial statements. Although the study and evaluation made for such purposes frequently provided a basis for constructive suggestions to clients concerning improvements in internal control, and such suggestions were desirable, the scope of any additional study to develop such suggestions was not covered by generally accepted auditing standards.

Because of difficulties in interpretation, the committee on auditing procedure felt that clarification of the previous definition of accounting control was desirable. The revised definitions were as follows:

*Administrative control* includes, but is not limited to, the plan of organization and the procedures and records that are concerned with the decision processes leading to management's authorization of transactions. Such authorization is a management function directly associated with the responsibility for achieving the objectives of the organization and is the starting point for establishing accounting control of transactions.

*Accounting control* comprises the plan of organization and the procedures and records that are concerned with the safeguarding of assets and the reliability of financial records and consequently are designed to provide reasonable assurance that:

- a. Transactions are executed in accordance with management's general or specific authorization.
- b. Transactions are recorded as necessary (1) to permit preparation of financial statements in conformity with generally accepted accounting principles or any other criteria applicable to such statements and (2) to maintain accountability for assets.
- c. Access to assets is permitted only in accordance with management's authorization.
- d. The recorded accountability for assets is compared with the existing assets at reasonable intervals and appropriate action is taken with respect to any differences.<sup>26</sup>

The committee reiterated that accounting control, but not administrative control, was within the scope of the study and evaluation of internal control contemplated by generally accepted auditing standards.

## **Relating Accounting Controls to the Audit Program**

Statement on Auditing Procedure 54 noted the following:

Adequate evaluation of a system of internal control requires (a) knowledge

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26. AICPA, Statement on Auditing Procedure 54, *The Auditor's Study and Evaluation of Internal Control* (New York: AICPA, 1972), ¶¶27–28.



and understanding of the procedures and methods prescribed and (b) a reasonable degree of assurance that they are in use and are operating as planned.<sup>27</sup>

The information necessary for the first requirement ordinarily would be obtained through discussion with appropriate client personnel and reference to such documents as procedure manuals, job descriptions, flowcharts, and decision tables. Such information could be recorded in the form of answers to a questionnaire, narrative memorandums, flowcharts, decision tables, or any other form that would suit the auditor's needs or preferences.

The information needed for the second requirement would be obtained through compliance tests. The statement indicates that such tests are necessary if

the prescribed procedures are to be relied upon in determining the nature, timing, or extent of substantive tests of particular classes of transactions or balances, as discussed later in this Statement, but are not necessary if the procedures are not to be relied upon for that purpose. The auditor may decide not to rely on the prescribed procedures because he concludes either (a) that the procedures are not satisfactory for that purpose or (b) that the audit effort required to test compliance with the procedures to justify reliance on them in making substantive tests would exceed the reduction in effort that could be achieved by such reliance. The latter conclusion may result from consideration of the nature or amount of the transactions or balances involved, the data processing methods being used, and the auditing procedures that can be applied in making substantive tests.<sup>28</sup>

If compliance tests are required, the statement indicates that "What constitutes a 'reasonable' degree of assurance is a matter of auditing judgment; the 'degree of assurance' necessarily depends on the nature, timing, and extent of the tests and on the results obtained."<sup>29</sup>

Statement on Auditing Procedure 54 provides a "conceptually logical approach" to the evaluation of accounting control, which focuses directly on the purpose of preventing or detecting material errors and irregularities in financial statements. Under this approach, the following steps should be applied in considering each significant class of transactions and related balances to be audited:

- a. Consider the types of errors and irregularities that could occur.
- b. Determine the accounting control procedures that should prevent or detect such errors and irregularities.
- c. Determine whether the necessary procedures are prescribed and are being followed satisfactorily.

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27. *Ibid*, ¶50.

28. *Ibid*, ¶55.

29. *Ibid*, ¶60.

- d. Evaluate any weaknesses—i.e., types of potential errors and irregularities not covered by existing control procedures—to determine their effect on (1) the nature, timing, or extent of auditing procedures to be applied and (2) suggestions to be made to the client.<sup>30</sup>

Again, the statement emphasized the necessity for professional judgment:

In the practical application of the foregoing approach, the first two steps are performed primarily through the development of questionnaires, checklists, instructions, or similar generalized material used by the auditor. However, professional judgment is required in interpreting, adapting, or expanding such generalized material as appropriate in particular situations. The third step is accomplished through the review of the system and tests of compliance, and the final step through the exercise of professional judgment in evaluating the information obtained in the preceding steps.<sup>31</sup>

It was pointed out that the auditor's review of the accounting control system and the compliance tests should be related to the purposes of the evaluation of the system. For this reason, "generalized or overall evaluations are not useful for auditors because they do not help the auditor decide the extent to which auditing procedures may be restricted." For each significant class of transactions and related balances, the conclusion reached from the evaluation of accounting control should be whether the prescribed procedures and compliance with them are satisfactory. They may be considered satisfactory if no conditions believed to be material weaknesses are discovered.

Statement on Auditing Procedure 54 also discussed the relationship between the evaluation of internal accounting control and the extent of other auditing procedures to be performed. The statement indicated that the ultimate purpose of evaluating internal accounting control is to contribute to the "reasonable basis for an opinion" comprehended in the third standard of field work, which states the following:

Sufficient competent evidential matter is to be obtained through inspection, observation, inquiries, and confirmations to afford a reasonable basis for an opinion regarding the financial statements under examination.<sup>32</sup>

In discussing this relationship, two important topics were covered: the type of evidence needed to satisfy the third standard and the fact that complete reliance on internal accounting control is not appropriate. Statement on Auditing Procedure 54 indicates, "The evidential matter required by the third standard is obtained through two general classes

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30. *Ibid.*, ¶65.

31. *Ibid.*, ¶66.

32. AICPA, Statement on Auditing Standards 1 (New York: AICPA, 1973), section 330.01.

of auditing procedures: (a) tests of details of transactions and balances and (b) analytical review of significant ratios and trends and resulting investigation of unusual fluctuations and questionable items. These procedures are referred to in this Statement as 'substantive tests.'<sup>33</sup> The purpose of substantive procedures is to "obtain evidence as to the validity and the propriety of accounting treatment of transactions and balances or, conversely, of errors or irregularities therein. Although this purpose differs from that of compliance tests, both purposes often are accomplished concurrently through tests of details."<sup>34</sup> In regard to how much reliance can be placed on internal accounting controls, it was stated that with respect to material amounts the auditor should not place *complete* reliance to the exclusion of other auditing procedures. Complete reliance was not suggested in either the second or third standards of field work, nor would it be appropriate because of the inherent limitations in any system of internal accounting control.

A conceptual analysis of the relationship between the second and third standards was also presented, as follows:

The ultimate risk against which the auditor and those who rely on his opinion require reasonable protection is a combination of two separate risks. The first of these is that material errors will occur in the accounting process by which the financial statements are developed. The second is that any material errors that occur will not be detected in the auditor's examination.

The auditor relies on internal control to reduce the first risk, and on his tests of details and his other auditing procedures to reduce the second. The relative weight to be given to the respective sources of reliance . . . are matters for the auditor's judgment in the circumstances. . . .

The second standard of field work recognizes that the extent of tests required to constitute sufficient evidential matter under the third standard should vary inversely with the auditor's reliance on internal control. These standards taken together imply that the combination of the auditor's reliance on internal control and on his auditing procedures should provide a reasonable basis for his opinion in all cases, although the portion of reliance derived from the respective sources may properly vary between cases.<sup>35</sup>

Statement on Auditing Procedure 54 also indicated that (1) work by internal auditors should be considered as a supplement to, but not as a substitute for, tests by independent auditors and (2) that statistical sampling may be a practical means for expressing in quantitative terms the auditor's judgment concerning the reliance to be derived from substantive tests and for determining sample size and evaluating sample results.

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33. AICPA, Statement on Auditing Procedure 54, ¶70.

34. *Ibid.*

35. *Ibid.*, ¶72.

## Recent Pronouncements

Additional pronouncements dealing with different aspects of internal accounting control were issued subsequent to SAP 54. Statement on Auditing Standards (SAS) 3, *The Effects of EDP on the Auditor's Study and Evaluation of Internal Control*, indicated that the evaluation of the EDP aspects of a system of accounting control is not different conceptually from the evaluation of other aspects of the system and therefore should be an integral part of the auditor's evaluation of the system. Statement on Auditing Standards 9, *The Effect of an Internal Audit Function on the Scope of the Independent Auditor's Examination*, indicated that "When the independent auditor considers the work of internal auditors in determining the nature, timing, and extent of his own audit procedures or when internal auditors provide direct assistance in the performance of his work, judgments as to the effectiveness of internal accounting control, sufficiency of tests performed, materiality of transactions, and other matters affecting his report on the financial statements must be those of the independent auditor."<sup>36</sup>

Statement on Auditing Standards 20, *Required Communication of Material Weaknesses in Internal Accounting Control*, established the requirement that the auditor communicate to senior management and to the board of directors or its audit committee the material weaknesses in internal accounting control identified during an examination of financial statements made in accordance with generally accepted auditing standards. As previously discussed, prior to SAS 20 the issuance of such reports was optional. Statement on Auditing Standards 20 also modified the suggested form of an auditor's written report, as follows:

We have examined the financial statements of ABC Company for the year ended December 31, 19X1, and have issued our report thereon dated February 23, 19X2. As a part of our examination, we made a study and evaluation of the Company's system of internal accounting control to the extent we considered necessary to evaluate the system as required by generally accepted auditing standards. Under these standards, the purposes of such evaluation are to establish a basis for reliance on the system of internal accounting control in determining the nature, timing, and extent of other auditing procedures that are necessary for expressing an opinion on the financial statements and to assist the auditor in planning and performing his examination of the financial statements. (If the auditor believes that the description of the objective of internal accounting control and the inherent limitations of any system, which are set forth in the illustrative report in section 640.12 of SAS No. 1, would be informative to the reader of his written report, he may wish to include them here or in an appendix to the report. Sections 640.12 and 640.13 of SAS No. 1 as revised by this Statement are reproduced in the Appendix to this Statement.)

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36. AICPA, Statement on Auditing Standards 9, *The Effect of an Internal Audit Function on the Scope of the Independent Auditor's Examination* (New York: AICPA, 1975), ¶11.

Our examination of the financial statements made in accordance with generally accepted auditing standards, including the study and evaluation of the Company's system of internal accounting control for the year ended December 31, 19X1, that was made for the purposes set forth in the first paragraph above, would not necessarily disclose all weaknesses in the system because it was based on selective tests of accounting records and related data. However, such study and evaluation disclosed the following conditions that we believe to be material weaknesses, excluding those which were corrected before they came to our attention. (A description of the material weaknesses that have come to the auditor's attention would follow.)

The foregoing conditions were considered in determining the nature, timing, and extent of audit tests to be applied in our examination of the financial statements, and this report of such conditions does not modify our report dated February 23, 19X2, on such financial statements.<sup>37</sup>

## Summary

This chapter has presented a history of the relationship of the auditor's study and evaluation of internal accounting controls to audit program design. Since the earliest professional literature, the auditor has been expected to consider the effectiveness of the system of internal check or internal control in selecting the nature, extent, and timing of audit procedures. The literature has consistently recognized the need for professional judgment in making these selections. Auditors have developed various approaches to the selection process, which are discussed in chapter 4.

The recent pronouncements discussed in this chapter are important with respect to the field experiment described in chapters 5 and 6. The auditors taking part in the experiment were making their judgments based on the environment of authoritative literature consisting of Statement on Auditing Standards 1, section 320 (Statement on Auditing Procedure 54), and Statements on Auditing Standards 3, 9, and 20. Chapter 3 discusses how the audit process has developed to meet these and other professional standards.

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37. AICPA, *Statement on Auditing Standards 20, Required Communication of Material Weaknesses in Internal Accounting Control* (New York: AICPA, 1977), ¶18.

# 3

## The Relationship of Internal Accounting Controls to the Audit Program

As indicated in chapter 2, internal accounting controls play an important role in the audit process. This chapter briefly considers the kinds of audit evidence that the auditor may consider and presents a more detailed description of a typical audit planning procedure. This description emphasizes the role of internal accounting control evaluation in the design of an audit program.

The objective of an audit is to render an opinion on (1) the fairness of presentation, in conformity with generally accepted accounting principles, of results of operations for a given period of time and (2) the fairness of presentation of the financial position at the end of that given time period. To develop such an opinion, the auditor must gather and evaluate many different types of information, both financial and nonfinancial. It is this gathering and evaluation activity that is known as the audit process.

### **Management Assertions**

Although preferability may have shifted over the years from one type of information, or audit evidence, to another, the basic audit process has undergone few major changes. It has emphasized gathering and eval-

uating evidence to judge five broad categories of management's assertions made in the financial statements. These five categories are

1. That assets or liabilities of the entity exist at a given date and that income and expense transactions have occurred.
2. That all transactions and accounts that should be reflected in the financial statements are reflected in the statements.
3. That assets are the rights of the entity and liabilities are the obligations of an entity at a given date.
4. That all assets, liabilities, revenue, and expense elements have been properly reflected in the financial statements at appropriate amounts.
5. That particular elements of the financial statements are properly classified, described, and disclosed.<sup>1</sup>

When designing an audit program to obtain evidence to test these assertions, three factors affect the auditor's judgment process (see figure 3.1). The first factor is the selection of procedures to obtain evidence from the various types of audit evidence available to the auditor. Governing this factor are two others—the need to satisfy generally accepted auditing standards and the auditor's personal criteria for accepting responsibility for the expression of an opinion.

## **Types of Audit Evidence**

Audit evidence can be classified according to several characteristics, one of which is reliability. For example, audit evidence resulting from physical examination procedures is highly reliable to determine existence—but not ownership. In fact, physical examination of inventories is virtually required by generally accepted auditing standards. Relatively less reliable audit evidence results from a second category of audit procedures: confirmation with independent, outside entities. Although this evidence may not be as reliable as physical examination, confirmations are important enough to be virtually required by generally accepted auditing standards for receivables.

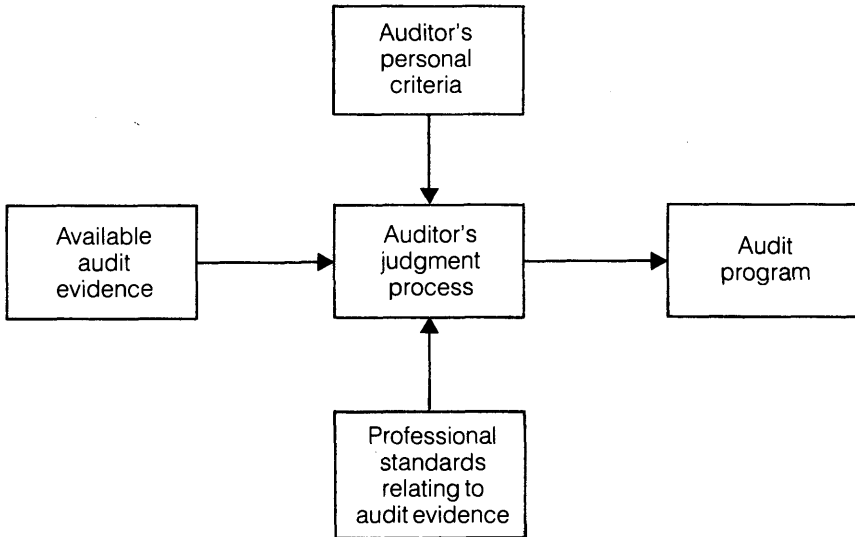
Evidence gathered by examining records maintained within the reporting entity is relatively less reliable. The results of this type of procedure are usually projected in financial terms to an entire population and then compared to the financial statement amounts in question.

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1. AICPA, Statement on Auditing Standards 31, *Evidential Matter* (New York: AICPA, 1980), ¶¶3–8.

Figure 3.1

Factors Influencing the Designing  
of an Audit Program



Physical examination, confirmation procedures, and examination of records are referred to as substantive tests.

The other category of procedures consists of compliance tests, which are tests of compliance with the system of internal accounting control procedures. Compliance tests are performed after the auditor has gained an understanding of the internal accounting control system, and they are intended to estimate the inherent deviation rate within an accounting system. Under generally accepted auditing standards the auditors may not place complete reliance on internal accounting controls to the exclusion of other auditing procedures with respect to material amounts in the financial statements. This does not mean that compliance procedures are not important or should be avoided if possible. Since compliance tests are often less costly than substantive tests, they can reduce the cost of an audit.

The ability to substitute one type of audit evidence for another, however, can also create significant problems for the auditor. In determining a proper mix of procedures that would produce audit evidence of appropriate reliability, the auditor must make several subjective judgments. The auditor must determine, first, the potential reliance that may be placed on the system of internal accounting controls; next, the



acceptable reduction of related substantive audit procedures; and finally, whether reliance would be cost beneficial.

## **Performing the Audit**

To encourage a consistent approach to this judgment process, most auditors have developed some type of sequential decision system in which each judgment builds on the results of previously performed procedures. An example of such an approach, as it relates to the degree of reliance judgment in a particular audit area, follows.

### *1. Consider the internal control environment.*

In developing an audit program, the auditor first obtains information on the environment in which internal accounting controls operate. The auditor considers if compliance with internal accounting controls is encouraged by management and if the circumstances appear to be conducive to the production of accurate and reliable accounting information.

One possibility of which the auditor must be aware is the deliberate circumvention of controls by management personnel, commonly termed "management override." Although it is usually impossible to determine with certainty those cases in which management has overridden the internal accounting controls, generally it should be possible to evaluate this risk. The evaluation may consider such factors as the type of organization being audited, the susceptibility of the area being examined to misstatement, the requirement for management judgment in determining the amounts in the records, and prior experience in auditing the entity's financial statements. Such an evaluation is not intended to assess the probability that management is overriding the internal accounting controls, but merely to assess whether the area being examined presents any significant potential for override.<sup>2</sup>

If the evaluation indicates a significant potential for management override, reliance on the internal accounting controls generally would not be appropriate. In those instances, substantive procedures should not be restricted.

### *2. Select audit procedures assuming no reliance on internal accounting controls.*

The auditor should select substantive audit procedures from which reasonable assurance would be gained to meet specified audit objec-

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2. Robert K. Elliott and John R. Rogers, "Relating Statistical Sampling to Audit Objectives," *Journal of Accountancy* 134 (July 1972): 49.

tives. The nature, extent, and timing of such procedures should be based on *no* reliance on internal accounting controls. An integral part of selecting substantive audit procedures is to consider the types of errors and irregularities that could occur. Once that has been done, the auditor can then select those substantive audit procedures that would be effective in identifying and evaluating the impact of each type of error or irregularity. A substantive audit procedure may be effective in identifying some types of errors or irregularities but ineffective in identifying other types. For example, a particular substantive procedure may be successful in identifying mathematical mistakes but be useless in identifying cutoff errors. Also, some procedures may be effective for overstatement errors but not for understatements.

### *3. Identify relevant internal accounting controls.*

Internal accounting controls relevant to the reliance decision may be defined as those that are intended to prevent or detect the same types of errors or irregularities that related substantive audit procedures would be designed to detect. If such relevant accounting controls exist and are functioning as designed, the auditor can consider relying on those controls for purposes of changing the nature, extent, or timing of the substantive audit procedures. If no relevant accounting controls exist, the auditor should perform the audit procedures selected in step 2 or equivalent substantive procedures. Approaches to the identification of relevant internal accounting controls are discussed in chapter 4.

### *4. Select procedures that test the functioning of relevant internal accounting controls.*

To determine if reliance on an internal accounting control is justified, the auditor must gain assurance that the control is functioning effectively and consistently. This is accomplished through the use of compliance tests. Such tests generate evidence of the likelihood that the control will fail to detect a specific error type. The design of the compliance tests should reflect the criteria by which an internal accounting control is to be judged. These criteria will reflect the auditor's judgment in regard to the expected degree of reliance that may be placed on the control. A simplified example showing one possible set of criteria is shown in figure 3.2.

In choosing to test an internal accounting control for possible reliance, the auditor should keep in mind that there is always a possibility that the criteria established for expected degree of reliance will not be met. That is, the auditor may expect that compliance test results will indicate that "substantial" reliance is justified; however, when compliance tests are completed, only "some" or "none" may appear justified.

Figure 3.2  
Possible Relationship Between Control Reliability and  
Extent of Reliance on Internal Accounting Control

Evaluation of Accounting Control Reliability	Situation	Expected Degree of Reliance
Good	Little likelihood of errors occurring or not being detected by control	Substantial
Fair	Some likelihood of errors or ineffec- tive control	Some
Poor	Strong likelihood of errors or ineffec- tive control	None

In those instances, the auditor would be unable to reduce related substantive procedures to the extent anticipated. In choosing to test compliance, then, the auditor should expect a fairly high probability of success in achieving the established criteria.

A compliance test can take many forms. In fact, many audit procedures may be used as either a compliance test, as a substantive test, or both, depending on how the results of the test are interpreted. Indeed, the distinction between compliance tests and substantive tests is not definitive. In general, however, a compliance test is performed to evaluate the effectiveness of an accounting control in preventing or detecting errors; a substantive test, on the other hand, is performed to gain evidence about the accuracy of the financial information contained in the financial statements.

Compliance tests may consist of procedures as simple as observation and inquiry of client personnel. More complex procedures include performance of selected operations or independent calculations by the auditor. Techniques using statistical or computer-assisted analysis are also common.

*5. Select audit procedures to be performed if the expected degree of reliance on internal accounting control is justified.*

Auditing standards are broad requirements that allow the auditor the choice of several alternative methods of accumulating audit evidence. However, no alternative may be chosen if it fails to meet the sufficiency and competence criteria in the third standard of field work. Accordingly, even though one possible alternative was established in step 2, other alternatives that would provide equally sufficient and competent evidence may be selected. Typically, these other alternatives are based on reduced substantive procedures combined with successful compliance tests of internal accounting controls.

#### 6. *Perform cost analysis.*

Professional standards recognize that an auditor typically has economic limits that must be met. Accordingly, if alternative sources of audit evidence, each equally sufficient and competent, are available, the auditor may select the source or sources that are most economical.

To accomplish this, the auditor must estimate the comparative costs of performing steps 7 and 8 (compliance tests combined with restricted audit procedures) and of performing step 9 (audit procedures reflecting no reliance on internal accounting controls).<sup>3</sup>

#### 7. *Perform and evaluate tests of compliance.*

After the compliance tests have been completed, the results must be analyzed to determine the possible effects on related substantive audit procedures. If results indicate internal accounting control reliability is as expected, reduced substantive audit procedures may be appropriate. If results are not as expected, however, the auditor again must evaluate the reliability of the accounting system and make appropriate adjustments to the substantive audit procedures. As before, such adjustments would be based primarily on professional judgment.

#### 8. *Perform and evaluate restricted substantive audit procedures.*

In evaluating the results of restricted substantive audit procedures, any errors or exceptions that are noted should be evaluated by two standards:

- a. What is the potential impact of any monetary error when projected to the financial statements as a whole?
- b. What internal accounting controls must have failed to allow the error to occur and/or go undetected? How does this information affect the auditor's previous evaluation of internal accounting controls?

Errors found by substantive procedures may provide evidence that the compliance tests did not project an accurate estimate of internal accounting control reliability. Having found such conditions, the auditor should immediately consider the effect on the overall audit plan, and he should expand the scope of audit work in order to evaluate the nature and extent of the problem and its effect on the financial statements.

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3. The issue of cost analysis is discussed in greater detail in Jerry L. Turner and Theodore J. Mock, "Economic Considerations in Designing Audit Programs," *Journal of Accountancy* 149 (March 1980): 65-74.

### *9. Perform and evaluate substantive audit procedures.*

If, at any point during the audit, it is determined that reliance on internal accounting controls is not appropriate or not cost beneficial, substantive audit procedures reflecting no reliance on controls should be performed. The objective of such tests is to develop evidence in regard to the fairness of presentation of the financial statements, and such tests are not intended to result in conclusions about the reliability of the internal accounting controls.

## **Summary**

This chapter has shown that different types of audit evidence may be used by the auditor to test five basic assertions made by management concerning the financial statements. In audit planning three factors are important: (1) the auditor's personal criteria, (2) professional standards, and (3) available audit evidence. These three factors allow the auditor to select various alternative combinations of procedures. The selection and implementation of those procedures were summarized in a nine-step illustration. Of critical importance to the monograph are the steps dealing with internal accounting control evaluation. Approaches to this evaluation are discussed in chapter 4.

# 4

## Approaches to the Evaluation of Internal Accounting Controls

Because of the lack of formal guidelines for evaluating internal accounting controls, many alternative approaches have been developed over the years. This chapter examines some of these approaches.

### **Identifying and Documenting Relevant Internal Accounting Controls**

The first problem encountered by the auditor is that of identifying and documenting the relevant internal accounting controls (defined in chapter 3). Traditionally, auditors have identified relevant internal accounting controls by observation and inquiry. Of primary concern are the safeguarding of assets and the clerical accuracy of the accounting records. The results of the observation and inquiry activities are usually documented in narratives in the workpapers. Although fairly easy to complete, such narrative documentation provides minimal aid for the auditor in identifying internal accounting controls. Accordingly, new methods have been developed to provide the auditor with some guidance.

As companies grow more complex, the corresponding review of

internal controls becomes more cumbersome. To handle large and cumbersome reviews, extensive standardized internal control questionnaires have been developed. An example of a typical internal control questionnaire page is shown in figure 4.1. For a given account, the questionnaire generally lists all internal controls that might be relevant either to management or to an auditor. The lists are almost always in question form, with a "yes" answer indicating existence of that particular internal control and a "no" answer indicating lack of the control. The widespread acceptance of this form of evaluation is indicated in *Montgomery's Auditing*:

The authors believe that a practical and useful device for investigating and recording the auditor's inquiries into the system of internal control is the standard questionnaire, prepared in advance for the use of staff members. Such a questionnaire, prepared by persons fully conversant with the problems of internal control, makes available to the staff auditor a large fund of accumulated experience, and furnishes a standard of comparison to measure the performance of the particular system under review.<sup>1</sup>

Although still used by many auditors, questionnaires tend to become more and more comprehensive and therefore more tedious to complete. The corresponding costs related to this type of evaluation tend to escalate as more and more questions are added, with few being deleted. Also, a major weakness of internal control questionnaires is the difficulty of relating the findings to the design of the audit program. When the auditor is faced with possibly several thousand questions, the effort required to identify the relevant controls becomes massive. Attempts have been made to assign subjective values to each question, indicating relative importance,<sup>2</sup> but this approach has had little success.

In an attempt to alleviate this problem, many auditors have turned to the use of flowcharts of the accounting system under review. A flowchart is a symbolic, diagrammatic representation of the accounting documents and their sequential flow in the organization. A flowchart may show the origin of each document and record in the system, the subsequent processing, and the final disposition of any document or record. In addition, it is possible for a flowchart to show the separation of duties, authorization, approvals, and internal verifications that take place within the system.<sup>3</sup> Although the flowcharts can become quite cumbersome

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1. R.H. Montgomery, N.J. Lenhart, and A.R. Jennings, *Montgomery's Auditing*, 7th ed. (New York: Ronald Press Co., 1949), p. 56.

2. R. Gene Brown, "Objective Internal Control Evaluation," *Journal of Accountancy* 114 (November 1962): 50-56.

3. Alvin A. Arens and James K. Loebbecke, *Auditing: An Integrated Approach* (Englewood Cliffs, N.J.: Prentice-Hall, 1976), p. 170.

Figure 4.1

Commercial Questionnaire on Internal Control  
Accounts Receivable

Accountant	
Date	

Company \_\_\_\_\_ Period ended \_\_\_\_\_

Branch, division, or subsidiary \_\_\_\_\_

Question	Answer		
	Yes	No	Remarks
<b>Accounts Receivable</b>			
1. Are accounts receivable ledgers balanced with general ledger controls monthly?			
2. Are monthly statements sent to all debtors?			
3. If there is more than one bookkeeper, are the bookkeepers assigned to different ledgers periodically?			
4. At least periodically on a surprise basis, do persons who are independent of the accounts receivable bookkeepers and billing clerks and who have no access to cash receipts			
a. Compare monthly statements with trial balances, balance the statements with the general ledger control, mail the statements, and investigate all differences reported?			
b. Compare trial balances and agings to ledgers?			
5. Are accounts confirmed periodically on a surprise basis by internal auditors or other independent officials?			
6. Are all claims for freight damage, shortages, unsatisfactory merchandise, etc., set up on the books or otherwise controlled as soon as the claims are prepared for filing?			
7. Are shipments on consignment, on approval, etc., handled separately from sales and excluded from the accounts receivable ledgers?			



and expensive to prepare, they have the advantage of allowing a more effective tie between the study of the internal accounting control system and the audit program. The flowcharts used in the field study appear in Appendix A.

A currently evolving concept involves the use of the computer to aid in identifying and evaluating internal accounting controls. The computer can be used to store abstract representations of an internal control system. These representations can be used to identify the existence, or the lack, of relevant internal accounting controls. Because of the computer's capabilities, highly complex analyses can be performed that could not be done without computer assistance. An example of the use of computers to document a control system is TICOM, developed by Cash, Bailey, and Whinston.<sup>4</sup>

## **Aids to Analysis**

An important step in the evaluation of internal accounting controls is the preparation of some form of organizing workpaper. Such a workpaper relates the relevant internal accounting control strengths and weaknesses to the audit procedures to be applied to the area being examined. One type of organizing workpaper is the "bridging" workpaper, such as the one used in the field study in Appendix A. This bridging workpaper documents the audit objective, the internal control strengths and weaknesses, the audit implications of those strengths and weaknesses, and the audit procedures selected to achieve the audit objective.

A different form of organizing workpaper is shown in figure 4.2. This workpaper is designed around transaction error types. In addition, some information about reliance to be placed on internal accounting controls is included, as well as the potential effect that each error type might have on the financial statements.

Many other types of organizing workpapers have been devised, emphasizing different aspects of the relationship between internal accounting controls and audit procedures. Regardless of form, however, all have the same basic purpose: to aid the auditor in making decisions about the extent of reliance to place on the system of controls.

## **Methods of Evaluating Internal Accounting Controls**

As already noted, the auditor may choose from several alternative sets

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4. James I. Cash, Jr., Andrew D. Bailey, Jr., and Andrew B. Whinston, "The TICOM Model—A Network Data Base Approach to Review and Evaluation of Internal Control Systems," *Proceedings of the American Federation of Information Processing Societies Conference* (Montvale, N.J.: AFIPS, 1977).

of audit procedures, each of which would satisfy both the auditor's personal criteria and generally accepted auditing standards. Typically, among the various alternative sets of procedures, one set of substantive procedures reflects no reliance on internal accounting controls, and the other sets are based on various reductions in substantive procedures combined with successful tests of compliance of internal accounting controls. A primary problem for the auditor is to determine that each alternative set of procedures considered produces equally sufficient and competent audit evidence.

The problem of determining equal sufficiency and competence can be approached with or without a formal model. The approach without a formal model requires that the auditor design and adjust the nature, extent, and timing of combinations of audit procedures until an indifference point, based on the auditor's judgment, is reached about which combination of procedures should be performed. In doing this, the auditor actually is using professional judgment to adjust the audit risk inherent in each combination of procedures to a perceived level of equal sufficiency and competence. Such a judgmental approach has been the traditional method used to design audit programs and is still the most common practice.

In recent years, however, applications of modeling techniques to auditing have allowed the level of audit risk to be approached mathematically. This permits a direct mathematical comparison of alternative combinations of audit procedures. One mathematical approach to this concept is a probability statement to express the risk that after audit a material error still exists in the area of audit interest:

$$R = p(e) \times p(1 - c) \times p(1 - s), \text{ where}$$

$R$  = the audit risk.

$p(e)$  = the probability of occurrence of material error in the area of examination in the absence of any internal control.

$p(1 - c)$  = the probability of the failure of the system of internal control to prevent or detect material error.

$p(1 - s)$  = the probability of the failure of the audit procedures to detect material error.

By use of the foregoing probability statement, the auditor can establish an acceptable level of risk and then determine the various combinations of probabilities that may achieve that level of risk. One of the primary problems in this approach is the difficulty involved in quantifying the various components of the probability statement. A common method is to use statistical techniques to estimate certain



1. *Legend of Identified Controls*

- A1 Sales orders prenumbered and controlled
- A2 Sales orders independently authorized or approved
- A3 Quantities ordered, shipped, recorded are independently checked
- B1 Sales order (See A1 and A2) is shipping order
- B2 Price list maintained (computerized)
- B3 Daily sales independently received
- B4 Sales detail independently reconciled to accounts receivable
- C1 Prelisting of cash receipts
- C2 Remittance advice used and compared to checks received
- C3 Deposit slip independently checked to cash receipts journal
- C4 Receipts deposited intact daily
- C5 Bank account reconciled monthly by independent person
- D1 Detailed accounts receivable reconciled to control monthly
- D2 Monthly statements sent to customer
- D3 Credit memos require approval
- D4 Returned goods require receiver
- D5 Advances to employees require authorization
- E1 New customers require separate approval
- E2 Sales orders matched against delinquent list and credit limits before processing
- E3 Credit limits periodically reviewed
- E4 Monthly aged trial balance prepared and delinquent accounts reviewed
- E5 Bad debt write-offs require approval

2. 0 Overstatement error

- u Understatement error
- o/u Over or understatement error

3. *Legend of Tests and Procedures*

- T1 Observation and/or inquiry
- For customer orders:
- T2 Ascertain approval or authorization
  - T3 Ascertain initialing of customer order signifying agreeing quantities on orders, bills of lading, and daily sales report; check whether quantities agree
  - T4 Ascertain initialing of customer order signifying that price was compared to price list; check whether prices agree
  - T5 Trace to monthly statement, A/R trial balance and subsequent credit (if any)
  - T6 Scan file for gaps in numbers
  - T7 Review on-order file for evidence of orders shipped but not billed

For those paid:

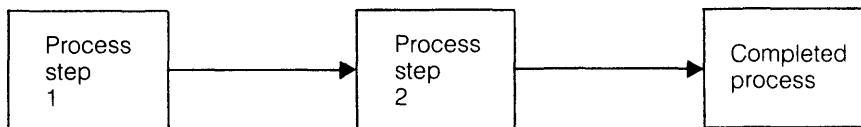
- T8 Trace deposit slip to bank statement
  - T9 Trace to listing of remittances and ascertain whether cash receipts clerk agreed check amount to remittance advice
  - T10 Determine credit to proper customer
  - T11 Examine noncash credits for proper approval
- For credit memos:
- T12 Ascertain proper support and authorization
  - T13 Verify prices and extensions
- For suspense report items:
- T14 Trace to cash accept/reject report
  - T15 Examine support
  - T16 Trace to application on A/R trial balance
- For bills of lading:
- T17 Trace to sales order in accounting
  - T18 Agree quantities to sales order
  - T19 Trace sales order to daily report; note delay from shipping date
- Test footings and postings:
- T20 Daily sales report
  - T21 Cash accept/reject report
  - T22 Weekly suspense report
  - T23 Large, unusual journal entries
  - T24 Monthly statement run
  - T25 Aged trial balance
- For accounts receivable:
- P1 Request confirmation of the recorded amounts
  - P2 Analyze and test the account from the date of confirmation to the closing date
  - P3 Review classification and disclosure
  - P4 Test aging
  - P5 Test subsequent collections
  - P6 Test period cutoffs of sales and inventory
  - P7 Analyze and evaluate allowance for doubtful accounts
  - P8 Reconcile accounts receivable detail file to general ledger balances
  - P9 Reconcile total credit to sales to debit to accounts receivable
  - P10 Reconcile sales order volume to capabilities, capacities, etc.

Source: Donald M. Roberts, *Statistical Auditing* (New York: AICPA, 1978), pp. 166-67.

probabilities and to control certain others. Donald M. Roberts provides a more detailed discussion of these techniques.<sup>5</sup>

Another approach to quantifying the probability that the internal control system will fail to prevent or detect material error ( $p(1 - c)$  in the preceding equation) uses concepts from reliability engineering. This approach views an internal accounting control system as analogous to a system composed of various electronic or mechanical parts. It assumes that the system is composed of a number of related procedures, that each procedure or set of procedures operates predictably, and that its operation can be described in probabilistic terms. Given the design of the system and the probability of failure of each component within the system, the overall system reliability can be calculated.<sup>6</sup> For this purpose, reliability is defined as the probability that a process will be completed with no errors.<sup>7</sup>

This approach can be illustrated by a series of diagrams showing the relationship between tasks or processes and their related controls. The first diagram represents two steps in a sequential process, where the output from step 1 is used as the input to step 2.



Reliability theory states that in a sequential process the overall reliability of the system is obtained by multiplying the individual component reliability estimates. For instance, if the reliabilities are 80 percent for process step 1 and 90 percent for process step 2, then the reliability of the completed process is 72 percent.

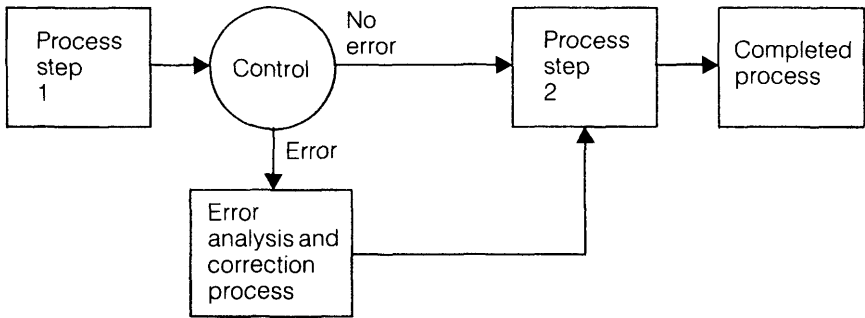
If the reliability of the output from a process step needs to be improved, some type of control can be added to evaluate such output. However, the addition of a control creates a greater complexity in the calculation of reliability. A typical control would consist of two components—the first, a signal to indicate whether the output was acceptable or unacceptable, and the second, some method of correcting unacceptable output. This is illustrated in the following diagram.

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5. Donald M. Roberts, *Statistical Auditing* (New York: AICPA, 1978).

6. Michael J. Barrett, Donald W. Baker, and Donald E. Ricketts, "Internal Control Systems: How to Calculate Incremental Effectiveness and Cost Using Reliability Concepts," *Internal Auditor* 34 (October 1977): 31-43.

7. Barry E. Cushing, "A Mathematical Approach to the Analysis and Design of Internal Control Systems," *Accounting Review* 49 (January 1974): 26.



The complexity of the reliability calculation is increased because there are now three components potentially affecting the output of process step 1. For the input to process step 2 to have no errors, two of the three components must operate correctly. To model this situation, Barry E. Cushing identified the following parameters.

1.  $p$  = the probability that process step 1 is correctly executed prior to administering the control procedure.
2.  $P(e)$  = the probability that the control step will detect and signal an error, given that one exists.
3.  $P(s)$  = the probability that the control step will not signal an error, given that none exists.
4.  $P(c)$  = the probability that the correction step will correct an error, given that one exists and has been signalled.
5.  $P(d)$  = the probability that a failure of the control step will be detected and no correction made, given that the control signals an error when none exists.<sup>8</sup>

The relationships of these parameters are shown in figure 4.3. An examination of these relationships reveals that reliability would be the sum of the probabilities of the "successful," or correct, responses. This can be expressed as follows:<sup>9</sup>

$$R = pP(s) + p(1 - P(s))P(d) + (1 - p)P(e)P(c).$$

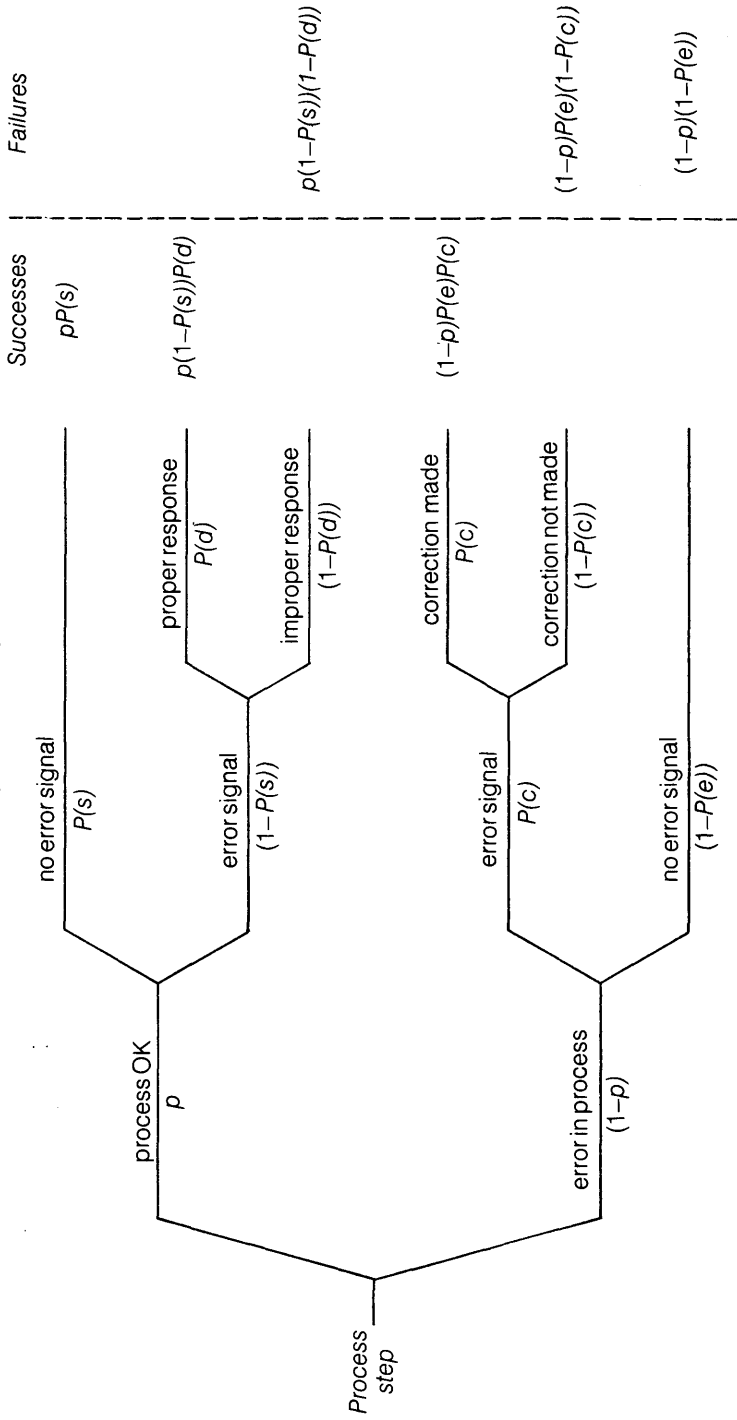
Likewise, the probability of an error in the output of process step 1 would be the sum of the "failures" shown in figure 4.3:<sup>10</sup>

$$1 - R = (1 - p)(1 - P(e)) + (1 - p)P(e)(1 - P(c)) + p(1 - P(s))(1 - P(d)).$$

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8. *Ibid.*  
 9. *Ibid.*  
 10. *Ibid.*, p. 27.

Figure 4.3  
Relationship of Reliability Parameters



Source: Cushing, "Mathematical Approach," p. 28.

These concepts can be expanded to encompass multiple error—multiple control situations and other variations in circumstances. In addition, concepts relating to feedforward mechanisms, human reliability, and cost analysis of control systems have been researched or suggested as research areas that may have some applications to reliability modeling.<sup>11</sup>

A different approach to internal control evaluation is the use of behavioral or sociometric techniques for analysis. This concept was first suggested by John J. Willingham in 1966 and was later researched by Douglas R. Carmichael and Robert J. Swieringa.<sup>12</sup> Sociometric techniques appear to be potentially useful, since the various definitions of internal accounting control have usually included “the plan of organization” as one of the elements. Expanding on this, Carmichael proposed that “the principal function of an internal control system is to influence (or control) human behavior.”<sup>13</sup> Based on this idea, the study of the various relationships of the people involved within an organization may prove to be more relevant than the study of the tasks they perform. Several approaches in applying sociometric methods have been suggested.<sup>14</sup>

Reliability and sociometric methods have not been widely accepted in the auditing profession. Future research may find that combinations of the various proposed methods; or some new methods, will be more successful in analyzing and evaluating internal accounting controls. Until that time, however, the auditor’s evaluation of internal accounting controls will continue to be made on the basis of professional judgment.

## **Relating Compliance Tests to Substantive Tests**

Regardless of the method used to estimate the reliability of an internal accounting control system, the auditor must still evaluate the effect of such estimates on the need for substantive audit procedures. Because

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11. See George Bodnar, “Reliability Modeling of Internal Control Systems,” *Accounting Review* 50 (October 1975): 747–57, and Akira Ishikawa, “A Mathematical Approach to the Analysis and Design of Internal Control Systems: A Brief Comment,” *Accounting Review* 50 (January 1975): 148–50.

12. John J. Willingham, “Internal Control Evaluation—A Behavioral Approach,” *Internal Auditor* 23 (Summer 1966): 20–26; Douglas R. Carmichael, “Behavioral Hypotheses of Internal Control,” *Accounting Review* 45 (April 1970): 235–45; and Robert J. Swieringa, “A Behavioral Approach to Internal Control Evaluation,” *Internal Auditor* 29 (March/April 1972): 30–45.

13. Carmichael, “Behavioral Hypotheses,” p. 235.

14. Robert J. Swieringa and Douglas R. Carmichael, “A Positional Analysis of Internal Control,” *Journal of Accountancy* 131 (February 1971): 34–43, and Robert J. Swieringa, “An Inquiry into the Nature and Feasibility of a Sociometric Analysis of Internal Control” (Ph.D. diss., University of Illinois, 1969).



no accepted standards have been established, appropriate substantive audit procedures are selected on the basis of an auditor's professional judgment. Such judgment requires the auditor to make trade-offs between reliance on the accounting controls and reliance on substantive procedures. An example of three different control evaluations involving such trade-offs, each resulting in evidence subjectively judged to be equally sufficient and competent, is shown in figure 4.4.

Figure 4.4  
Three Different Control Evaluations With  
Corresponding Sets of Audit Procedures Resulting in  
Equally Sufficient and Competent Evidence

<u>Control Evaluation</u>	Good	Fair	Poor
Reliance	Substantial	Some	None
<u>Compliance Tests</u>			
Extent	Tight Precision	Loose Precision	None
Timing	Interim—Well before year-end	Interim—Near year-end	N/A
<u>Substantive Tests</u>			
Extent	Maximum Restriction	Some Restriction	No Restriction
Timing	Interim with interim to year-end review and testing required	Interim with interim to year-end review and testing required	Year-end

It should be noted that even though circumstances indicate that "substantial" or "some" reliance may be appropriate, the auditor is not required to place such reliance. Accordingly, other combinations of procedures with equal or lesser planned reliance may be evaluated as alternatives, as long as each combination results in evidence judged to be equally sufficient and competent.

**Summary**

This chapter has summarized some of the basic approaches to the identification, documentation, and evaluation of internal accounting controls. Because of various complexities and difficulties in applying some of these approaches, few have achieved wide acceptance, particularly with respect to evaluation of accounting controls. Current practice relies heavily on professional judgment in evaluating internal accounting controls and their effect on substantive audit procedures.

# 5

## The Internal Accounting Control Experiments: Introduction and Task Description

Chapters 5 through 10 of this monograph discuss the underlying research questions, methodology, and results of a series of five interrelated experiments on internal accounting control evaluation. Chapter 5 introduces the research questions addressed and presents a detailed discussion of the basic experimental task. Chapter 6 considers existing professional and theoretical guidelines about how an auditor should address the audit planning task in an environment of improving internal accounting controls. General hypotheses are derived, and potentially important behavioral factors are identified. In chapter 7 the research methods and design used in the internal accounting control experiments are detailed. The discussion of experimental results is contained in two chapters. Chapter 8 discusses the effects of a number of factors—internal accounting controls, audit planning aids and approaches, and demographics—on the auditor's recommended sample sizes. Chapter 9 contains a discussion of the effects of the various experimental treatments on the content of auditors' rationale memos. Also, a summary of a study used to investigate the auditor's decision process is presented. The final chapter summarizes the research and presents implications for the accounting profession.

## General Research Questions

Previous chapters have described the complexity and the judgmental nature of the auditor's study and evaluation of internal accounting controls.

In the early stages of the research, attempts were made (1) to develop a means of modeling or depicting an auditor's judgment process and (2) to identify the judgments that an auditor usually would make while evaluating internal accounting controls. The first objective led to an "input-process-output" model, which is depicted in a simplified form in figure 5.1. The second objective resulted in an inventory (see figure 5.2) of judgments that may be required as the auditor plans and implements the portions of an audit program relating to internal accounting control evaluation. The model (figure 5.1) assists in the identification of the cues, information, and criteria that form the basis of an auditor's judgment. The requisite input can be quite extensive, even for the audit of a small entity. This will be evident when the case materials underlying the experiments are presented.

Figure 5.1

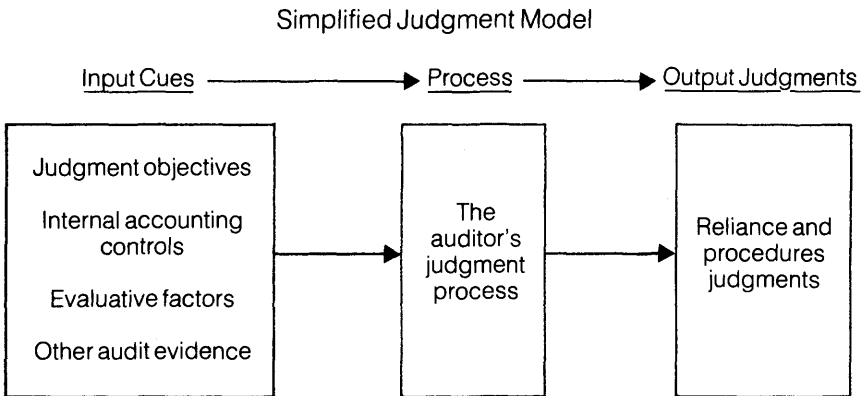


Figure 5.2, an inventory of reliance and procedure judgments relevant to internal accounting control evaluation, illustrates the complexity of the auditor's task. The figure includes eleven judgments, whereas the experimental study examines only the fourth procedure judgment: "How should reliance judgments affect the extent of substantive testing?" This judgment is of particular interest because it influences both audit efficiency and overall audit risk. Audit efficiency may be enhanced if overall audit resources are reduced by an appropriate mix of internal accounting control evaluation and substantive evidence. Overall audit

risk is affected by the reliability of the information produced by the accounting system and the reliability of the substantive audit procedures. Although the fourth procedure judgment is the general research question on which the experimental phase is founded, the experiments actually facilitate research into many, more specific, issues.

Figure 5.2  
Inventory of Reliance and Procedure Judgments  
Relevant to the Study and Evaluation  
of Internal Accounting Controls

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Reliance Judgments

1. Is the environment in which controls operate conducive to effectively functioning internal accounting control?
2. If the environment is conducive to effectively functioning internal accounting controls, does the auditor choose to place reliance on such controls?
3. Do specific related internal accounting controls considered together provide reasonable assurance against the undetected occurrence of material errors or irregularities?
4. Do specific internal accounting controls that were compliance-tested provide reasonable assurance against the undetected occurrence of material errors or irregularities?
5. For areas where compliance test results were not satisfactory, are there other internal accounting controls on which reliance may be placed?
6. For reliance areas where the auditor has performed compliance tests up to an interim date, should compliance tests be extended to the remainder of the period being tested?

Procedure Judgments

1. What method of documentation of internal accounting controls would be appropriate?
  2. What compliance tests would be most effective?
  3. Can internal accounting controls identified in reliance judgment 5, above, be compliance-tested effectively? If so, what compliance tests would be appropriate?
  4. How should reliance judgments affect the extent of substantive testing?
  5. What types of tests would be appropriate for the period after interim?
- 

A second area of general research interest arose as various auditor input-process-output decision models were developed. Specifically, were the judgment inputs contained in the models (for example, figure 5.1) and in the literature the actual inputs that the auditors considered and upon which they relied? By asking the experimental subjects (auditors) to document their logic in "rationale memos," experimental evidence was obtained.

## Previous Research Concerned With the Effect of Internal Accounting Control Reliance on Audit Programs

General references are presented in this section to help set the scope and to describe the nature of the research problems. Literature that bears more directly on tested hypotheses is contained in subsequent chapters.

Previous research on the auditor's study and evaluation of internal accounting controls may be classified as being either normative or descriptive. Normative research is also of two types—authoritative or optimal. The authoritative literature, discussed in earlier chapters, is important partly because it specifies decision inputs (cues and factors) that auditors should consider and document.

The second class of normative research, which derives from decision theory, has recently been applied to auditing.<sup>1</sup> This research has the goal of specifying an optimal audit decision, such as sample size, or mix of audit procedures.

A significant amount of behavioral and, in particular, human information processing research has recently appeared in accounting and auditing literature.<sup>2</sup> This research is primarily descriptive and involves the modeling of an auditor's judgment process in terms of available input cues used and their implicit weightings.

Descriptive research has also been conducted by use of field studies. For example, W. Morris and H. Anderson conducted a field study concerning the effects of the study and evaluation of internal controls on auditor extent judgments, with the following results: "Based on the audits included in the study, there exists no pervasive relationship between the auditor's evaluation of internal control and the amount of evidence obtained on the engagement."<sup>3</sup>

The descriptive research detailed in this monograph is based on controlled experimentation. The primary objective was to obtain empirical evidence on the effect of changes in internal accounting controls and differences in audit approach on auditors' sample size decisions. The experiments were designed to address both the general research questions discussed in the previous section and questions derived from previous research.

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1. For a review of both normative and descriptive studies, see W. Thomas Lin, Theodore J. Mock, Lauren K. Newton, and Miklos A. Vasarhelyi, "A Review of Audit Research," *Accounting Journal* (forthcoming).

2. For a comprehensive review of human information processing research, see Robert Libby and Barry L. Lewis, "Human Information Processing Research in Accounting: The State of the Art," *Accounting, Organizations, and Society* vol. 2, no. 3 (1977): 245–68. For research within auditing, refer to Lin et al., "Audit Research."

3. William Morris and Hershel Anderson, "Audit Scope Adjustments for Internal Control," *CPA Journal* 46 (July 1976): 15–20.

## Overview of the Experimental Task and Available Input Cues

In the experiments, nearly 200 audit seniors and supervisors were presented a case containing information on improvements in internal accounting controls. They were asked to adjust, as they considered necessary, the planned sample size for four specific auditing procedures in an audit program. The experimental case study was based on a portion of a commercial entity's revenue cycle; it presented the subjects with nearly all the documentation normally available during an audit. A pilot study was conducted to verify the completeness of the data base. The documentation included consisted of the following:

1. The prior year's completed audit program and the current year's partially completed program.
2. A memo summarizing audit planning considerations (economic, organizational, management, general control environment, and other data).
3. Accounting system documentation (flowcharts).
4. "Bridging workpapers," which related audit objectives, system controls, compliance tests, and subsequent substantive procedures.
5. Results of interim compliance tests, which provided evidence of improvements in specific internal accounting controls.
6. Miscellaneous data, including interim financial information and results of the prior year's confirmation tests.

The subjects were informed that they were replacing an audit senior who had resigned during interim to take a position in industry and that they should perform the following tasks:

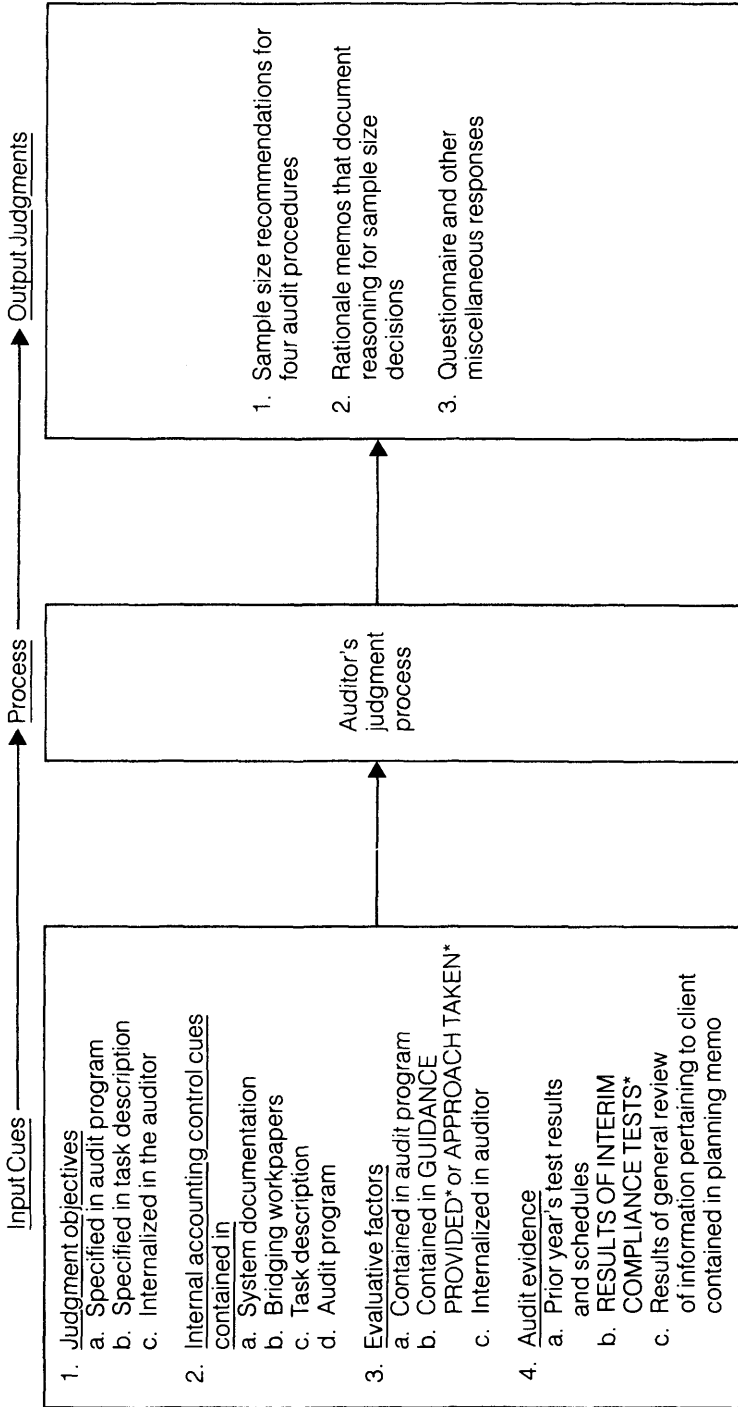
1. Evaluate the planned audit program for four procedures with respect to the extent of testing (see Appendix A for details):

Procedure E-5:	Packing slip—invoice comparison.
Procedure E-6b, c:	Invoice pricing tests.
Procedure E-9:	Posting test.
Procedure E-10:	Confirmation of accounts receivable.
2. Prepare a memo for each procedure that summarizes their rationale for the audit manager's review.

As outlined above, this test situation provided data about the degree to which the subjects changed the planned sample size in response to year-to-year improvements in internal accounting controls. The experimental treatments were controlled by providing half the subjects with

Figure 5.3

Judgment Model Depicting Experimental Task



\*Capitalized items indicate the variables that differed, depending on which of the 5 versions of the experiment the subject performed.

evidence of marked improvements in internal controls and the other half with fewer improvements.

For purposes of this discussion, the previous year's internal accounting controls are called "weak," those accounting controls that showed less improvement are called "fair," and the accounting controls that showed marked improvement are called "strong." These terms refer to the accounting controls as a group and do not always apply to each accounting control within the group. Details of specific accounting control changes are discussed in the next chapter.

The experimental task may be depicted as an input-process-output model, as is shown in figure 5.3. This figure organizes the available data, as was done previously in figure 5.1, and indicates the inputs and judgment requirements that differed among the five related experiments.

Examples of typical case materials actually used in the experiments are contained in Appendix A. The reader is encouraged to study these materials in detail to understand better the normative analysis of the case contained in the next chapter.

## **Summary**

Chapter 5 has explained several judgments that are important in the auditor's study and evaluation of internal accounting controls. The judgment relating changes in internal accounting controls to the extent of substantive audit procedures was selected for experimental study. Previous research was discussed, and an audit planning task that provided the basis for a series of five interrelated experiments was described.

The decisions required of the auditors who completed the planning task are complex. The next chapter contains a normative analysis of the task and develops research hypotheses.



# 6

## Normative Analysis of the Audit Planning Task; Development of General Research Hypotheses

The Olde Oak audit case contained in Appendix A presented the experimental subjects with a complex and realistic audit planning problem. This chapter discusses alternative normative approaches that have been suggested in academic and professional literature and that may be applied to audit tasks concerned with the study and evaluation of internal accounting controls. A detailed analysis of Olde Oak is presented, and hypotheses are derived about (1) how the improving internal accounting controls are expected to affect auditor decisions and (2) how several important behavioral variables may be expected to have an impact on these decisions. The final section of chapter 6 considers the subjects' second major experimental task: preparing a memo documenting their rationale. The norms for rationale memo content are discussed from the perspective of the audit review process.

### **Alternative Approaches to a Normative Analysis of Auditor's Extent Decisions**

Two general approaches to determining "appropriate" or "optimal" auditor sample size decisions pervade the appropriate literature. The

first focuses on formal decision models. The second is based on professional standards, such as Statement on Auditing Standards 1, section 320, and expert consensus.

### Formal Decision Model Approaches

Kinney attempted to integrate internal control evaluation and related judgments into a comprehensive decision model.<sup>1</sup> His approach is comprehensive in the sense that it jointly considers decisions concerning system design, internal controls, analytical review procedures, and detail tests. Two problems arise in applying this approach to Olde Oak: (1) it is difficult to measure certain needed variables, such as payoff and costs, and (2) the experimental task in Olde Oak is only a portion of Kinney's more comprehensive problem.

Another formal decision approach is based on statistical sampling concepts. This approach initially seemed promising with respect to two questions that were encountered in designing the experiments:

1. Could any type of standard be developed against which the experimental results could be evaluated?
2. What were the appropriate "anchors" to be provided in the planned audit program?

Further analysis indicated, however, that no logically comparable statistical standard could be developed. Although both statistical and judgmental samples are affected by numerous variables (including an estimate of audit materiality, the degree of reliance placed on internal accounting controls, the strength of other related tests, the dispersion of population values, and the frequency and magnitude of errors), nobody has devised a unique method of incorporating these variables into a sample. This will become clear when the results of the statistical version of the experiment are discussed. Briefly, in the statistical version, auditors recommended a wide variety of audit sample sizes even though each auditor was presented with an identical audit situation. As might be expected, this result was also observed in the version of the experiment requiring judgmental samples. There are no accepted standards regarding how to incorporate all the possible variables relevant to the sample size decision.

Two other formal decision model approaches were considered as possibilities for developing normative standards, and both were discarded. Reliability analysis, as discussed in chapter 4, presents a possible way to evaluate internal control networks, but the necessary reliability data were not available.

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1. William R. Kinney, Jr., "Decision Theory Aspects of Internal Control System Design/ Compliance and Substantive Tests," *Studies on Statistical Methodology in Auditing*, Supplement to vol. 13 of the *Journal of Accounting Research* (1975): 14–29.

Formal simulation, which was used by Burns and Loebbecke, presented a fourth possibility.<sup>2</sup> However, this would have required data, such as statistical distribution of sales invoices and accounts receivables, not normally available to subjects.

Each of these formal approaches provides opportunities for further research, but none provides the norms needed to hypothesize the experimental effects of the improving accounting controls in Olde Oak.

### **Professional Norms**

As demonstrated in chapters 2, 3, and 4, professional standards provide the auditor with broad guidelines and permit great flexibility in the use of conclusions about an entity's accounting controls when formulating the audit program. Yet these standards, which are based on expert consensus, provide a decision structure (as in figure 3.2) and an inventory of relevant input cues (as in figure 5.3), which are the basis of a feasible, normative analysis of the case. The decision structure in figure 3.2 includes (1) an evaluation of the general control environment, (2) identification of errors, irregularities, and relevant controls, and (3) selection of the nature, extent, and timing of compliance tests. Such a process has been detailed many times.<sup>3</sup> Accordingly, figure 3.2 forms the basis of the following normative analysis of the experimental case.

## **A Normative Analysis of the Sample Size Selection Task**

An analysis of a problem such as the experimental case should begin with a specification of the objective or objectives that underlie the audit task. In Olde Oak each subject was asked to evaluate only this year's *audit program* in regard to the nature, extent, and timing of procedures. Given this task, an auditor should consider objectives related to the obtaining of sufficient and competent audit evidence. These notions were discussed in detail in chapters 3 and 4.

The auditor would also need to consider the evidence and cues available at the time of the audit program evaluation. In the experimental case, the audit program evaluation took place during interim work after initial planning, general review, system documentation, and several compliance tests had been completed. Thus, available cues, summarized in figure 5.3, included all the data contained in the Olde Oak case, including a complete planning memo, prior year's audit program, the

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2. David C. Burns and James K. Loebbecke, "Internal Control Evaluation: How the Computer Can Help," *Journal of Accountancy* 140 (August 1975): 60–70.

3. See, for example, Donald M. Roberts, *Statistical Auditing* (New York: AICPA, 1978), or William C. Mair, Donald R. Wood, and Keagle W. Davis, *Computer Control and Audit*, rev. ed. (Altamonte Springs, Fla.: Institute of Internal Auditors, 1973).

current year's planned program, and system documentation. For purposes of deriving a normative analysis of the experiment, and thus hypotheses, only those items that were experimentally controlled (that differed among different subjects) warrant explicit discussion. The cues and variables that were the same for *all* subjects would not be expected to be significant determinants of different audit program recommendations.

### Relevant System Strengths and Compliance Test Results

In evaluating Olde Oak's system of internal accounting controls for possible reliance, an auditor would be expected to consider exposures and internal accounting controls that may reduce such exposures.<sup>4</sup> Accounting controls on which an auditor may potentially rely can be referred to as strengths. Lack of internal accounting controls or ineffective controls can be referred to as weaknesses. For purposes of the experimental task, *relevant* accounting controls, strengths, and weaknesses would refer to those that, in an auditor's judgment, would affect the error rates within the financial data being audited.

In Olde Oak, eight strengths and three weaknesses are identified in the system flowcharts, and their nature and audit implications are listed in the bridging workpapers. Of course, an auditor would be expected to critically evaluate such papers for errors. For instance, an undocumented strength labeled US-1 in figure 6.1 was incorporated within the experimental case.

Figure 6.1 contains a list of those system strengths and compliance test results that were experimentally manipulated in the case. Thus, those auditors randomly assigned the "fair" treatment were given interim compliance test results listed in column 3, and those randomly assigned the "strong" case received the compliance test results listed in column 4. All subjects received the same data concerning the prior year's compliance tests (column 2). Thus, the main research question involves measuring the effect of the "fair" versus the "strong" controls on auditors' revised audit programs for the following four audit procedures:

<u>Audit Program Step</u>	<u>Brief Description</u>
E-5	Sales Invoice/Packing Slip Comparison
E-6b, c	Sales Invoice Price and Extension Test
E-9	Accounts Receivable Posting Test
E-10	Confirmation of Accounts Receivable

Figure 6.2 contains an analysis of these procedures in terms of possible test objectives, controls that might affect sample size if the

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4. Exposures may be defined as the possible financial consequences of errors or irregularities.

Figure 6.1  
System Strengths, Changes in Compliance Test Results, and the  
Audit Manager's Initial Evaluation for the Two Experimental Treatments

(1) Documented System Strengths	(2) Last Year's Compliance Test Results	(3) This Year's Compliance Test Results	(4) Strong Treatment
S-1 Prenumbered sales invoices are a. Prepared for all sales. b. Issued sequentially. c. Numerically accounted for.	Issued without regard to sequence	No exceptions found	No exceptions found
S-6 The sales invoice customer suspense file is reviewed monthly for unmatched invoices.	Not following up	Not following up	Immediate follow-up
S-7 An independent clerk checks the pricing of invoice, extensions, and footings.	(Weakness noted in man- agement letter)	Test failed on 33rd item	No exceptions noted
S-8 The manager reviews monthly statements and attached invoices and spot checks some invoices to customer statements.	Limited review and follow- up	Limited review and follow- up	Detailed review and fol- low-up
Undocumented System Strengths			
US-1 The dispatcher maintains an independent numerical packing slip file. (The audit manager's initial evaluation of the control environment is contained in the task description.)	Numerous sequence er- rors and a missing slip "No reliance"	Moderate number of ex- ceptions "Some reliance"	No exceptions noted "Significant reliance"

auditor relies on them, relevant compliance test results, and several other factors. This normative analysis is the result of "expert consensus," since it benefits (1) from the experimenters' evaluation of the case, (2) from a review of several experienced audit managers and partners, and (3) from a critical review of the rationale memos of the first seventy-three subjects. On the other hand, the case is rich enough for many other credible analyses to be possible. The crucial column in figure 6.2 is the fourth one, which shows the accounting controls that are relevant to the four audit procedures.

## **Development of Hypotheses About the Effect of the Internal Accounting Control Treatments**

The second standard of field work implies that the extent of substantive audit procedures is inversely related to the reliance placed on a system of internal accounting controls. Such reliance is directly related to the strength of that system of controls. Thus, the initial hypothesis with respect to the effect of improving internal accounting controls would be a decrease in the recommended sample sizes (extent) of the four procedures for both experimental treatments (fair and strong), with a larger decrease for strong controls than for fair controls.

A refinement of the initial hypothesis may be made if one considers the relationship between specific controls and specific procedures. The primary evidence of improvements in internal accounting control was the year-to-year change in the compliance test results of *specific* accounting control strengths, as described in figure 6.1. Yet a subject may not decide to adjust sample size solely on the basis of an evaluation of the specific accounting control strength(s) related to an audit procedure. For example, evidence of improvements in specific, irrelevant accounting controls may lead to judgments about the general control environment, which may, in turn, influence sample size decisions. Such an influence may be called "halo effect."<sup>5</sup> To test whether subjects were influenced by halo effect, there was no year-to-year improvement in compliance test results for any specific accounting control relevant to the packing slip–invoice comparison (E-5). One may hypothesize that, for E-5, if subjects reduced sample sizes as a result of halo effects, subjects working with the strong accounting control treatment would make greater reductions in recommended sample sizes than those working with the fair accounting control situation.

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5. "Halo effect" is defined in psychology as "the tendency in making an estimate . . . of one characteristic . . . to be influenced by another characteristic" (Horace B. English and Ava Champney English, *A Comprehensive Dictionary of Psychological and Psychoanalytical Terms* (New York: Longmans, Green & Co., 1958), p. 236).

Figure 6.2  
Normative Analysis of the Researched Audit Procedures

Audit Procedure	Controls That Might Affect Sample Size*					Relevant Compliance Tests**	Influence of Other Evidence
	Objective of Test	Nature of Test	Sample Size*	Nature of Exposure	Cost/Benefit Alternatives		
Step E-5: packing slip comparison	Test assignment of initial economic value	Dual purpose	None	Overstatement or understatement	Could select from invoices if S-4 is in effect (combine with E-6a, b and E-10)	E-4	Errors noted in prior year
Step E-6b, c: pricing test (Interpretation A)	Test assignment of initial economic value	Dual purpose	S-7	Overstatement or understatement	Could combine with E-5 and E-9	E-6a	Some errors noted in prior year
(Interpretation B)	Test control over assignment of initial economic value	Compliance	None	Failure of control	None	E-6a	None
Step E-9: posting test	Test posting accuracy	Dual purpose	S-1, S-6, possibly S-8	Understatement	Could combine with E-5 and E-6b, c	E-3, E-7, E-8	Exceptions noted in prior years
Step E-10: confirmations	Test validity Test valuation	Substantive	S-1, S-6, S-7, possibly S-8	Overstatement	Could add negative confirmations or re-stratify sample	E-3, E-6a, b, c, E-7, E-8	Results of E-5, E-6a, b, c

\* See Figure 6.1.

\*\* See Appendix A for details.

The basic experimental situation was also used to develop some limited evidence about the influence of the previously planned sample sizes on the subject's determination of the appropriate sample size. The issue is raised by Loebbecke:

Generally, in auditing, the first examination for a new client is the most objective one. More time is spent on learning activities, more attention is given to the objectives of corroboratory activities, and there is a greater sense of awareness and skepticism. *In subsequent examinations, however, even the best auditor is biased by the preconceptions formed by preceding efforts and findings.*<sup>6</sup>

One of Mautz and Sharaf's tentative postulates of auditing also provides a basis for anchoring behavior. Postulate 6 states, "In the absence of clear evidence to the contrary, what has held true in the past for the enterprise under examination will hold true in the future."<sup>7</sup> To the degree that a subject's decision is influenced by a planned or previous sample, the individual may be said to *anchor* to it. Given that the case contained both the prior year's and the current year's audit programs, subjects may be hypothesized to anchor on those that may have an effect on sample size recommendations.

These, then, are the general research hypotheses concerned with the effect that differences in the internal accounting controls compliance test results have on auditors' sample size recommendations. Chapter 7 expands on these hypotheses to consider the effect that certain types of guidance and differing audit approaches have on such recommendations. First, however, a normative analysis of the subject's second major task should be considered.

## **Normative Analysis of the Rationale Documentation Task**

In addition to analyzing the four audit procedures, the subjects were requested to prepare rationale memos for the engagement manager that included their specific recommendations and documented their reasoning and analysis. Two of the purposes of this phase of the research were to gain insight into the factors that the subjects considered important in internal control evaluation and to consider the adequacy and comprehensiveness of such memos as they might relate to the review process.

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6. James K. Loebbecke, "Discussant's Response to A Decision Theory View of Auditing," *Contemporary Auditing Problems*, ed. Howard F. Stettler (Lawrence, Ks.: University of Kansas Printing Service, 1974), p. 73 (emphasis added).

7. R.K. Mautz and Hussein A. Sharaf, *The Philosophy of Auditing* (Menasha, Wis.: American Accounting Association, 1961), p. 42.



The review process is an important component of an audit, but little research has focused on it.

The normative question of what kinds of rationale should be contained in the memos was a difficult one to address. Little formal guidance is available, but implicit guidelines are contained in the professional literature.

The approach taken in this study is based on formal content analysis.<sup>8</sup> By reviewing the authoritative literature and a sample of the rationale memos, an initial “dictionary” of relevant cue categories was derived. The initial set of categories consisted essentially of the items contained in the column headings of figure 6.2. These were refined during content analyses of the subsequent experiments, primarily by evaluating the reliability of the judges coding the memos and the completeness of the coding scheme. The final set of cue categories with which the comprehensiveness of individual auditor memos was evaluated appears in figure 6.3. A comprehensive rationale memo should contain explicit rationale on at least the first seven cue categories, or the reviewer may be left in doubt about undisclosed items.

Figure 6.3  
The Set of Cue Categories Used in Content Analysis

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1. Test objective(s)
2. Audit risk in account or item
3. Referenced controls
4. Compliance test results
5. Reliance placed
6. Nature of population
7. Cost/benefit factors
8. Other cues relied on
9. Specification of alternative or complementary procedures
10. Statistical reasoning
11. Heuristic reasoning
12. Evaluation of planned sample size

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Note: Items 1 through 7 represent a comprehensive set for review purposes.

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## Summary

This chapter has presented normative analyses of the auditor's sample size decisions for the experimental case and of the type of information that should be contained in the documented rationale. The normative sample size analysis was derived from professional judgment because

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8. Ole R. Holsti, *Content Analysis for the Social Sciences and Humanities* (Reading, Mass.: Addison-Wesley Publishing Co., 1969).

no optimal solution was available. General hypotheses about the expected impact of the improved compliance test results and of possible behavioral factors were also presented.

The next chapter discusses the research methods that were designed to address these issues.

# 7

## Research Methodology and Hypotheses

Based partly on the lack of clear and consistent results in previous research on internal accounting control evaluation, a series of field experiments was designed to address the kinds of questions discussed in chapter 6. Other issues that were researched include the effect that explicit guidance to auditors has on their decisions and the decision process auditors use to search through available evidence.

### Summary of Research Design

A number of possible research approaches for addressing such issues are available, including case studies, simulation modeling, and experimentation (the primary method used here). Some previous experimental auditing research is open to criticism for being unrealistic. For example, Ashton's internal control evaluation task required many more reliability judgments within a very short period of time than an auditor would normally encounter.<sup>1</sup> Other studies have been archival, and thus lacked experimental control.<sup>2</sup>

This research is based on a realistic audit experiment. The chosen

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1. Robert H. Ashton, "An Experimental Study of Internal Control Judgments," *Journal of Accounting Research* 12 (Spring 1974): 143–57.

2. William Morris and Hershel Anderson, "Audit Scope Adjustments for Internal Control," *CPA Journal* 46 (July 1976): 15–20.

case, which is explained in chapter 5 and in Appendix A, was based on an actual audit client and presented the experimental subjects (auditors) with nearly all the documentation normally available during an audit.

The experimental design involved assigning subjects to one of ten possible cases in which both changes in internal accounting controls and guidance or decision approach were systematically varied.

Changes in accounting controls were detailed in figure 6.1 according to the system strengths identified on system flowcharts and experimental differences in interim compliance test results. Controls improved in both cases, but more so for the strong treatment than for the fair treatment. Because internal accounting controls are frequently improving because of suggestions made by the auditor, this was considered to be the most realistic experimental case.

The second experimental treatment involved providing guidance related to the task or, alternatively, specifying a variation in approach to the task. Guidance differed: In one situation none was provided, in a second situation a narrative summarizing professional literature was provided, and in a third a highly structured planning form was provided. Approach was varied by requiring some of the auditors to take a statistical approach and, for others, requiring a joint decision in which the senior's decisions were reviewed by an audit manager. Each of these five treatments also varied in terms of the internal accounting control dimension (fair or strong compliance test results). The entire two-by-five research design is summarized in figure 7.1, which also shows the number of subjects assigned to each of the ten cells.

The task was set up with approximately two hours to complete the judgments, rationale memo, and any questionnaires that were administered. A debriefing followed the case.

## **Details on Variations in Guidance and Decision Approach**

The experiments were conducted in two phases, with the no-guidance and narrative-guidance experiments encompassing phase 1 and the other three experiments following in the indicated order. The formal investigation of guidance effects is appropriate because practicing auditors are continuously provided with guidance, such as training, audit manuals, and professional standards. Four types of explicit guidance were provided: (1) a written narrative that reviewed professional literature (primarily SAS 1, section 320), (2) a highly structured planning form, (3) a statistical approach based partly on formal statistical documentation, and (4) the guidance provided by formal manager review. In addition, a control group was provided with no explicit guidance. Each

Figure 7.1  
 Summary of Experimental Design and Number  
 of Auditors Assigned to Each Treatment

Change in Internal Accounting Controls	Guidance Provided or Decision Approach	No Guidance	Narrative Guidance	Structured Guidance	Statistical Approach	Manager Review
Weak to fair		18	19	18	17	15 teams
Weak to strong		18	18	17	17	15 teams

Note: To achieve experimental realism, subjects were selected from a single audit firm. Because of differences in methods of documenting controls and other aspects, replication of the exact case in other audit firms is not possible.

of these experimental conditions may result in effects on the subject's sample size recommendations and rationale memos. Such hypothesized effects will be discussed in the following section of this chapter.

### **No Guidance**

Phase 1 of the research provided thirty-six subjects with no explicit guidance materials regarding the study and evaluation of internal accounting control. Thus, these auditors provide a control group against which to measure other guidance treatments. Except for differences in the internal control treatments, these auditors evaluated the case exactly as it is given in Appendix A.

### **Narrative Guidance**

The narrative guidance provided to thirty-seven subjects was intended to review the major cues contained in the professional literature. In summary, it contained<sup>3</sup>

1. A discussion of the judgment to rely on internal accounting controls in terms of
  - Professional standards (SAS 1, section 320).
  - System or transaction cycle analysis.
  - Definition of reliance and nonreliance areas.
  - Factors to consider.
2. Definition of compliance and substantive tests.
3. Discussion of
  - Relationships between degrees of reliance and extent of substantive testing.
  - Factors to consider in making extent judgments.
4. Discussion of purposes of rationale memos.

### **Structured Guidance**

An initial evaluation of the effects of the narrative guidance showed little effect either on the subjects' recommended sample sizes or on the content of their rationale memos. The next step was to design a highly structured planning documentation form that integrated guidance and documentation. For each of the four evaluated audit procedures, subjects were required to indicate the following on a sample size documentation form (see Appendix B):

1. The objective(s) of the audit procedure being analyzed.

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3. Copies of the actual guidance are available from the authors.

2. The kind(s) of audit risk the procedure was designed to identify.
3. The range of sample sizes subjects were considering.
4. Materiality.
5. Relevant internal accounting control strengths.
6. Reliance being placed.
7. Nature of the population.
8. Other factors (cost/benefit, related audit procedures, and so forth).

In essence, this documentation form was designed to elicit judgments about relevant cue categories. The actual categories were derived partly from an initial analysis of the rationale memos and partly from literature sources.<sup>4</sup>

### Statistical Approach

The initial phase of these experiments revealed a great deal of variation among auditors, in terms of both their sample size recommendations and the content of their rationale memos. To measure the effect of a statistical approach, the experiment described in this section was implemented.

The rationale that a statistical approach may affect auditors' judgments is contained in a number of sources, including SAS 1, sections 320A and 320B, and Roberts, who comments

Statistics has been defined as "a body of methods for making wise decisions in the face of uncertainty." . . .

. . . The auditor can determine the *extent* of testing more objectively when using statistical sampling in tests of details rather than judgmental samples. That is not to say that statistical sampling replaces the auditor's judgment. Rather, statistical sampling allows the auditor to exercise judgment relative to the amount of sampling risk that can be borne and to express that sampling risk quantitatively. . . .

. . . However, quantification merely makes explicit that which has always been implicit. . . .

Using numbers to reflect professional judgment improves an auditor's ability to communicate examination results to others.<sup>5</sup>

Although one might take issue with several of these points,<sup>6</sup> the proba-

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4. For example, see the approach in Donald M. Roberts, *Statistical Auditing* (New York: AICPA, 1978), which is reproduced in figure 4.2.

5. Roberts, *Statistical Auditing*, pp. 1–2.

6. For example, Chesley's results question the ability of auditors to communicate unambiguously in quantitative terms. G. Richard Chesley, "Procedures for the Communication of Uncertainty in Auditor's Working Papers," *Behavioral Experiments in Accounting II*, ed. Thomas J. Burns (Columbus: The Ohio State University, 1979): pp. 115–49.

bility of significant experimental effects of a statistical version of the experiments is high. Thus, the statistical approach version of the case was designed and administered to thirty-five auditors during the second week of a statistical audit training course.

Experimental guidance and approach effects that differentiate the statistical approach from the other experiments can be summarized thus:

1. In-depth guidance regarding statistical considerations in the study and evaluation of internal accounting controls and related audit procedures was contained in the course and in the eighty hours of advance preparation.<sup>7</sup>
2. Additional guidance was provided for the packing slip comparison and confirmation audit procedures in the form of a completed and approved form entitled "Request for Approval of Statistical Sampling Application." In particular, the request form contained cues with respect to
  - Audit objective of the test.
  - Definition of population, sampling unit, and error.
  - Estimated sampling units.
  - Type of test (attribute or variables).
  - Relation of the attribute test to substantive test work and the planned degree of reliance.
  - Confidence level (reliability) and upper precision limit.
  - Materiality and risk considerations.

The experimental case given to the statistical approach subjects was identical to that of the standard Olde Oak case, except for the addition of the aforementioned approval forms and a change in one planned audit procedure. The confirmation procedure was changed to require a statistical, dollar-unit sample. The planned statistical parameters for the confirmation procedure were the following:

- Materiality = 1% of book value
- Beta risk = .05
- Acceptable overstatement = 20% of materiality
- Alpha risk = .05

Subjects were expected to critically evaluate these parameters on the basis of the experimental case. They were permitted either to use a computer-based software package to determine sample size or to calculate sample size by hand. Most used the computer package. Their rationale for the sample sizes was to be documented in a rationale memo.

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7. Note, though, that internal control evaluation was only one of many topics covered.



## Manager Review

For a number of reasons that have been raised in organizational behavior and decision-analysis literature, individual auditor recommendations may differ from audit team decisions.<sup>8</sup> For example, it may be hypothesized that "group judgment is more accurate and consistent than individual judgment."<sup>9</sup>

To explore the effects of group decision-making on decisions relating to internal accounting control, a fifth version of these experiments was designed and implemented. This version involved a senior-manager team, thus adding a formal review element to the experiment. The audit senior and the manager were both given copies of the Olde Oak case identical to those given to the no-guidance subjects. The instructions and procedure for this experiment were identical to those of the no-guidance version, with the following exceptions:

1. The senior's initial recommendations and rationale memos were given to the manager, who, in isolation, documented any comments on a review form.
2. The senior-manager team then met and decided on their joint decisions. The disposition of any manager comments was also documented on the review form. In some cases, the senior's rationale memos were also updated.

The rationale memo data collected were all analyzed after this joint meeting. It was difficult to identify changes that may have been made in these memos as a result of discussion between the senior and manager.

In implementing the five experiments, slight differences in case materials were necessary. A comparison of the materials for each experiment is summarized in figure 7.2. This table also summarizes the materials used in a separate protocol study and a no-anchor pilot study.

## The Protocol and No-Anchor Pilot Experiments

In addition to the five main experiments detailed in the preceding section, two other experiments were conducted. A protocol study, which

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8. See Hillel J. Einhorn, Robin M. Hogarth, and Eric Klempner, "Quality of Group Judgment," *Psychological Bulletin* 84 (January/February 1977): 158–72, and Robert Libby and Roger K. Blashfield, "Performance of a Composite as a Function of the Number of Judges," *Organizational Behavior and Human Performance* 21 (April 1978): 121–29.

9. E. Michael Bamber, *Expert Judgment in the Audit Team: Perception of Judgment Differences* (Unpublished working paper, the faculty of Accounting, The Ohio State University, January 1979), p. 6.

Figure 7.2  
Comparison of Materials Provided or Collected for Each Experiment

Item	No Guidance Standard*	Narrative Guidance	Structured Guidance	Statistical Approach	Manager Review	Protocol Analysis	No-Anchor Pilot
1. Biographical data form	Standard	Standard	Standard	Standard	Standard	Standard	Standard
2. Guidance provided	None	Narrative based on professional literature	Comprehensive, structured rationale memo	Statistical test approval form (E-6 and E-10)	None (manager review comments)	None	Review of firm guidance on judgmental samples
3. Case (task description)	Standard: task, role, selected audit results	Standard	Standard, except for slight task modifications	Standard, except that task included review of statistical test approval form	Standard for senior, except review phase	Standard, except for verbalization instructions and practice session	Standard, except that less time was budgeted and no written rationale was required
4. Decision form/rational rationale memo	Standard	Standard	Comprehensive, programmed (structured)	Standard	Standard	Abbreviated	Abbreviated

5. Manager's review form	None	None	None	None	Yes	None	None
6. Planning memo	Standard	Standard	Standard	Standard	Standard	Standard in audit binder	None
7. Audit programs (revenue cycle)	Standard (this and last year's)	Standard	Standard	Standard, except E-10 planned as statistical	Standard	Standard in audit binder	This year's program only with no anchors
8. System flow-charts and bridging worksheets	Standard	Standard	Standard	Standard	Standard	Standard in binder	None
9. Request for statistical procedure approval form	None	None	None	For E-6 and E-10	None	For E-6 only	None
10. (Post-) Experiment questionnaire	Standard	Standard	None	None	None	Verbal protocol	None

\* "Standard" refers to materials provided in the original no-guidance experiment contained in Appendix A.

is detailed in chapter 9, investigated auditors' decision processes. A no-anchor pilot experiment was implemented to test potential anchoring effects on sample size decisions; a more detailed discussion is contained in chapter 8.

## **Experimental Procedures and Subject Selection**

### **Subject Selection**

The experiments were conducted at approximately twenty offices within the continental United States, plus a national training center. The offices were chosen to obtain a wide geographical dispersion contingent on economies of scale of at least five subjects or subject teams per replication. Similar experiments were run at approximately the same time period to minimize possible interchange among offices. Subjects were chosen by each office according to our specifications (audit seniors or supervisors with some commercial experience) and availability. Some possibility of selection bias exists because the experimenters were representing the firm's executive office. As figure 7.1 shows, over 200 auditors participated.

### **Case Introduction**

In most offices the entire experiment was conducted in a large conference room. Participants were informed beforehand that they were to participate in a case study and that they could bring, or have access to, usual audit manuals and authoritative literature.

The introduction phase included the following elements:

1. An introduction and brief backgrounds of the experimenters.
2. A brief description of the audit research activities of the experimenters and of the importance of the research project.
3. A random assignment of treatments to the subjects.
4. A review with the subjects of their materials, task, and time constraints, as described on pages 1 and 2 of the case study. The standard time budget was 30 minutes each for review of case materials, analysis and decision, preparation of rationale memo, and completion of questionnaire (if any).

### **Case Review and Decisions**

The auditors then worked on the case. The case materials were organized in the order in Appendix A.

## **Debriefing**

The final phase for each experiment consisted of a fifteen-minute debriefing that covered the purpose of the research and experimental design. Subjects were also queried about problems they may have had and about the completeness of case materials. The vast majority of subjects found the case to be complete and to be an interesting experience.

## **Data Collected**

As figure 7.2 shows, the experiments generated the following items:

1. Sample size recommendations for the four audit procedures for all subjects.
2. Rationale memos.
3. Explicit, documented judgments concerning certain underlying variables for the structured-guidance and statistical approach experiments.
4. Complete, tape-recorded verbal analyses of the entire task in the protocol study.
5. Biographical data on all subjects.

## **Major Research Hypotheses**

The experiments generated much data and numerous hypotheses. As figure 7.1 shows, the underlying experimental design can be displayed in a two-by-five matrix with two internal accounting control treatments and five guidance/approach treatments, which will be referred to simply as guidance treatments. The primary experimental hypotheses thus relate to the expected effects (if any) of the treatments on subjects' sample size decisions and rationale memos. Hypotheses concerning the internal accounting control effects were developed in chapter 6. Although the following does not represent a comprehensive listing of all tested or testable hypotheses, it does summarize the major ones for the purposes of this monograph.

### **Hypotheses Concerning Sample Size Decisions**

H1—*General Effect of Improving Internal Accounting Controls.* For both the fair and strong treatments, the improvement of specific controls relevant to the price test, the posting test, and the confirmation procedure are expected to result in reduced sample size recommendations.

H2—*Differential Effect of Strong Control Treatment*. For the price test, the posting test, and the confirmation procedure, recommended sample sizes of subjects receiving the strong internal control compliance test results are expected to be significantly smaller than those of subjects receiving the fair treatment.

H3—*Halo Effect*. For the packing slip comparison, the improvement in the general control environment is expected to result in significantly smaller sample size recommendations for subjects receiving the strong control treatment than those of subjects receiving the fair treatment.

H4—*Anchoring Effect*. In contrast with a control group receiving no planned sample sizes, subjects are expected to begin adjusting from the originally planned sample sizes. This should result in significant differences in sample size recommendations between the subjects and the control group.

H5—*General Guidance Effect on Mean Sample Sizes*. The various guidance treatments are not expected to have any significant effects on recommended sample sizes.

H6—*Guidance Effect on Variability of Sample Size Recommendations*. Narrative guidance, structured guidance, the statistical approach, and manager review are all expected to result in reduced variability in sample size recommendations.

### **Hypotheses Concerning Rationale Memo Content and Interaction Effects**

H7—*Guidance Effects*. The content of rationale memos is expected to vary according to the type and explicitness of guidance provided.

H8—*Interaction Effects*. The internal accounting control and guidance treatments are not expected to have any explicit interaction effects on either sample sizes or rationale memos.

Statistical tests of these and other hypotheses are presented in chapters 8 and 9.

### **Pilot Tests**

Pilot tests were conducted on the standard case materials in two separate offices. The testing was designed to evaluate the realism of the case, the comprehensiveness of the experimental materials, time budgets, and other aspects. In both pilot tests, participants were interviewed, and

many of their suggestions were incorporated in the case. In particular, the time budget was relaxed, and the task requirements were made more precise. Because of time considerations, taped, in-depth interviews were dropped from the original procedures.

## **Experimental Limitations**

The experimental design involved several trade-offs and limitations. The first involved complications that were knowingly permitted in the experimental situation for the sake of establishing a realistic task environment. Subjects had access to decision-influencing information other than the improvements in specific internal accounting controls. The task environment enabled them to consider alternative test approaches and to decide to delete completely the audit test in question or to pursue the perceived audit objective by obtaining other types of audit evidence (for example, evidence from analytical review procedures, such as gross profit analysis).

A second limitation involved the possibility of a confounding variable. The instructions told the subjects to consider the audit manager's initial decision about degree of reliance. For fair controls, the manager's initial decision was to place *some* reliance on internal controls for purposes of designing this year's substantive tests. For strong controls, the audit manager's initial decision was to place *significant* reliance on those controls. Thus, observed differences in sample size recommendations may be a function of both differences in internal accounting control compliance test results and the manager's initial reliance decision. On the other hand, auditors should arrive at their own independent judgments concerning reliance on the *specific* controls that relate to the evaluated audit procedures. In fact, very few rationale memos included the manager's reliance decision as part of the subject's reasoning.

Subject selection for these studies was also a source of experimental limitation. They were selected from a single audit firm, and the possibility of firm effects exists. The possibility of a selection bias was mentioned earlier. On the other hand, the selected sample has a number of advantages, including homogeneity of training and experience.

The control group used to test the anchoring hypothesis also presents some difficulties in generalizing any significant differences. As figure 7.2 shows, available materials and time availability differed between the no-anchor and the experimental groups. Thus, the test of anchoring is a weak one.

Finally, one must consider the traditional weaknesses of experimental research methods in interpreting the experimental results. These include lack of complete realism (external validity) and the possibility of lack of motivation. The task was designed to minimize these effects.

## **Summary**

This chapter has presented the research design, experimental procedures, and major research hypotheses of this research. The research design is based on control of two factors: internal accounting control treatment (two levels) and the guidance provided to the subjects regarding their evaluation of internal accounting control (five levels). Experimental procedures entailed analysis of an audit case that provided data about sample size decisions and documentation of the subjects' decision rationales. Hypotheses were derived concerning the effects of the experimental treatments on sample size decisions and rationale memo content. Other hypotheses concerning behavioral factors were also derived. The statistical analyses of these hypotheses are discussed in the following two chapters.



# 8

## Experimental Results: The Effect of Improving Internal Accounting Controls and Differences in Guidance and Approach on Auditors' Sample Size Decisions

The previous three chapters explain the internal control evaluation experiments. The results of these experiments are discussed in two chapters. This chapter statistically analyzes the auditor's sample size recommendations in terms of experimental variables that may be expected to affect these recommendations. The analyzed variables include the experimentally controlled treatments (results of compliance tests of improving internal accounting controls and differences in guidance or approach) and individual differences among auditors, such as in experience and training. Chapter 9 presents the experimental results with respect to the rationale memos and a protocol study of several auditors' information-search and decision processes.

### **Effects of Experimental Treatments on Sample Size Recommendations**

Hypotheses concerning sample size recommendations were developed in chapter 7. The hypotheses may be classified into three areas: (1)

experimental differences in average sample sizes (H1, H2, and H5), (2) experimental differences in the variability of sample size recommendations (H6), and (3) behavioral tendencies (H3 and H4). In general, these hypotheses predict differences (in some cases insignificant differences) in average sample sizes or in variability according to systematic differences in the experimentally controlled treatments.

Several conventions were used in analyzing the data. First, the following analyses of sample size decisions apply only to what are defined as valid subject decisions. Invalid decisions included (1) recommendations that did not specify an explicit sample size (for example, "I believe procedure E-5 should be reduced"), (2) recommendations that eliminated a particular audit step, and (3) decisions deemed invalid because the subjects did not complete the exercise satisfactorily (because they were interrupted with job requirements, because they misunderstood the task, or for other reasons). Only a few subject responses were eliminated as a result of the third criterion, but many responses were eliminated as a result of the first two, especially for the posting test (E-9). The second criterion was imposed because the experiments were designed primarily to investigate the effect that improving internal accounting controls has on auditors' reliance and sample size judgments. Professional standards do not permit total reliance on internal controls; thus, procedures that were eliminated through zero sample size recommendations were eliminated for other reasons.<sup>1</sup> Statistical analysis applied to the no-guidance and narrative-guidance experiments showed no significant difference in results if the second criterion was not imposed.

The subjects' sample size recommendations are displayed in figures C.1, C.2, C.3, and C.4 in Appendix C.

The second convention that was applied to the data concerns the confirmation procedure (E-10). The planned audit program specified 439 *positive* confirmations, but the subjects were permitted to alter the planned program as they deemed necessary, and many auditors recommended negative confirmations or some combination of negative and positive confirmations.<sup>2</sup> Although positive and negative confirmations may not be equivalent in terms of information content, this study uses the aggregate number of confirmations in subsequent analyses of E-10.

## Effect of Experimental Treatments on Sample Sizes

Several of the major hypotheses that were derived from the normative

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1. The subject's rationale memos indicated that procedures were eliminated primarily because the auditor received "little comfort" (i.e., no significant information content) from the procedure or because other procedures could be substituted.

2. A positive confirmation requests a reply whether the account is in error or not, whereas a negative confirmation requests a reply only if the account is incorrect.

analysis in chapter 6 and that were stated in chapter 7 deal with the effect of the controlled, experimental treatments on sample size recommendations. Figures 8.1 and 8.2 present the basic results that are relevant to these hypotheses. Figure 8.1 contains, for each of the four audit procedures, (1) the sample size recommendations that were contained in the planned audit program (row 1), (2) the average sample size, standard deviation, range, and coefficient of variation measured over all valid subject responses (rows 2, 3, 4, and 5), (3) average sample sizes for subjects receiving evidence of fair and strong accounting controls (rows 6 and 7), and (4) average sample sizes for subjects working under the various guidance treatments (rows 8 through 13). The figure shows the manager review results for both the joint manager-senior decision and the senior's decision prior to manager review, although only the joint decisions are used in the subsequent analyses. In figure 8.2 the results are further broken down to show the results for the entire two-by-five research design.

Hypothesis H1 predicted that, given the improvement in compliance test results over the prior year for both the fair and strong treatments, reduced sample sizes could be expected.<sup>3</sup> A comparison of rows 1 and 2 in figure 8.1 shows that averages over all subjects support hypothesis H1. But considering the effects of the internal accounting control treatments (rows 6 and 7), only for the strong treatment was there a consistent reduction over all procedures. No statistical tests were run for H1 because a difference between planned and overall average sample sizes may result from factors other than internal accounting control differences, such as substitution of alternative procedures.<sup>4</sup>

Statistical analysis of the experimental effects of the treatments are presented in the analysis of variance (ANOVA) data in figures 8.3 and 8.4. In figure 8.3 one-way ANOVA is used to investigate whether a statistically significant amount of the variance in auditors' sample size recommendations can be explained using a one-way classification of fair versus strong internal accounting control treatment. Recall that hypothesis H2 predicted significant internal accounting control differences in sample sizes for the price, posting, and confirmation audit procedures. Figure 8.3 shows mixed results. Over all experiments, sample size recommendations are significantly different (actually smaller: See figure 8.2) for subjects receiving strong as opposed to fair controls. Yet, analysis of the results by guidance treatment show that the effect for the pricing, posting, and confirmation procedures is significant

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3. For explicit statement of hypothesis H1 and others, refer to chapter 7.

4. In other words, no control group used the weak compliance test results reported in the Olde Oak case for the previous audit period.

Figure 8.1  
 Average Sample Sizes Classified by Experimental Treatment  
 (Averaged over all valid subject responses within each category)

Row	Audit Procedure	E-5 Packing Slip Comparison	E-6 Pricing Test	E-9 Posting Test	E-10 Confirmations
1	Planned sample sizes	150	75	100	439
2	Overall experimental results:				
	Average sample size	88	69	81	381
3	Standard deviation	62.4	36	62.6	173.6
4	Range	390	290	382	854
5	Coefficient of variation	.71	.52	.77	.46
6	Fair controls	98	80	94	424
7	Strong controls	79	59	68	337
8	No guidance	79	73	65	351
9	Narrative guidance	85	72	66	364
10	Structured guidance	82	58	75	354
11	Statistical approach	125	77	126	531
12	Manager review				
	Joint	76	66	78	321
	Senior	74	53	68	368

Figure 8.2  
Descriptive Statistics for Subjects' Sample Size Decisions  
for the Four Evaluated Audit Procedures

Experiment	Packing Slip Comparison				Pricing Test				Posting Test				Confirmation Procedure			
	Mean	Std. Dev.	Coef. of Var.	Range	Mean	Std. Dev.	Coef. of Var.	Range	Mean	Std. Dev.	Coef. of Var.	Range	Mean	Std. Dev.	Coef. of Var.	Range
No guidance	94	56	.60	175	84	40	.48	160	76	50	.66	175	394	128	.33	461
Strong	65	26	.40	120	62	16	.26	79	55	19	.35	75	303	106	.35	431
Narrative guidance	103	87	.84	260	90	57	.63	241	78	74	.95	275	424	191	.45	784
Strong	67	30	.45	125	53	19	.36	80	46	19	.41	49	303	106	.35	304
Structured guidance	79	34	.43	120	63	27	.43	125	68	30	.44	80	389	129	.33	481
Strong	86	41	.48	170	53	17	.32	60	81	63	.78	225	324	121	.37	345
Statistical approach	135	112	.83	342	76	30	.39	90	156	104	.67	333	578	275	.48	689
Strong	116	97	.83	341	77	36	.47	126	93	76	.82	275	485	225	.46	724
Manager review																
Senior decision	91	36	.40	100	60	7	.12	35	65	26	.40	100	390	74	.19	269
Strong	59	23	.39	90	48	17	.35	49	70	70	1.00	306	342	144	.42	500
Joint decision	87	37	.43	100	82	52	.63	191	96	51	.53	191	353	128	.36	544
Strong	68	41	.60	190	51	14	.27	39	63	43	.68	190	287	67	.23	280

Figure 8.3  
One-Way Analysis of Variance of Effect of Internal Control Treatment  
on Sample Size Recommendations

Experiment	E-5 Packing Slip Comparison	E-6 Pricing Test	E-9 Posting Test	E-10 Confirmation Procedure
No guidance	Yes ( $\alpha = .08$ )	Yes ( $\alpha = .05$ )	No ( $\alpha = .15$ )	Yes ( $\alpha = .03$ )
Narrative guidance	No ( $\alpha = .14$ )	Yes ( $\alpha = .02$ )	No ( $\alpha = .25$ )	Yes ( $\alpha = .04$ )
Structured guidance	No* ( $\alpha = .62$ )	No ( $\alpha = .23$ )	No* ( $\alpha = .56$ )	No ( $\alpha = .18$ )
Statistical approach	No ( $\alpha = .67$ )	No* ( $\alpha = .90$ )	No ( $\alpha = .14$ )	No ( $\alpha = .36$ )
Manager review	No ( $\alpha = .22$ )	Yes ( $\alpha = .04$ )	Yes ( $\alpha = .08$ )	Yes ( $\alpha = .10$ )
Over all experiments	Yes ( $\alpha = .05$ )	Yes ( $\alpha = .005$ )	Yes ( $\alpha = .025$ )	Yes ( $\alpha = .005$ )

Note: Significant at  $\alpha \leq .10$

\* Average recommended sample sizes were larger for strong control treatment as compared to the fair control treatment.

Figure 8.4  
Two-Way Analysis of Variance of Internal Control and Guidance/Approach  
Differences Over All Valid Sample Size Decisions

Experimental Effects by Audit Procedure	F Value	Degrees of Freedom	Significance	Percent of Variance Explained (R <sup>2</sup> )
E-5 Packing Slip Comparison	3.47	1, 130	$\alpha = .065$	
Internal control	2.64	4, 130	$\alpha = .037$	
Guidance/Approach	.53	4, 130	Not Sig.	10.0%
Interaction				
E-6 Pricing Test	13.15	1, 136	$\alpha = .005$	
Internal control	1.38	4, 136	Not Sig.	
Guidance/Approach	1.43	4, 136	Not Sig.	11.5%
Interaction				
E-9 Posting Test	5.95	1, 107	$\alpha = .016$	
Internal control	4.07	4, 107	$\alpha = .004$	
Guidance/Approach	1.20	4, 107	Not Sig.	16.6%
Interaction				
E-10 Confirmations	11.50	1, 135	$\alpha = .001$	
Internal control	7.69	4, 135	$\alpha = .000$	
Guidance/Approach	.16	4, 135	Not Sig.	23.6%
Interaction				

in only seven of fifteen cases.<sup>5</sup> In twelve of the fifteen cases, however, the average sample size difference was in the expected direction. Overall, these one-way ANOVAs support the notion that the subjects were systematically reducing sample sizes more given the comparatively better compliance test results for the strong internal accounting control treatment.

These results are also verified in the two-way ANOVAs contained in figure 8.4, which statistically accounts for both the internal accounting control and guidance treatments plus any possible interaction effects. In all cases, the internal accounting control effects are statistically significant and in the expected directions. Also, contrary to hypothesis H5, guidance effects are significant for three of the four audit procedures. The data in figure 8.1 suggest that guidance differences are primarily a result of the larger sample size recommendations for the statistical approach experiment. Figure 8.4 also indicates that there was no significant interaction effect between the two treatments, as hypothesized in H9.

### **Effect of Experimental Treatments on the Variability of Sample Size Recommendations**

Variability in professional judgment is an issue that has attracted the interest of researchers in psychology for many years and that more recently has attracted the attention of researchers in auditing. With respect to variability in auditor extent decisions, a wide range in recommended sample sizes increases the likelihood of unwarranted reliance on small samples. For samples at the large end of the range of recommendations, the risk is one of overauditing. Of course, sample size is not the only factor to consider in evaluating such risks. Because the auditor has flexibility in program design, analysis of the entire mix of audit procedures would be necessary to determine audit risk, as defined in chapter 4.

Hypothesis H6 predicted a reduction in sample size variability given the additional guidance provided in the narrative-guidance, structured-guidance, statistical-approach, and manager-review experiments. The rationale for this hypothesis is based on an assumption that (1) some sort of ideal sample size exists and (2) given the relevant cues and objectives, seasoned professional judgment will approach the ideal. Guidance directs attention to the relevant cues and objectives. If observed judgments do concentrate around a single point, consensus is said to be high and variability low. High variability, then, indicates lack of consensus.

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5. Recall that no significant difference is expected for the packing slip comparison if no relevant control improved.



A problem with this type of analysis is the difficulty in obtaining an acceptable measure of variability (consensus). Figure 8.2, for example, contains three measures of variability—range, standard deviation, and coefficient of variation. Range indicates the difference between the highest and lowest recommended sample sizes. The largest ranges among the five experiments were 342 packing slip/invoice comparisons for E-5, 241 invoice price tests for E-6, 333 invoice posting tests for E-9, and 784 confirmations for E-10. Such wide ranges may indicate significant risk of both unwarranted reliance and of overauditing, although drawing such an implication without a careful evaluation of the entire audit program is somewhat tenuous. Clearly, variability exists in terms of the subjects' range of recommended judgmental samples.

A second measure of variability presented in figure 8.2 is the standard deviation. If one divides the standard deviation of sample size recommendations by the mean sample size, a coefficient of variation (CV) results. Note that the CV is standardized by using the mean sample size, which facilitates comparison among different audit procedures. For example, in figure 8.2, the CV for the packing slip comparison in the no-guidance experiment is 60 percent, whereas it is only 33 percent for the confirmation procedure. As with the range measures, the CV measures in figure 8.2 indicate a significant amount of variability, with thirty-one of forty-eight coefficients exceeding 40 percent. A 40 percent CV indicates that roughly one-third of the sample size recommendations were at least 40 percent larger or 40 percent smaller than the average recommendation.<sup>6</sup>

In order to evaluate the effect of the experimental guidance and internal accounting control treatments on sample size variability, the CVs are ranked in figure 8.5, and an average ranking over the four audit procedures is calculated. For hypothesis H6, which predicted reduced variability and greater consensus given greater guidance, to be supported, the rankings for the no-guidance experiment should be near 1. This would indicate the highest coefficient of variation. In fact, the no-guidance variability has the lowest average for the strong internal accounting control treatment and the second lowest for the fair treatment. Thus, hypothesis H6 is not supported.

The effect of the internal accounting control treatment on variability is also shown in figure 8.5. In phase 1 (no guidance and narrative guidance) of these experiments, there was some limited evidence that consensus increased (that is, variability decreased) in the strong internal accounting control treatment. This effect was not sustained throughout the experiments, as the comparison of CVs for fair versus strong indicates

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6. If a population is normally distributed, almost two-thirds of the observations lie within one standard deviation. Thus, about one-third lie outside of  $\pm 1$  standard deviation.

Figure 8.5  
 Comparison of Variability of Sample Size Recommendations  
 Ranked in Terms of Coefficients of Variation (CV)

Guidance Treatment	Audit Procedure												Average Ranks	
	E-5 Packing Slip Comparison			E-6 Pricing Test			E-9 Posting Test			E-10 Confirmations				
	Fair	Strong	S < F?	Fair	Strong	S < F?	Fair	Strong	S < F?	Fair	Strong	S < F?	Fair	Strong
No guidance	3	5	Yes	3	5	Yes	3	5	Yes	4.5	3.5	No	3.4	4.6
Narrative guidance	1	4	Yes	1.5	2	Yes	1	4	Yes	2	3.5	Yes	1.4	3.4
Structured guidance	4.5	3	No	4	3	Yes	5	2	No	4.5	2	No	4.5	2.5
Statistical approach	2	1	=	5	1	No	2	1	No	1	1	Yes	2.5	1
Manager review	4.5	2	No	1.5	4	Yes	4	3	No	3	4	Yes	3.3	3.3

Note: The rankings within the table are from the largest CV, 1, to the smallest CV, 5. The column labeled S < F? indicates whether the CV for the strong treatment is less than the CV for the fair treatment.

in figure 8.5. In only eleven of twenty cases are the CVs for the strong treatment less than those for the fair treatment. Thus, neither the guidance nor the internal accounting control treatments consistently reduced variability in the subjects' sample size decisions.

## **Effect of Behavioral Factors on Mean Sample Size Recommendations**

### **Halo Effect**

A number of behavioral variables have been posited as being important in an auditor's information search and decision process. In chapter 6 the possibility of a halo effect was hypothesized (H3). A halo effect would be said to exist if an auditor reduced the sample size of substantive procedures because of improvements in (the glow of) the general internal accounting control environment even though no improvements in specific, relevant controls occurred. This was the case for audit procedure E-5, the packing slip comparison.

The halo effect hypothesis may be tested using the analysis of variance data contained in figure 8.3. If the halo effect is significant, the amount of variance explained for E-5 by classifying observations according to fair and strong would be significant. As shown in figure 8.2, most of the average sample sizes for E-5 (strong) are less than the average sample sizes for E-5 (fair). Only in the no-guidance and overall-experiments cases are the differences statistically significant. Thus, if a halo effect exists, the guidance treatments seem to mitigate the effect. Additional evidence of this is provided in a later section of this chapter.

### **Anchoring Effect**

The research situation also provided the opportunity to evaluate the effect of the anchoring heuristic hypothesized earlier (H4). Some suggestive, but not conclusive, evidence of anchoring was obtained by comparing the experimental subjects that worked under the strong treatment with a no-anchor control group (see figure 8.6). The evidence is weak because the experimental situation for the no-anchor control group differed in terms of time allowed, an abridged version of the case was given, and there was no requirement for a written rationale memo. Given the experimental situation, it is impossible to determine what effect these variations had on the results.

For three of the four procedures, subjects who had planned samples (anchors) recommended larger sample sizes than did the control group, which had no planned samples, and the larger sample sizes lie between the planned sample sizes and the no-anchor recommendations. Also, in these three instances, the differences in sample sizes were statistically

Figure 8.6  
 Recommended Sample Sizes With and Without Planned Sample (Anchor)  
 (Strong control treatment only)

	E-5 Packing Slip Comparison		E-6 Pricing Test		E-9 Posting Test		E-10 Confirmations	
	Planned Sample	No Planned Sample	Planned Sample	No Planned Sample	Planned Sample	No Planned Sample	Planned Sample	No Planned Sample
This year's planned program	150	—	59	—	100	—	439	—
Field experiments								
Mean sample	79	42	59	59	68	44	337	205
Significant difference?	Yes	—	No	—	Yes	—	Yes	—

significant. The exception, E-6, the pricing test, where the two sample means are essentially the same, may be explained by the fact that the subjects' average recommendation equaled a firm-specific anchor for an attribute sample (see step E-6a in Appendix A). Some additional evidence of anchoring is contained in the subjects' rationale memos and in the protocol study discussed in chapter 9.

## **Analysis of Subjects' Explicit Rationale Derived From Structured Documentation Forms**

As part of this study, research was conducted into the factors and decision processes that underlie auditors' sample size judgments. One approach was designed into the structured-guidance experiment, in which subjects were required to explicate a number of factors that the normative analysis of the case deemed relevant. These factors were detailed in chapter 6 and included audit procedure objective, materiality, nature of audit procedure (substantive, compliance, or dual purpose), reliance placed on internal controls, and feasible range of samples. Thirty-five auditors completed the structured-guidance experiment. The results are summarized in figure 8.7. The table includes the maximum sample size that subjects would consider if all factors pointed toward a large sample. Also included are the minimum sample sizes they would consider if all factors pointed toward a small sample and the procedure were to be included in the audit program. The difference between the maximum and minimum is a measure of the subjects' feasible range, which is defined to be their cognitive width.

Some of the variability (lack of consensus) discussed in the previous section can be explained in terms of differences between auditors in making some of these judgments. For example, the "reliance placed" judgment has a relatively high standard deviation of up to one on a four-point scale. Since sample size decisions are directly related to reliance judgments, variability in reliance logically leads to variability in sample size decisions.

Consider the results contained in figure 8.8, which shows the wide divergence in opinion about the nature of the packing slip comparison and the pricing tests. In both cases, subjects were almost evenly divided in regard to substantive, compliance, or dual purpose interpretation. The observed variability in the nature of test interpretation is another possible reason for lack of consensus among auditors.

Figure 8.8 also shows the sample size range, mean, and coefficient of variation according to the nature interpretation. The results of analysis of variance of the possible effect of nature interpretation on sample sizes is also given for the packing slip comparison, E-5, and the pricing test, E-6. In the case of E-5, the effect is not significant, but it is significant

Figure 8.7  
Summary Statistics, Structured Documentation

Audit Procedure	Internal Control Treatment	Sample Size (SS) Recommendation			Maximum SS Considered		Minimum SS Considered		Materiality		Reliance Placed on Internal Controls	
		$\mu$	$\sigma$	R	$\mu$	R	$\mu$	R	$\mu$	$\sigma$	$\mu$	$\sigma$
E-5: Packing slip comparison	Fair	74.3	29.7	120	157	240	43	55	2.6	.67	1.1	.8
	Strong	84.9	42.9	170	163	250	48	85	2.7	.68	1.4	.8
E-6: Pricing test	Fair	62.1	27.9	125	91	275	43	50	2.8	.6	1.5	.6
	Strong	52.1	17.7	60	112	280	42	49	2.7	.7	1.9	.5
E-9: Posting test	Fair	65.2	29.5	80	125	225	45	55	2.8	.4	1.0	.7
	Strong	83.8	65.2	225	132	290	40	54	2.8	.6	1.6	1.0
E-10: Confirmations	Fair	369	112	366	547	670	227	350	3.0	0	1.4	.4
	Strong	318	122	345	637	2015	234	419	3.0	0	1.8	.5

Notation:  $\mu$  = mean,  $\sigma$  = standard deviation, R = range, SS = recommended sample size.

Figure 8.8  
 Relationship Between Subjects' Interpretation of Nature of Audit Procedure  
 and Recommended Sample Sizes (Structured Documentation)

Nature Interpretation	Audit Procedure											
	E-5 Packing Slip Comparison			E-6 Pricing Test			E-9 Posting Test			E-10 Confirmations		
	N	R	CV	N	R	CV	N	R	CV	N	R	CV
Substantive	7	65	.84	8	49	.45	16	230	.79	21	355	.346
Compliance	9	70	.66	8	85	.70	3	41	.78	1	n/a	n/a
Dual purpose	12	150	.86	10	60	.56	2	34	.42	4	331	.293
ANOVA Summary												
F Value	.87			2.57			Not appropriate			Not appropriate		
Significance	Not significant			α = .097								

Notation: N = number of subjects, R = sample size range,  $\mu$  = sample size mean, CV = coefficient of variation.

for E-6, in which, on the average, subjects recommended smaller sample sizes for the substantive interpretation.

Figure 8.7 also includes data concerning subjects' reliance judgments scored on a four-point scale. One would hypothesize that, except for the packing slip comparison, greater reliance would be indicated by subjects given the strong control treatment. In fact, as figure 8.9 shows, reliance was significantly greater. Also, negative (but statistically insignificant) correlations were observed between the sample size recommendations of these three procedures and the reliance decisions. The statistical insignificance of these correlations may indicate that a more complex decision process underlies sample size decisions than simply an inverse relation between reliance and sample size. Finally, figure 8.9 shows the lack of a halo effect for the packing slip comparison, since the reliance effect is not significant.

Internal control judgments could be sensitive to the range of feasible sample sizes that auditors consider. For instance, if an auditor specifies a narrow range of sample sizes, regardless of internal accounting controls, not much change in recommended sample sizes can be expected. In order to investigate such effects, a cognitive width analysis was performed. First, an investigation was conducted to check for significant internal accounting control effects on cognitive widths, even though the adequacy of internal accounting controls would not be expected to be related to subjectively determined maximum or minimum sample sizes as defined. Indeed, as figure 8.10 shows, no significant effect was observed.

Second, an analysis of variance was conducted on the sample sizes standardized by cognitive width. Standardization removes differences among subjects regarding ranges of samples they were considering. This facilitates evaluation of the effect that the internal control treatment had on moving the subjects' recommended sample size toward the high (1) or low (0) end of their cognitive width. For example, as is shown in figure 8.11, on the average, subjects with the fair treatment recommended confirmations at the midpoint (.51) of their cognitive widths. With strong controls, their recommended sample sizes were at the lower (.38) end of their cognitive widths. As was the case with the nonstandardized sample sizes, the standardized sample sizes show no statistically significant internal accounting control effects.

## **Variability in Subjects' Specification of Statistical Sampling Parameters**

Another possible rationale for the observed variability in subjects' sample sizes lies in their judgments concerning the parameters that underlie statistical samples. Variability in the specification of such



Figure 8.9  
 Analysis of Effect of Internal Control Treatment on Reliance Judgment and  
 Correlation Between Reliance Judgment and Sample Size Recommendation  
 (Structured Guidance, Valid Subjects)

Treatment	Audit Procedure											
	E-5 Packing Slip Comparison			E-6 Pricing Test			E-9 Posting Test			E-10 Confirmation		
	N	$\mu$	CV	N	$\mu$	CV	N	$\mu$	CV	N	$\mu$	CV
Fair controls	17	1.2	.70	17	1.5	.41	17	1.1	.66	18	1.4	.28
Strong controls	16	1.4	.56	16	1.9	.27	14	1.6	.61	16	1.8	.31
T-Test		.71			1.88			1.63			2.31	
Significance of treatment	Not significant			$\alpha = .10$			$\alpha = .10$			$\alpha = .10$		
Correlation of reliance and sample size	.228			-.227			-.295			-.140		
Significance of correlation	Not significant			Not significant			Not significant			Not significant		

Note: Question F in the structured documentation memo stated, "In recommending a sample size, how much reliance are you placing on internal controls?"

None                      Some                      Sub-stantial                      Very Great

The replies were scaled from 0 for "none" to 3 for "very great."  
 Notation: See figure 8.8.

Figure 8.10  
 Analysis of Effect of Internal Control Treatment on Cognitive Widths  
 Specified by Subjects for Structured-Guidance Experiment

Audit Procedure	Treatment										Significance of Treatment	
	Fair Controls					Strong Controls					ANOVA F Value	Significant? ( $\alpha \leq .10$ )
	N	R	$\mu$	CV	N	R	$\mu$	CV	N	R		
E-5: Packing slip comparison	13	255	120	.70	13	268	104	.82			1.20	No
E-6: Pricing test	7	265	78	1.18	8	270	98	.98			.03	No
E-9: Posting test	8	239	99	.86	12	270	97	.88			.55	No
E-10: Confirmations	9	606	346	.60	10	2195	423	1.58			.32	No

Notation: See figure 8.8.

Figure 8.11  
 Analysis of the Effect of the Internal Control Treatment  
 on Subjects' Planned Sample Sizes Standardized by Cognitive  
 Width for Structured-Guidance Experiment

Audit Procedure	Treatment						Significance of Treatment			
	Fair Controls			Strong Controls			T Value	Difference in Means Significant? ( $\alpha \leq .10$ )		
	N	R	$\mu$	CV	N	R	$\mu$	CV		
E-5: Packing slip comparison	13	1	.27	1.07	13	1	.40	.73	1.09	No
E-6: Pricing test	7	1	.32	1.13	8	9	.29	1.07	.18	No
E-9: Posting test	8	1	.24	1.41	12	1	.37	1.02	.75	No
E-10: Confirmations	9	1	.51	.63	10	1.9	.38	1.70	.56	No

Notation: See figure 8.8.

parameters is apparent in figure 8.12, which is based on the statistical approach data. For the statistical approach, subjects determined judgmentally several dollar unit sample parameters for procedure E-10, confirmation of accounts receivable. Their judgments concerning the parameters—beta risk, alpha risk, materiality, and acceptable amount of overstatement—had coefficients of variation ranging between 28 and 86 percent. The range of chosen values for materiality was from \$10,500 to \$61,000 and for beta risk from 5 percent to 50 percent. Evidence of such differences in auditors' judgments may help explain the variability both in the statistical approach and in the entire set of experiments.

Figure 8.12 also shows the analysis of variance results for the effect that differences in the internal accounting controls had on the parameter judgments. As would be expected, in the case of beta risk this effect is significant. Those subjects given the strong compliance test results established a beta risk nine percent higher on the average than those subjects with the fair compliance test results.

## **Analysis of Subject Demographics**

As a final attempt to explain the observed differences in sample size recommendations, demographic data were collected and analyzed, primarily for phase 1, no-guidance and narrative-guidance, subjects. Figure 8.13 contains a summary of subject demographics. More detail was collected for phase 1 subjects. Because no significant demographic effects were observed, only specialized training and experience data were obtained for subsequent experiments.

Figure 8.13 shows that, on the average, the seniors had over three years of audit experience, with about two years of commercial experience (in contrast to experience with financial institutions, government, and so forth). Except for the statistical approach, the majority of subjects had no specialized statistical or computer training. The more detailed data collected on the no-guidance and narrative-guidance subjects indicate a rather homogeneous population in terms of audit experience, audit-level courses taken, and client mix.

To evaluate possible demographic effects, such as differences in specialized training, one-way analysis of variance was applied to the sample size decisions for phase 1 subjects. Figure 8.14 shows that in only one case is a significant amount of variance explained.<sup>7</sup> An analysis of covariance indicated some significant commercial and audit experience effects on sample size decisions for the statistical approach and the manager-review experiments. However, the preponderance of evi-

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7. "Local office effects" classified subjects according to the office (city) to which they reported.

Figure 8.12  
 Analysis of the Effect of Internal Control Treatment on  
 Subjects' Specification of Dollar Unit Sample Parameters  
 for Audit Procedure E-10

Dollar Unit Sample Parameters	Treatment						Significance of Treatment			
	Fair Controls			Strong Controls			T Value	Difference in Means Significant? ( $\alpha \leq .10$ )		
	N	R	$\mu$	CV	N	R	$\mu$	CV		
Beta risk	16	.34	.14	.85	15	.45	.23	.72	1.7	Yes
Alpha risk	15	.05	.07	.36	13	.15	.07	.60	.23	No
Materiality	16	\$50,500	\$20,140	.55	15	\$24,000	\$18,265	.30	.59	No
Overstatement	15	\$ 8,480	\$ 4,143	.52	13	\$ 4,800	\$ 3,809	.28	.50	No

Figure 8.13  
Summary of Demographic Information

	No Guidance, Narrative Guidance Combined	Structured Guidance	Statistical Approach	Manager Review	
				Seniors	Managers
<u>Experience in Years</u>					
Up to 2.5	10				
2.5-3.0	27				
3.5-4.0	20				
4.5 or more	<u>16</u>				
	<u>73</u>				
Average experience (years)	3.3	2.0	4.1	3.2	6.6
<u>Specialized Training</u>					
Computer auditing specialist (CAS)	16	1	6	4	9
Statistical audit specialist (SAS)	6	0	34	2	5
No specialized training	51	35	0	24	17
<u>Highest Audit Course Taken</u>					
Staff level	1				
Senior level	3				
Supervising senior level	64				
Data not available	<u>5</u>				
	<u>73</u>				

Commercial Experience

None	3			
Some	8			
Moderate	28			
Extensive	30			
Data not available	<u>4</u>			
	<u>73</u>			
Average commercial experience (years)	2.3	1.8	2.1	1.9

1.8

1.9

2.1

1.8

Client Mix Experience

Primarily small clients	5			
Mixed	53			
Primarily large clients	11			
Data not available	<u>4</u>			
	<u>73</u>			

Figure 8.14  
 Analysis of Variance of Sample Size Decisions  
 by Demographic Factors for No-Guidance and  
 Narrative-Guidance Experiments

Possible Explanatory Variable	Audit Procedure			
	E-5 Packing Slip Comparison	E-6 Pricing Test	E-9 Posting Test	E-10 Confirmations
<u>Experience Factors</u>				
1. Years of experience	F = 1.09 (No)	F = 1.08 (No)	F = .33 (No)	F = 1.54 (No)
2. Commercial experience (some, moderate, extensive)	F = .06 (No)	F = .23 (No)	F = .88 (No)	F = 1.48 (No)
3. Client mix experience (small, mixed, large clients)	F = .56 (No)	F = .95 (No)	F = .17 (No)	F = .57 (No)
<u>Training Factors</u>				
1. Specialized statistical or computer schools	F = .43 (No)	F = .92 (No)	F = .17 (No)	F = .86 (No)
2. Local office internal control evaluation training session	F = .11 (No)	F = .02 (No)	F = .15 (No)	F = 1.33 (No)
3. Local office statistical training program	F = .39 (No)	F = 1.9 (No)	F = 1.93 (No)	F = .65 (No)
<u>Miscellaneous</u>				
1. Local office effects	F = .81 (No)	F = 1.37 (No)	F = 2.54 (Yes)	F = .75 (No)

*Note:* F values and significance at  $\alpha \leq .10$ .

dence indicates that the demographic variables tested were not significant determinants of differences in, or variability of, sample size recommendations.

### Analysis Limitations

The analysis used in this chapter is based on parametric statistics and on the assumptions that underlie analysis of variance and the other tests



that were utilized. The assumption most frequently violated in the observed data was that of equal variance, which is that the standard deviations of the data sets are approximately equal (see figure 8.2). This particular violation does not result in significant risk of erroneous conclusions if the sample sizes are relatively equal. The experimental design summarized in figure 7.1 shows that the cell sizes were essentially equal.

A second limitation of any inferences based on this chapter concerns the test of anchoring. As was noted earlier, the no-anchor control group differed from the experimental group in several ways in addition to not being supplied with planned sample sizes. Thus, while the data support the anchoring hypothesis, it is not conclusive.

Other possible limitations in research design are noted in earlier chapters.

## **Summary**

This chapter has presented statistical results of the effect of various factors on auditors' sample size recommendations. These decisions were found to be significantly affected by differences in internal accounting control treatments and were found to exhibit a great deal of variability among auditors. Tests of possible auditor behavioral heuristics led to evidence of an anchoring heuristic, but a halo effect observed in the early experiments seemed to be mitigated by guidance. In addition, differences in the guidance provided were significant determinants of differences in sample size decisions. The analyses also included an attempt to explain sample size variability in terms of a number of experimental and behavioral factors. In general, few of these variables were found to be related to sample size variability.

# 9

## Experimental Results: Auditors' Rationale and Modeling of Auditors' Decision Processes

This chapter considers the content of the subjects' rationale memos and the possible effect of experimentally controlled variables on them. The research technique of content analysis provides a summary of the factors that auditors documented as being important determinants of their decisions. The possibility exists, of course, that these documented factors were not important determinants of their behavior and that they lacked self-insight.<sup>1</sup> The memos are analyzed from a number of perspectives, including self-insight, comprehensiveness, and evidence of auditor heuristics.

Several questions, including the question of comprehensiveness of the subjects' information search and processing behavior, led to a protocol study of the subjects' completion of the task. The second main section of this chapter discusses the methodology and results of the protocol study. This study phase provides evidence of the actual decision processes used by auditors in searching for data, in evaluating alternative recommendations, and in reaching a decision. Some evidence concerning decision heuristics is also obtained.

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1. Lack of self-insight has been observed in a number of psychological studies of expert decision makers.

## Content Analysis of Auditors' Rationale Memos

Recently increasing emphasis has been placed on documenting the various steps of the audit process. This emphasis has resulted from several factors, including the development of quality control reviews of performance and compliance with designated standards. These factors have tended to increase the need for more extensive documentation of the entire audit process, including planning, program design, and performance. Much of this documentation is in the form of rationale memos that describe the auditor's underlying logic at each phase of the audit.

In these experiments, content analysis was applied to the rationale memos for each audit procedure for all subjects except the structured-guidance subjects. These subjects did not prepare rationale memos; rather, they completed a structured planning memo, as detailed in chapter 7. The results of this study phase are presented after a brief discussion of methodology. Methodological issues include the development of a dictionary of themes within which to classify the rationale and the reliability and validity of the classification process.

### Methodology

According to Berelson's definition, a content analysis may use any of five different types of units to code data: words, themes, characters, items, and space-and-time measures.<sup>2</sup> Of these types, analysis using words or themes seemed most applicable to rationale memos. The word is probably the basic unit of analysis in most content studies, particularly with the emergence of computer-based content analysis. However, since this study is concerned with references to particular audit cues, it is well suited to thematic analysis. An early attempt was made to use words as the coding units, but this approach was abandoned because it did not realistically capture the audit rationale. Themes were a more natural outgrowth of the cues.

A theme is a subject or a topic of discourse, such as a sentence or proposition about something. Thematic analysis is more complex than analyses employing other types of units. First, it is often quite difficult to discern the boundaries between themes. This is true because physical evidence of boundaries is not present as it is with words, sentences, or paragraphs. In addition, several themes may coexist within one sentence, which makes analysis all the more difficult.

The development of themes in this study was accomplished through an iterative process. First, a preliminary dictionary of themes was prepared, and the no-guidance and narrative-guidance rationale memos

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2. Bernard Berelson, "Content Analysis," in *Handbook of Social Psychology*, ed. Gardner Lindzey, vol. 1 (Cambridge, Mass.: Addison-Wesley Publishing Co., 1954), pp. 488-522.

were scored jointly by the researchers.<sup>3</sup> This process led to a first revision of the dictionary and the related set of theme definitions.

Each researcher independently used the revised dictionary to code the rationale memos derived from the statistical approach experiment. Reconciliation of the coding resulted in only a few minor changes in the dictionary of themes. A summary of theme categories is presented in figure 9.1. The formal definitions used in the coding are included in figure 9.2. This finalized set of themes and definitions was used to code both the statistical approach and the manager review memos and to code a random sample of twenty memos each from the no-guidance and narrative-guidance experiments.

Figures 9.3 and 9.4 contain the final results of the content analysis. These results will be presented after a discussion of the measurement, reliability, and validity of the coding (content analysis) process.

### Measurement

The themes used in content analysis can be quantified in several ways. Assigning numbers to the objects of content analysis through nominal measurement is the most useful method. After categorization of units, the frequency of observations in each category is counted. The frequencies thus indicate the raw number of times a theme such as "audit procedure objective" appeared in the rationale memos. As such, the

Figure 9.1  
Summary of Categories of Themes  
Used in Content Analysis

Category Number	Brief Description
1	Test objective
2	Audit risk in account, item being audited
3	Referenced controls or strengths
4	Compliance test results
5	Amount of reliance placed on control(s)
6	Nature of population
7	Cost or benefit factors
8	Other cues relied upon
9	Specification of alternate or complementary audit procedure
10	Statistical reasoning or rationale
11	Heuristic reasoning (rules of thumb)
12	Evaluation of planned sample size

3. The results of the initial coding and related dictionary are contained in Theodore J. Mock and Jerry L. Turner, "The Effect of Changes in Internal Controls on Audit Programs," *Behavioral Experiments in Accounting II*, ed. Thomas J. Burns (Columbus: The Ohio State University, 1979), pp. 277-326.

Figure 9.2  
Content Analysis Dictionary

Category 1: Test Objective

Reference to nature of test (e.g., substantive test, compliance test, dual test).

Examples of possible objectives:

- Validity of recorded transactions.
- Proper authorization of transactions (balance).
- Assignment of proper initial economic value for recording purposes.
- Accurate recording of transactions.
- Proper valuation of transactions to reflect current economic value.

Category 2: Audit Risk in Account, Item Being Audited

Some mention of audit risk (e.g., possibility of error, understatement, overstatement), error type (e.g., goods billed do not correspond to goods shipped, accuracy, missing invoices, shipments with no corresponding billing), materiality.

Category 3: Reference to General or Specific Controls and Strengths

Reference to evaluation of general controls (e.g., "controls are strong").

Reference to specific controls or strengths:

- S-1. Prenumbered sales invoices are prepared for all sales, issued sequentially, and numerically accounted for.
- S-2. After sales invoices are initialed, one copy is kept in the numerical suspense file until other copies of the invoice are returned from the warehouse.
- S-3. Sales invoices are required for warehouse personnel to fill an order.
- S-4. The dispatcher matches the corrected sales invoice with the packing slip of the merchandise shipped.
- S-5. The general office clerk matches copies 1 and 2 of sales invoices received from the dispatcher with the control copy 3. The numerical suspense file is periodically reviewed for undelivered orders.
- S-6. The sales invoice customer suspense file is reviewed monthly for unmatched invoices.
- S-7. An independent clerk checks pricing of invoice items and also checks extensions and footing.
- S-8. The manager reviews monthly statements and attached invoices and spot checks some of the aged trial balance.
- US-1. The dispatcher maintains an independent numerical packing slip file (note that this control was not identified as a strength in the case).

Category 4: Compliance Test Results

Some mention of the results of completed compliance tests (e.g., no exceptions were noted).

<u>Audit Procedure</u>	<u>Control Strength Tested</u>	<u>Results</u>
E-3a, b	S-1	As a result of a management letter comment, the clerks have been issuing invoices on a strict numerical sequence. The audit test revealed <i>no exceptions</i> to this control strength.

Audit Procedure	Control Strength Tested	Results
E-3c	US-1	The review of packing slips (E-3c) revealed only a <i>moderate number of exceptions</i> . These exceptions appear to be primarily due to <i>laxity on the part of the dispatcher</i> .
E-7	S-6	The clerk assigned the responsibility of reviewing the customer suspense file monthly was still <i>not following up on unmatched invoices</i> (step E-7).
E-6a	S-7	The compliance test for the clerk's initials indicating checking of prices, extensions, and footings (step E-6a) <i>failed on the 33rd item tested</i> .
E-8	S-8	Step E-8 revealed that the manager was still performing <i>only a limited review</i> and spot check of the monthly statements, invoices, and aged trial balance.

#### Category 5: Amount of Reliance Placed on Control(s)

Some statement about the amount of reliance placed on controls (e.g., significant, some, none).

#### Category 6: Nature of Population

Statement about the nature of the population (invoices for E-5, E-6, E-9; receivables for E-10) (e.g., variability of dollar units, expected error frequency, or expected error magnitude).

#### Category 7: Cost or Benefit Factors

Some statement about cost or benefit factors of the procedure or the evidence generated (e.g., it would combine with another step, the procedure gives limited results, the step is justified, it enables us to limit the confirmation effort, time could be better used, it does not serve a useful purpose).

#### Category 8: Other Cues Relied Upon

For example, confirmation replies, analytical review of cost of goods sold, substantive tests in the previous year, the fact that last year 150 was determined to be an adequate sample size, firm literature on judgmental samples.

Statement about the influence of other audit evidence on the sample size decision:

- Reference to last year's results.
- Other evidence that has been or may be collected this year.

#### Category 9: Alternative or Complementary Audit Procedure

Statement about the need to add a new audit procedure to the program or to substitute for the procedure being evaluated.

#### Category 10: Statistical Reasoning or Rationale

For example, statistical sampling or an attribute sampling rationale.

#### Category 11: Heuristic Reasoning

Some reference to a rule of thumb or heuristic rationale used to reach or justify a decision (e.g., 10 percent confirmations is "normal").

#### Category 12: Evaluation of Planned Sample Size

Some statement about the adequacy or inadequacy of *previously planned* sample size (e.g., it is large, excessive, adequate, inadequate, or too small).

Figure 9.3  
 Reliability Results for Content Analysis of 40 Randomly Selected Rationale Memos  
 From the No-Guidance and Narrative-Guidance Experiments

	Audit Procedure			
	E-5 Packing Slip Comparison	E-6 Pricing Test	E-9 Posting Test	E-10 Confirmations
Initial agreement ratio	59%	57%	67%	56%
Cohen's kappa measure (adjusts for chance agreement)	54%	54%	62%	50%
Ultimate agreement ratio after reconciliation of differences	100%	100%	95%	98%
Z score (all significant at $\alpha \leq .10$ )	16.7	6.0	5.5	5.9

frequencies incorporate a limitation of double (or multiple) counting if one auditor referenced the same theme more than once. Thus, a second measurement, labeled comprehensiveness, is provided in figures 9.4 and 9.5. Comprehensiveness measures the percentage of subjects who referenced each theme (cue) one or more times and thus eliminates double counting.

### **Pitfalls in Content Analysis and Reliability and Validity Considerations**

Although content analysis can be quite useful in analyzing data (a text) that would otherwise be difficult to interpret, it still has some pitfalls. The link between thinking and the ability to report accurately on those factors that influence decisions is somewhat tenuous. For example, Nisbett and Wilson described a series of experiments related to retrospective reports on mental processes.<sup>4</sup> Their findings pointed to the difficulty in accurately reporting on the factors that affect perceptions.

The classification of items can also cause a deficiency in a study. Since the researcher decides on the categories and classification of items, the results can be biased by a researcher's decisions. To minimize this deficiency, categories could be selected prior to the research from data not being used in the study. Also, a second researcher should independently classify themes as a means of checking reliability.

To lend credibility to these findings, attention was paid to intercoder reliability. Intercoder reliability, as used in this study, is a measure of the independent coders' agreement on the specific assignment of these categories, taking chance agreement into account. A coefficient of agreement for nominal scales (developed by Cohen) was used to determine reliability between coders.<sup>5</sup> Tests for intercoder reliability revealed that there was a statistically significant level of agreement between coders for each set of rationale memos. The results for the forty randomly selected memos from the no-guidance and narrative-guidance experiments are summarized in figure 9.3. Reliability ranged from 50 percent to 62 percent, which, although not high, seems reasonable, given the fourteen theme categories used. Reconciled coding, which is used in subsequent analysis, resulted in 95 percent to 100 percent agreement.

It is difficult to assess the validity of a classification scheme such as the one used here. It does exhibit face validity, since the themes are

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4. Richard E. Nisbett and Timothy Decamp Wilson, "Telling More Than We Can Know: Verbal Reports on Mental Processes," *Psychological Review* 84 (May 1977): 231–59; and K. Anders Ericsson and Herbert A. Simon, *Retrospective Verbal Reports as Data*, Complex Information Processing Working Paper 388, and *Thinking-Aloud Protocols as Data: Effects of Verbalization*, Complex Information Processing Working Paper 397 (Pittsburgh: Carnegie Mellon University, 1978 and 1979).

5. Jacob Cohen, "A Coefficient of Agreement for Nominal Scales," *Educational and Psychological Measurement* 20 (Spring 1960): 37–46.



Figure 9.4  
 Summary of Content Analysis of Combined No-Guidance and Narrative-Guidance Subjects

Audit Procedure	Content Measure*	Theme Categories											Evaluation of Planned Sample				
		Test Objective	Audit Risk	Internal Control Reference	Compliance Test Results	Reliance Placed on Controls	Nature of Population	Cost or Benefit	Other Cues Relied Upon	Complementary Audit Procedures Specified	Statistical Reasoning	Heuristic Reasoning					
No Guidance																	
E-5: Picking slip comparison	Frequency Comprehensiveness	5 .60	1 .10	2 .20	7 .50	0 0	1 .10	6 .50	7 .50	10 .70	2 .20	0 0	0 0	2 .20			
E-6: Pricing test	Frequency Comprehensiveness	6 .50	1 .10	2 .20	9 .70	8 .60	1 .10	4 .30	3 .20	6 .40	4 .40	0 0	0 0	1 .10			
E-9: Posting test	Frequency Comprehensiveness	3 .20	0 .10	0 0	6 .50	0 0	0 0	4 .30	4 .40	9 .60	0 0	0 0	1 .10	7 .70			
E-10: Confirmations	Frequency Comprehensiveness	2 .20	1 .10	1 .10	5 .30	2 .20	3 .30	7 .60	9 .80	4 .30	0 0	0 0	12 .70	7 .70			

Narrative Guidance

E-5: Packing slip comparison	Frequency	7	4	9	14	1	0	5	13	3	1	1	1
	Comprehensiveness	.30	.20	.60	.90	.10	0	.40	.40	.20	.10	.10	.10
E-6: Pricing test	Frequency	7	1	2	6	3	0	5	5	9	5	0	0
	Comprehensiveness	.40	0	.20	.60	.30	0	.30	.40	.40	.20	0	0
E-9: Posting test	Frequency	4	3	1	5	1	0	5	6	3	0	0	0
	Comprehensiveness	.40	.20	.10	.50	.10	0	.60	.60	.30	0	0	0
E-10: Confirmations	Frequency	1	1	1	8	2	0	4	16	4	0	5	2
	Comprehensiveness	.10	.10	.10	.80	.20	0	.30	.80	.20	0	.30	.20

*Note:* N = 20 randomly selected memos from each experiment.

\* Frequency measures the total number of times a theme was used with replications counted.

Comprehensiveness measures percent of auditors who utilized each theme category at least once in their rationale memos.

Figure 9.5  
Summary of Content Analysis Results of Statistical Approach and Manager Review

Audit Procedure	Content Measure*	Test Objective	Theme Categories										Evaluation of Planned Sample
			Audit Risk	Internal Control Reference	Compliance Test Results	Reliance Placed on Controls	Nature of Population	Cost or Benefit	Other Cues Relied Upon	Complementary Audit Procedures Specified	Statistical Reasoning	Heuristic Reasoning	
Statistical Approach													
E-5: Packing slip comparison	Frequency Comprehensiveness	.73	.30	.43	.43	.13	.30	.60	.67	.33	.43	.07	.13
E-6: Pricing test	Frequency Comprehensiveness	.50	.31	.50	.23	.19	.77	.69	.35	.77	.0	.15	.4
E-9: Posting test	Frequency Comprehensiveness	.48	.33	.37	.15	.19	.70	.63	.22	.26	.07	.11	.2
E-10: Confirmations	Frequency Comprehensiveness	.04	.46	.07	.61	.43	.43	.82	.43	.39	.07	.07	.07

Manager Review

E-5: Packing slip comparison	Frequency	12	10	23	36	6	12	13	48	6	4	3	5
	Comprehensiveness	.37	.30	.47	.67	.23	.30	.40	.73	.23	.20	.17	.20
E-6: Pricing test	Frequency	11	10	23	23	11	2	14	35	0	4		
	Comprehensiveness	.30	.33	.53	.67	.33	.07	.43	.63	.30	.57	0	.13
E-9: Posting test	Frequency	7	4	30	26	4	5	16	25	1	3		
	Comprehensiveness	.24	.14	.59	.62	.14	.14	.45	.48	.10	.17	.03	.10
E-10: Confirmations	Frequency	4	19	12	24	4	25	22	63	13	9		
	Comprehensiveness	.13	.50	.30	.67	.13	.53	.50	.93	.03	.03	.33	.30

Note: N = all rationale memos.

\* Frequency measures the total number of times a theme was used with replications counted.

Comprehensiveness measures percent of auditors who utilized each theme category at least once in their rationale memos.

those used by auditors in their rationale memos. In addition, they compare quite closely with those developed independently by Roberts.<sup>6</sup>

### Content Analysis Results

The frequency and comprehensiveness scores for each audit procedure and for each experiment except the structured documentation are shown in figures 9.4 and 9.5. A brief review of these figures shows that the subjects were not particularly comprehensive in their memos and that the subjects exhibited a great deal of variability in the contents of their rationales. Lack of comprehensiveness is indicated because only a few themes were referenced by more than 50 percent of the subjects in their rationales. Only two items were mentioned by a majority of auditors over 50 percent of the time: compliance test results and other cues relied upon. Some items that would seem to be important in the review process were mentioned rather infrequently: the objective of the audit procedure, the risk (exposure) inherent in the transaction/account being audited, and the reliance being placed on controls. Clearly, these are items that auditors do consider; thus, their lack of explicit inclusion in the memos may be a result of such factors as lack of time or lack of guidance in memo preparation. Other possible factors are discussed by Ericsson and Simon.<sup>7</sup>

One question that may be partially answered by these data is the effect of the indirect guidance that was provided in the narrative-guidance, statistical-approach, and manager-review experiments. To evaluate this effect statistically, the comprehensiveness scores were aggregated and averaged by audit procedure for each experiment and for all procedures (figure 9.6). The overall aggregation was calculated for both the first twelve themes (excluding counting the sample size recommendation) and the first nine themes (excluding counting statistical and heuristic reasoning and discussion (anchoring) of the planned samples). Figure 9.6 shows that, on the average, subjects referenced about one-third of the items. However, the guidance provided in the statistical-approach and the manager-review experiments increased the comprehensiveness scores for both the twelve- and nine-theme analyses. Analysis of variance applied to these scores indicated statistically significant differences.

In addition to providing some evidence on the comprehensiveness of rationale and the effect of guidance, the content analysis provides some limited evidence about auditors' self-insight. In psychological and decision-making literature, self-insight indicates the ability of an expert

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6. Donald M. Roberts, *Statistical Auditing* (New York: AICPA, 1978), p. 166.  
7. Ericsson and Simon, "Verbal Reports" and "Thinking-Aloud Protocols."

Figure 9.6  
 Average Cue Comprehensiveness Scores Classified According to  
 Audit Procedure and Treatment and Results of Variance Analysis

Audit Procedure	Treatment				F-test (Significant at $\alpha \leq .10$ ?)
	No Guidance	Narrative Guidance	Statistical Approach	Manager Review	
E-5: Packing slip comparison	.30	.28	.38	.36	No
E-6: Pricing test	.30	.23	.42	.36	No
E-9: Posting test	.19	.23	.32	.27	No
E-10: Confirmations	.36	.26	.45	.37	No
Aggregated over all procedures (12 themes)	.29	.25	.39	.34	Yes
Aggregated over all procedures (9 themes)	.31	.31	.43	.39	Yes

decision maker to explicate the factors (cues or themes) that affected his or her decision. For example, did the auditors who indicated they were relying on other audit evidence (theme 9) reduce the extent of their testing? Figure 9.7 summarizes the results of an analysis of variance of such subjects, with the hypothesis being that subjects who indicated reliance would have recommended smaller samples. Although categorizing subjects in this way did not result in explaining a statistically significant amount of variance, in each case the difference was in the expected direction. Analysis of other theme categories also resulted in no significant sample size effects.

Finally, the content analysis data provide some evidence about the existence of anchoring among the subjects. The theme "evaluation of planned sample" indicates an explicit evaluation of the planned sample sizes within subjects' rationale memos. In approximately 10 percent of the cases, subjects explicitly evaluated the planned sample within their rationale memos.

## **Protocol Analysis of Auditors' Verbalizations of Their Decision Processes**

The evaluation of internal controls and subsequent integration of this evaluation into the audit planning decision is by any standard a highly complex task. Little is known, however, about the auditor's information search and decision processes. Most research in this area suggests that certain judgments related to internal control evaluation can be represented by a simple linear decision rule.<sup>8</sup> On the surface, at least, these findings represent a paradox. How can simple linear decision rules represent a decision that seems highly complex and nonlinear? The paradox may be explained by two observations. First, the studies cited above involved task situations that were simplified so that subjects could make repeated judgments on a number of cases within a relatively short period of time. This allowed the application of statistical models to the experimental results, but the experimental task may not have captured the complexity of the task that the practicing auditor faces. Second, the linear models in those studies were representational models and therefore were not necessarily descriptive of how individual subjects actually processed information in making their judgments.

One possible solution to this problem is to use verbal protocol analysis. In verbal protocol analysis, subjects are given a task and are asked to think aloud as they make their decisions. A model of each

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8. Robert H. Ashton, "An Experimental Study of Internal Control Judgments," *Journal of Accounting Research* 12 (Spring 1974): 143-57; and Edward J. Joyce, "Expert Judgment in Audit Program Planning," *Studies on Human Information Processing in Accounting*, Supplement to vol. 14 of the *Journal of Accounting Research* (1976): 29-60.

Figure 9.7

Auditors' Self-Insight Analyzed in Terms of Effects of  
 Explicit Reliance References on Sample Size Decisions for  
 Combined No-Guidance and Narrative-Guidance Experiments

Audit Procedure	Independent Variable	Classification	Group Sample Size Means	F Value	Significant at $\alpha \leq .10?$
E-5: Packing slip comparison	Relied on other audit evidence?	Yes	81.7	.001	No
		No	82.3		
E-6: Pricing test	Relied on other audit evidence?	Yes	66.7	.54	No
		No	74.8		
E-9: Posting test	Relied on other audit evidence?	Yes	57.7	1.30	No
		No	73.3		
E-10: Confirmations	Relied on other audit evidence?	Yes	328	2.65	No
		No	385		



subject's problem-solving behavior is developed from the verbalizations (verbal protocols). Thus, verbal protocol analysis provides a basis for developing a trace of subjects' step-by-step information processing as they make a complex decision.

Verbal protocol analysis might be expected to provide answers to the following types of research questions:

1. What decision models describe an individual auditor's study and evaluation of internal accounting controls and design of related audit programs?
2. What are the step-by-step processes used by auditors to make a complex internal control evaluation?
  - a. What information search patterns are used?
  - b. How much information is explicitly referenced?
  - c. How do auditors process the information and knowledge related to the evaluation of internal controls and related audit program decisions?
  - d. What types of analytical processes or *operators* are used, and what is their frequency?
  - e. What types of decision rules, heuristics, conjectures, and assumptions are being used or being made?
  - f. Are there some general patterns that characterize their decision behavior?

One reason that research has ignored studying questions such as these is that the methodology for data collection and data analysis is not well known. However, verbal protocol analysis has been used to study decision-making in a variety of highly complex situations, such as chess and arithmetical tasks.<sup>9</sup>

### **Tasks and Subjects**

Four experienced audit seniors (two with fair and two with strong internal accounting control treatments) were the subjects. The task was the one discussed in chapter 5 and Appendix A. The only differences were that the case materials were put into audit binders and the subjects were given a practice session on an accounting task to become familiar with the tape recording process.

### **Data Collection**

The subjects were asked to think aloud as they performed the task, and

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9. Allen Newell and Herbert Simon, *Human Problem Solving* (Englewood Cliffs, N.J.: Prentice-Hall, 1972).

their verbalizations were recorded on audio tape. The tape recordings were transcribed into short phrases in accordance with procedures established by Newell and Simon.<sup>10</sup> An example of such a transcript is shown in figure 9.8.

### Verbal Protocol Scoring Procedures

Each subject's protocol was scored by two researchers to identify the types of operations performed (termed operators), data sources referenced, and decision heuristics used by each subject. By preparing and reconciling a preliminary coding of two subjects' protocols, a list of operators being used was developed. This list, which is detailed in figure 9.9, contains operators representing subjects' task structuring, information search, analysis, and decision activities. Formal scoring (coding) rules were developed and applied to all four subjects, and differences were reconciled.

Figure 9.8  
Example of Protocol Transcript From Subject B

Line Number	Verbal Protocol
906	this, the attribute sample test. It just might not be,
907	it might not be the proper use of the test itself,
908	in the fact that we're not addressing the identified strengths
909	in two out of the three tests,
910	which is cause for concern.
911	It seems to be . . . (Here again, you're on E-6, are you?)
912	Yes, I'm just now, I'm just going to basically review the entire program,
913	just to highlight what we've already discussed
914	and possible revisions.
915	Again, these random selections are still,
916	they just really seem to be . . .
917	We did it last year, they probably did it the year before,
918	so why not do it this year?
919	These selections should be based on the results of prior year result,
920	of prior year test work,
921	and detailed it accordingly, either increase or decrease.

10. *Ibid*, p. 166.

Figure 9.9  
Operators and Operator Definitions  
Used in Coding of Verbal Protocols

Operator	Notation	Brief Definition*
<u>Task Structuring</u>		
1. Set goal	SG	Assigned when the subject specifies a goal to be accomplished in performing the sample size decision. The SG operator usually signifies the beginning of an "episode" or "sub-episode."
<u>Information Search</u>		
2. Information search	IS	Assigned when the subject searches the case materials for specific pieces of information (directed search) or searches following some systematic pattern (usually sequential search). A piece of information is defined as all the words contained under one label (section) in the case materials.
3. Algebraic calculation	AC	Assigned when the subject makes a mathematical calculation in order to obtain new information about the task.
4. Information retrieval	IR	Assigned when the subject retrieves a previously stored piece of information from external memory (i.e., notes, calculations) or internal memory.
<u>Analytical</u>		
5. Assumption	AS	Assigned when the subject generates an arbitrary (unspecified) fact about the case.
6. Conjecture	CJ	Assigned when the subject makes an if-then or hypothetical statement.
7. Comparison	CN	Assigned when the subject makes a judgment based on a comparative process (i.e., two alternatives, the current and prior year's programs).
8. Evaluation	E	Assigned when the subject makes a teleological judgment about the task based on some explicit or implicit criterion.
9. Generate alternative	GA	Assigned when the subject specifically states a tentative sample size alternative.

<u>Operator</u>	<u>Notation</u>	<u>Brief Definition*</u>
10. Generate query	GQ	Assigned when the subject raises a question about the task.
<u>Decision Process</u>		
11. Decision rule	DR	Assigned when the subject specifies a method (including heuristics) of determining a sample size or parameters (i.e., stratification) directly related to the sample size decision.
12. Sample size	SS	Assigned when the subject finalizes the sample size (SS) or specifies a temporary sample size (TSS) that is ultimately revised.
13. Temporary sample size	TSS	
14. Other decisions	OD	Assigned when the subject recommends that other actions be taken (i.e., "must consult with manager," or recommends an additional audit procedure).

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\* The actual definitions used were more detailed and contained examples. Complete definitions are available from the authors.

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To determine the reliability of the verbal protocol scoring, a measure termed the Kappa Coefficient was used to determine the amount of nonchance agreement between the two researchers.<sup>11</sup> A Kappa Coefficient of 55 percent, which is statistically significant, was obtained.

## Results

The research results obtained from the protocol study include evidence concerning auditors' information search and decision processes. The evidence indicates a rather complex task requiring a significant amount of information search and analytical operations. The evidence may be analyzed at both a micro and a macro level. Micro-level analysis focuses on the specific operators used, whereas macro-level analysis attempts to capture the overall aspects of the decision process.

Figure 9.10 contains a summary of the frequency with which operators were assigned to each auditor. The table also includes the number of pages and lines in each verbal protocol. On the average, information search encompassed 39 percent and analysis 54 percent of the assigned operators. Subjects generated and evaluated numerous alternative solutions. Task uncertainty is evident in the large number of explicit conjectures and assumptions that were stated.

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11. Cohen, "Coefficient of Agreement."

Figure 9.10  
Frequency of Operator Use by Protocol Subjects  
and Measures of Length of Protocol

	Subject A	Subject B	Subject C	Subject D
Task Structuring Operator				
Set goal (SG)	8	20	13	4
Information Search Operators				
Information search (IS)	189	148	165	53
Algebraic calculation (AC)	23	31	6	5
Information retrieval (IR)	7	23	8	15
Analytical Process Operators				
Evaluation (E)	237	159	166	29
Generate alternative (GA)	42	42	47	9
Generate query (GQ)	49	41	1	7
Conjecture (CJ)	45	9	15	7
Assumption (AS)	0	9	5	2
Comparison (CN)	48	29	30	5
Decision Process Operators				
Decision rule (DR)	0	3	1	2
Temporary sample size decision (TSSD)	3	2	4	5
Sample size decision (SSD)	11	7	7	5
Other decisions (OD)	31	10	19	7
Total Identified (Coded) Operators	<u>693</u>	<u>533</u>	<u>487</u>	<u>155</u>
<i>Length of Typed Protocol</i>				
Number of pages	62	70	60	19
Number of lines	1,449	2,015	1,726	477

The time, about two hours, required to complete the task was approximately the same for the protocol and experimental subjects discussed in previous chapters. The completion of the task generated an average of over 1,400 lines of text, most of which contain a complete sentence or thought.

The protocols were examined for overall or macro indicators of behavior, including the completeness of subjects' information search, systematic decision process patterns, and evidence of decision heuristics. The results are summarized in figure 9.11. Completeness of information search is indicated by the ratio of the number of items of information explicitly referenced through information search operations and total items of information (144) contained in the case materials. As is evident in figure 9.11, subjects A and C explicitly searched out over 85 percent of the items. This represents evidence of comprehensive

Figure 9.11  
Subjects' Information Search and Decision

	Subject A	Subject B	Subject C	Subject D
Proportion of 144 information items referenced	86.1%	47.2%	88.2%	35%
Characterization of subject's decision process	Systematic search	Systematic search directed by audit program	Systematic search	Search directed by four reviewed audit procedures
Evidence of decision heuristics	Possible anchoring, rule of thumb for confirmation stratification	Anchoring	Anchoring, halo effect	Anchoring

information search, which is also correlated with our characterization of these subjects' decision processes.

The issue of decision process was investigated by use of episode and problem behavior graph analysis.<sup>12</sup> First, a number of theoretical decision models and approaches were considered. Most of the existing theoretical models ignore information search, which is an important part of the task in this study. One possible combined information search and choice model is reproduced as figure 9.12. This model addresses

Figure 9.12  
One Possible Decision Process Flowchart

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Task—Recommend a sample size for audit procedure E-N.

Episode I—Goal: Determine the nature and objective of the audit procedure.

1. Determine the account (and related transactions) being audited.
2. Determine test objectives.
  - a. What are the implied audit risks?
3. Determine planned audit procedures.
  - a. Nature
  - b. Extent
  - c. Timing
  - d. Prior evidence and rationale

Episode II—Goal: Determine to what extent the system may be relied on.

4. Gain an understanding of the system.
  - a. Controls
  - b. Strengths and weaknesses
  - c. Possible errors
5. How was the system audited?
  - a. What compliance tests were conducted?
  - b. What were the test results?
6. Determine what reliance may be placed.
  - a. What reliance did the manager place?
  - b. Accept or reassess?
  - c. Reliance decision.

Episode III—Goal: Reach a sample size recommendation.

7. What other audit evidence is relevant?
    - a. Are there substitute procedures?
    - b. Does interrelated, complementary, or compensating evidence exist?
  8. What are the costs and benefits of the alternatives?
  9. Determine sample size.
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12. See Newell and Simon, *Human Problem Solving*, and Stanley F. Biggs, "An Investigation of the Decision Processes Underlying the Assessment of Corporate Earning Power" (Ph.D. diss., University of Minnesota, 1978).

the task of recommending a sample size in terms of set goal, information search, and decision operations.

According to the analysis conducted, the subjects tended to use one of two strategies:

- **Systematic Search Strategy**—This strategy involved a comprehensive search of available information and the information system before any attempt to make an extent decision.
- **Directed Search Strategy**—This strategy involved the selection of a particular audit step and then a search for information relevant to the sample size decision for that audit step alone. Once that decision was made, a similar process was employed on the next audit step. Thus, there was a particular information search for each audit step.

Subjects A and C used a systematic search that entailed first an in-depth review of the environmental data, the planning data, and the information system flowcharts. Subject D used a directed search process, which began with selection of a specific audit procedure and continued with a search of the materials in terms of their relevance to that procedure. Subject B used a hybrid approach in which the search and evaluation operations were directed by a sequential consideration of all audit program steps (E-1 through E-16).

Thus, although not conclusive, this phase of the research provides some insight into the comprehensiveness of information search (up to 88 percent of available data) and the decision processes that were used. It also provides some evidence of the decision heuristics used by subjects. Figure 9.11 indicates that anchoring was evident in all four subjects and that subject B used a rule of thumb in stratifying his confirmations (to gain greater dollar coverage). The protocols contained explicit anchoring references, such as that reproduced in protocol lines 917 and 921 in figure 9.8.

## Limitations

Like most other research methods, protocol analysis exhibits both strengths and limitations. Limitations include the possibility that the verbalization and taping might have had an obtrusive effect on the subjects.<sup>13</sup> Also, costs of transcribing, coding, and analyzing the protocols tend to prohibit large sample sizes. Finally, there is now no standard set of operators for a typical audit task, nor has any standard method of characterizing decision processes been developed.

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13. However, research to date indicates little likelihood of obtrusive effects in properly designed protocol studies. See Ericsson and Simon, "Verbal Reports" and "Thinking-Aloud Protocols."



## Summary

This chapter has presented the results of the content analysis of subjects' rationale memos and a protocol study of the subjects' information search and sample size choice processes. Rationale memo content was found (1) to be significantly affected by the guidance treatments, (2) to vary considerably among auditors, and (3) to exhibit limited comprehensiveness. In contrast, the protocol study indicated up to 88 percent comprehensiveness in subjects' information search of the provided audit materials. The protocol analysis identified three general categories of operators that subjects used: (1) information search, (2) analytical, and (3) choice. On the average, 93 percent of the subjects' decision activities were devoted to information search and analytical operations. In addition, the protocol analysis helped identify two general strategies that auditors seemed to use in this task: a search directed primarily by each audit procedure and a systematic search focused initially on gaining an understanding of the accounting system.

# 10

## Summary and Implications

Although the implications of research findings and future research paths are, to a great extent, the bottom line of a research project, the reader should be aware of the difficulties in drawing generalizations and implications from research. Most research is based on a number of critical assumptions and is constrained by a number of limitations. This study is no exception, although it does exhibit advantages over many previous audit research studies—multiple experiments, adequate sample size, actual auditor subjects, highly motivated subjects, to name but a few. Several possible limitations of this study have been discussed in preceding chapters and need not be repeated.

The findings of this study cover a wide range of factors and circumstances. These multiple results make implications even more difficult to draw than would be the case in a more typical one- or two-factor research study. The major research implications and related future research questions may be discussed in terms of six types of findings: (1) variability among auditors in their various recommendations, judgments, and interpretations, (2) documentation of auditor rationale, (3) the effect of auditor guidance, (4) the effect of the audit review process, (5) behavioral factors, and (6) the impact of task complexity.

### **Variability**

The analysis of auditors' decision processes concerning internal accounting controls, contained in chapters 2, 3, 4, and 6, identified many relevant variables, including combined audit risk factors, relevant internal controls, the internal control environment, and trade-offs in nature,

timing, and extent of alternative packages of audit procedures. It is not surprising, then, that the actual sample size decisions and rationale documentation exhibited a great deal of variability among auditors. Variability was observed in terms of the factors that are inputs into auditors' sample size recommendations, including their interpretation of the nature (substantive, compliance, dual purpose) of the audit procedure, their judgments about appropriate alpha risk, beta risk, and materiality, the relevance of various internal control strengths and the amount of reliance that they were willing to place on the compliance-tested strengths, and their information search strategies, as evidenced in a protocol study. What is perhaps more surprising is the rather small percentage of variability that can be explained by various statistical models and the number of factors researched.

The major implication of variability in sample size recommendation concerns the possible risk of unwarranted reliance on small sample sizes and the risk of excessive audit cost for large samples. Such risks may be directly related to decision variability *only if* other audit planning factors remain constant. The magnitude of such risks can only be measured if future research studies can quantitatively relate the quality of internal controls to the many other variables in the audit, including ultimate risk, probability of material error or irregularity, and audit cost. Such a normative solution to the experimental case study was not obtained. If it were deemed desirable, sample size variability could possibly be reduced through the review process, through a narrowing of decision alternatives by specifying standards or ranges, and perhaps through elimination of certain judgments by automating them. Such approaches need further study, particularly since the variables expected to reduce variability in this study (guidance and manager review) did not have a significant effect.

The second aspect of observed variability concerns the lack of explained variance in terms of the statistically evaluated variables. For the sample size decisions, this implies that many decision variables and decision approaches may have been used. For the observed variability in rationale documentation, this could lead to difficulties in communication and thus in review. Issues concerning rationale documentation are discussed in the following section.

In general, lack of explained variability shows that too little is known about the complex decision process underlying internal accounting control evaluation and rationale documentation.

## **Rationale Documentation**

As noted in chapters 8 and 9, rationale documentation was not comprehensive when compared to a twelve-cue dictionary of items that would

help justify an audit sample size recommendation. Comprehensiveness was increased by the guidance provided in three of the experiments, but memo content varied significantly among auditors and audit teams. In most cases, rationale documentation followed the auditor's review of the audit materials and thus was prepared after each decision (retrospectively) rather than concurrently with the decision process. Given the task's complexity and the retrospective nature of the documentation, lack of comprehensiveness was not surprising. The results indicate that, if formal decision documentation needs to be improved, alternative means of documentation need to be developed and tested.<sup>1</sup> Alternatives include concurrent documentation through structured planning forms or through automation of internal control evaluation. Such automation would be similar to what is frequently done in computer-assisted statistical sampling, in which key decisions are input to the system and may be permanently stored in memory. This research indicates that open-ended, narrative rationale memos are unsatisfactory in many respects.

## **Guidance**

The accounting profession invests significant resources in formal training and audit program guidance. Thus, research on the impact of the effect and effectiveness of various types of guidance should be welcomed. In this research study, several types of guidance experiments were designed and implemented following the first two experiments.<sup>2</sup> Although the guidance provided had no significant effect on sample size decision variability, the guidance increased the comprehensiveness of rationale documentation. Also, the behavioral halo effect observed in the early experiments was not significant in the latter experiments in which internal control evaluation guidance was provided. Although these results imply that such guidance may be useful, the cost/benefit aspects have not been researched. Also, other experimental results, such as unexplained variability, may indicate that improved guidance or decision aids need to be developed and tested.

## **Review Process and Behavioral Factors**

*In addition to the results and implications already summarized, some limited results were obtained with respect to the audit review process*

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1. The desirability of improvement is basically a cost/benefit question beyond the scope of this research.

2. "Guidance" is used here to include both the structured-guidance experiment and the guidance provided in the statistical and manager-review experiments.

and several investigated behavioral factors. The manager-review experiment involved thirty audit senior–audit manager teams in which a manager reviewed the senior's recommendations and rationale memos. Then both auditors met and jointly reached a decision. Their joint results did not differ significantly from the individual auditor decisions in terms of sample size, sample size variability, or content of their rationale memos. Little research has been conducted within an auditing context on group or joint decisions; thus, it is difficult to speculate about the factors that may have led to these findings. The most obvious hypothesis relates to the relatively limited comprehensiveness of the narrative rationale memos coupled with the task's complexity. These two factors may have mitigated any potential review effect. Perhaps research into content analysis of rationale documentation and other review techniques is needed. Perhaps standardized documentation and approval forms are indicated.

The results obtained with respect to behavioral factors are limited, since they encompassed secondary research objectives. Yet, some evidence was obtained that indicated possible halo effects, where the auditor reduced a sample size decision on the basis of general improvement in internal accounting controls rather than specific, directly related controls. Subjects also seemed to anchor on previously planned sample sizes. Both content analysis of rationale memos and a protocol study of selected auditors' information search and decision processes indicated anchoring, use of rules of thumb (heuristics), and substantial differences in search and choice models. These results support the increasing amount of behavioral auditing research that is now occurring. Educational programs that may increase an auditor's awareness of behavioral factors are also indicated.

The experimental findings with respect to halo effect and possible anchoring may have implications for the preparation of audit programs. If halo effect is shown to impair appropriate weighting of specific control improvements, auditors could be instructed to make sharper distinctions between improvements in general and specific internal controls. If anchoring is shown to be a barrier to determining appropriate sample size, it may be advisable to design the planning process so that anchors are not available. The results obtained in the guidance versions of the experiments also indicate that structured documentation forms and formal review may counteract such factors and behavioral tendencies.

## **Task Complexity**

Perhaps the most pervasive, though general, finding that arose both from the experimental and review phases of this study concerns the significant complexity involved in internal accounting control evaluation.

This conclusion is valid even from the limited perspective of an external auditor reviewing controls purely as an input into audit program design. Internal control reviews with more general objectives would seem to exhibit even greater complexity. Task complexity was evident in a number of findings:

- A large number of information inputs are required (see figures 5.3, 6.1, 6.2, and 9.11 and Appendix A).
- A significant number of interrelated auditor judgments are required (see figure 5.2).
- Lack of professional consensus, and thus ambiguity, exists with respect to many of the input cues. For example, judgments varied considerably in terms of auditors' interpretation of the nature of audit evidence, relationships among test objectives, compliance test results, and related substantive tests.
- Lack of statistical or judgmental decision norms exists. Unambiguous, normative decision rules have yet to be derived concerning many factors, including appropriate conditions for reliance and trade-offs among audit risk and cost factors.
- Numerous approaches and techniques exist for identifying, documenting, and evaluating internal accounting controls (see chapter 4).
- No method has yet been implemented for cost/benefit analysis although a notion of net benefit is contained in the second and third standards of audit field work.

These items imply that further research is needed. It should be noted, though, that research on complex decision situations, ill-structured decisions, and group decision-making is still somewhat primitive. Thus, short-term breakthroughs may be unlikely. Task complexity may also indicate that the accounting profession may require an experimental and developmental period before resolving the issues related to the growing interest in internal control systems.

# APPENDIX A

## Olde Oak Case Materials

(For "no guidance," "fair controls" version of case)  
(Abbreviated audit program)

### Biographical Data

Name \_\_\_\_\_

Office \_\_\_\_\_

Classification \_\_\_\_\_

No. of Years Audit Experience \_\_\_\_\_

	<u>Yes</u>	<u>No</u>	<u>If Yes, for How Long?</u>
SAS*	_____	_____	_____
CAS**	_____	_____	_____

\_\_\_\_\_

\* Statistical audit specialist

\*\* Computer audit specialist

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### Olde Oak Framing Supplies, Inc. Case Study Instructions

This case has been prepared to represent a realistic audit situation concerned with the auditor's specification of the nature, extent, and timing of substantive audit procedures. The case focuses entirely on a portion of Olde Oak's revenue cycle. You are asked to assume the role of the new in-charge accountant for Olde Oak, which has been a client for several years. In the attached materials, you will find a description of your role, the client, and the audit programs for this year and last, as well as bridging workpapers and other materials prepared during an audit.

#### Task

The major task you are asked to do is to prepare recommendations concerning the nature, extent, and timing of substantive procedures.

You have been budgeted two hours to complete this task. We would recommend approximately the following time allocation.

1. Review of case materials 30 minutes  
*Note:* You should not critically evaluate the flowcharts, bridging workpapers, and other system documentation, but merely should familiarize yourself with

the client's system. You are expected to evaluate only this year's *audit program* in regard to the nature, extent, and timing of procedures.

2. Analysis and decision about the nature, extent, and timing of substantive procedures. 30 minutes
3. Preparation of a rationale memo for the engagement manager that includes your specific recommendations and documents your reasoning and analysis. 30 minutes
4. Completion of questionnaires (to be completed after step 3 is done). 30 minutes

John Thomas, last year's senior-in-charge, left the firm to head the internal audit department of one of our bank audit clients. Unfortunately, John left during this year's interim at Olde Oak Framing Supplies. You have been assigned as the new senior-in-charge and must complete interim and final audit work. After reviewing last year's and this year's workpapers and discussing the audit with the manager, Wally Barnes, you have made the following notes.

1. The programs for last year and as designed for this year are substantially the same in regard to the nature, extent, and timing of procedures, except for step E-6, which has been modified to provide a compliance test of a new strength.
2. There were no adjusting journal entries required by the firm for any account in the revenue cycle at December 31, 1976.
3. General controls appear to be good, and the possibility of management override is not significant.
4. Wally Barnes believes that the flowcharts are an accurate representation of the client's system and that strengths and weaknesses are properly identified on the flowcharts and in the bridging workpapers. He has instructed you, therefore, *not* to evaluate these workpapers critically, but to evaluate the nature, extent, and timing of the *uncompleted* interim audit steps. Specifically, he has asked you to review steps E-5, E-6, E-9, and E-10 to determine if the originally planned extent of sampling is still reasonable or appropriate in light of known changes in the system, the results of procedures already completed, and his decision about the degree of reliance. Wally has asked for *specific* sample sizes and wants you to document your rationale in selecting these sample sizes.
5. After discussion with the assigned computer specialist, it has been decided that our computer audit program will be used only to prepare confirmations, to foot the accounts receivable file, and to prepare an aging of accounts receivable. *Statistical sampling will not be used for selection of sample sizes.*
6. Results of last year's compliance tests were as follows:
  - a. The test for numerical sequence (E-3 a, b) revealed that the clerks were not issuing invoices sequentially. When they needed a supply of invoices,



they simply picked up a handy box in the supply room without regard to the numbers contained in the box.

- b. The review of the packing slips (E-3 c) revealed numerous sequence errors. These appeared to be a result of both the problem mentioned in (a) and a general laxity on the part of the dispatcher.
  - c. Step E-8 revealed that the manager was performing only a *limited* review and spot check of the monthly statements, invoices, and aged trial balance.
  - d. The clerk assigned the responsibility of reviewing the customer suspense file monthly was not following up on unmatched invoices (step E-7).
  - e. Because of the pervasive exceptions encountered during the compliance tests, the audit team placed *no* reliance on the system of internal controls for purposes of designing substantive tests.
7. The following were the results of last year's substantive tests:
- a. The test for the reliability of the pricing and extension function indicated that there were numerous errors made when the regular clerk was ill or on vacation or when other clerks were used during high-volume days. These instances occurred frequently enough to warrant a management letter comment suggesting that pricing and extensions be checked by a second clerk. They were not of such magnitude, however, to require an adjusting journal entry as of December 31, 1976. An adjustment reflecting pricing errors that were noted was waived because of immateriality.
  - b. Confirmation results are shown on an accompanying page.
8. Results of this year's compliance tests are as follows:
- a. As a result of a management letter comment, the clerks have been issuing invoices on a strict numerical sequence. The audit test revealed no exceptions to this control strength.
  - b. The review of the packing slips (E-3 c) revealed only a moderate number of exceptions. These exceptions appear to be due primarily to laxity on the part of the dispatcher.
  - c. Step E-8 revealed that the manager was still performing only a *limited* review and spot check of the monthly statements, invoices, and aged trial balance.
  - d. The clerk assigned the responsibility of reviewing the customer suspense file monthly was still not following up on unmatched invoices (step E-7).
  - e. The compliance test of whether the clerk's initials indicate a check of pricing, extensions, and footings (step E-6 a) failed on the thirty-third item tested.
  - f. Because the results of the compliance tests were generally better than last year, Wally Barnes has decided that we should be able to place *some* reliance on internal controls for purposes of designing this year's substantive tests.

9. Notes on this year's program—Olde Oak installed the new internal control suggested in the management letter comments effective February 1, 1977 (see bridging workpapers): having an independent check of the pricing, extension, and footing of invoices. On the basis of inquiry and prior years' data, it does not appear that invoices issued in January are of a different make-up than invoices issued at other times of the year. We shall, therefore, test the control for an eleven-month period and extend the results to the full year (step E-6).

Details of Accounts Receivable  
As of 10/31/77

<u>Range</u>	<u>Number</u>	<u>Amount</u>
\$ 0-500	1020	\$ 250,250
500-1000	680	522,700
1000-1500	340	425,622
1500-2000	150	262,509
2000-2500	76	168,651
2500 or above	49	149,100
Total	<u>2315</u>	<u>\$1,778,832</u>

Included in the above amounts were forty-five accounts, amounting to \$17,652, that were past due sixty days or more.

At this point, you should review the uncompleted portion of the interim program and do the following:

1. Review the sampling plans and develop specific recommendations to leave as is or change nature, extent, or timing.
2. Document your recommendations in a rationale memo, using the attached form. Please do *not* prepare a memo such as you would put in the workpapers but, instead, try to explain your true thought processes. For example, you may have considered the time budget, the manager's likes and dislikes, or other criteria or made assumptions that you would not normally document in actual workpapers. Items such as these should be discussed in this rationale memo along with the more traditional decision factors.

**Olde Oak Framing Supplies  
Rationale Memo**

Documentation of reasons and analysis  
to be submitted to audit manager

For audit steps E-5, E-6, E-9, and E-10, indicate the rationale for all changes in the extent of recommended audit procedures. Where you have indicated no change, also indicate why. Be as specific as possible about the factors that influenced your recommended sample sizes.

The results of last year's confirmation work were as follows (as of 10/31/76):

Type	Total Number	Number Mailed	% Mailed	Number Received	% Received	Total Dollars	Dollars Mailed	% Mailed	Dollars Received	% Received
Past dues (P)	40	40	100.0%	20	50.0%	\$ 20,400	\$ 20,400	100.0%	\$ 12,852	63.0%
Over \$2500 (P)	41	41	100.0	35	85.4	124,757	124,757	100.0	99,806	80.0
Under \$2500 (P)	2051	345	16.8	265	76.8	1,544,733	248,702	16.1	196,475	79.0
Total	2132	426	20.0%	320	75.1%	\$1,689,890	\$393,859	23.3%	\$309,133	78.5%

(P)—Positive confirmations sent.

Note 1: Alternative work was performed on all nonreplies.

Note 2: No exceptions of audit significance were noted either on the replies or as a result of the alternative test work.

### Abbreviated Audit Program

(Steps E-2, E-7, E-8, and E-11 through E-16 deleted)

Examination of Revenue Cycle Sales, Cost of Sales, Accounts Receivable  
 Company Olde Oak Framing Supplies Period ended 12/31/77

Item No.	Auditing Procedure	Period and Extent	Done By
	<p>The objectives of our audit of the revenue cycle are to ascertain that there is</p> <ul style="list-style-type: none"> <li>• Proper recording of items shipped as sales and proper period cutoff.</li> <li>• Proper matching of sales and cost of sales.</li> <li>• Propriety and collectibility of accounts receivable balances and proper period cutoff.</li> </ul> <p>If, after the system has been tested and evaluated, we determine that the system is <u>not functioning as effectively as anticipated</u>, the originally designed substantive procedures will be appropriately modified and documented.</p> <p style="text-align: center;">Interim Examinations</p>	<p><i>Noted</i></p> <p> </p>	<p>JT</p> <p>JT</p> <p>JT</p> <p>JT</p>
E-1	Familiarize yourself with the client's revenue cycle procedures by reviewing the flowcharts, narratives, and bridging workpapers developed during the field work planning phase of the audit.		JT
E-3	<p>Test for numerical sequence of sales invoices.</p> <p>a. Review unissued sales invoices for numerical sequence.</p> <p>b. Randomly select <u>Three</u> months during the year, and</p> <ul style="list-style-type: none"> <li>• Obtain the monthly reconciliations for the numerical sequence of the prenumbered sales invoices. These reconciliations help ensure that all invoices for goods shipped are forwarded for processing.</li> <li>• Examine the reconciliation for propriety and note follow-ups of old outstanding invoices.</li> <li>• Review the numerical sales invoices file for the same <u>Three</u> months for sequence.</li> </ul> <p>c. On a surprise basis for <u>One</u> day(s)</p> <ul style="list-style-type: none"> <li>• Review the packing slip file of the dispatcher for numerical sequence. Note any missing packing slips in the file and determine the reasons for the missing packing slips.</li> <li>• Review the numerical suspense file in the general office for invoices over <u>Thirty</u> days old and determine whether follow-up action has been taken.</li> </ul>		<p>Jm</p> <p>Jm</p> <p>Jm</p> <p>Jm</p> <p>Jm</p> <p>DB</p> <p>DB</p>
E-4	By observation and inquiry, determine that sales invoices are required for merchandise to be shipped from the warehouse.		DB
E-5	<p>Randomly select <u>150</u> packing slips in the dispatcher's file and</p> <p>a. Trace to the corresponding processed invoice.</p> <p>b. Agree types and quantities of goods shipped with types and quantities billed to the customer.</p>		

**Abbreviated Audit Program (continued)**

**Examination of** Revenue Cycle Sales, Cost of Sales, Accounts Receivable  
**Company** Olde Oak Framing Supplies **Period ended** 12/31/77

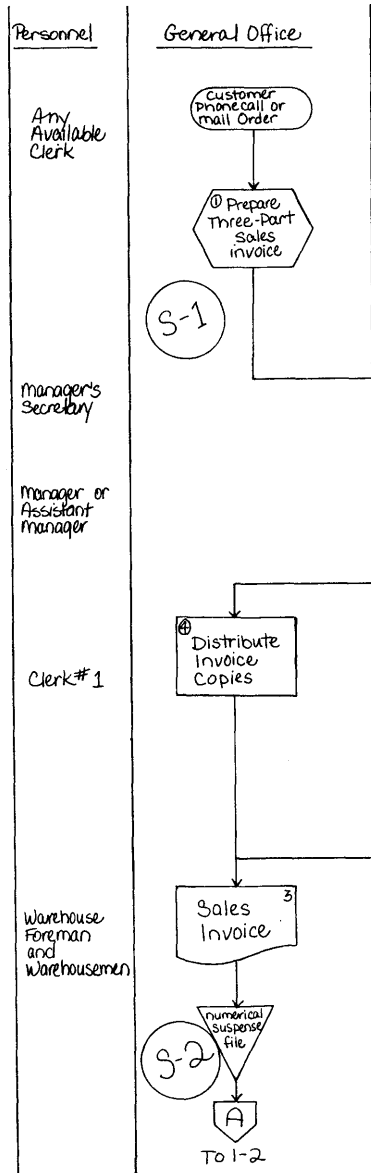
Item No.	Auditing Procedure	Period and Extent	Done By
E-6	<p>For the period <i>after</i> installation of the control, use attribute sampling with a <u>95%</u> confidence level and a <u>5%</u> upper precision limit to select a minimum sample of <u>59</u> invoices and perform the following:</p> <p>a. Determine that a second clerk has initialed the invoice to indicate that the control step of checking extensions and prices has been performed.</p> <p>b. For the same <u>59</u> invoices, compare billing prices on the invoices to selling prices in effect at the invoice date.</p> <p>c. For the same <u>59</u> invoices, check extensions and footing totals.</p> <p>d. Prepare a memo documenting the degree of reliance that can be placed on the control in designing other substantive tests.</p>		<p><i>Jm</i></p> <p><i>Jm</i></p>
E-9	<p>Randomly select <u>100</u> invoices from the numerical invoice file and trace the totals to the accounts receivable records.</p>		
E-10	<p>Confirmation of accounts receivable will be done as of <u>10/31/77</u>. If compliance testing indicates weaknesses in controls affecting validity of accounts receivable balances, notify the in-charge accountant immediately.</p> <p>a. Using the firm's computer audit package, perform the following:</p> <ul style="list-style-type: none"> <li>• Prepare and foot a detailed listing of accounts receivable as of the confirmation date.</li> <li>• Reconcile the balance with the general ledger.</li> <li>• Prepare positive confirmations as follows:               <ol style="list-style-type: none"> <li>1. <u>All</u> accounts over sixty days past due.</li> <li>2. <u>All</u> accounts over \$2500.</li> <li>3. <u>345</u> accounts of the remaining number.</li> </ol> </li> </ul> <p><i>Note: We have in our possession a magnetic tape of Olde Oak accounts receivable at <u>10/31/77</u>, which can be used for the above operations.</i></p> <p>b. Check replies to confirmations and investigate all exceptions.</p> <p>c. Second requests should be sent on positive confirmations for which no replies are received within two weeks.</p> <p>d. Investigate all undelivered requests returned by post office. If possible, obtain better addresses and remail. Apply alternative auditing procedures to requests that cannot be delivered and to positive requests for which no replies are received.</p>		

# System Flowcharts

**Olde Oak Framing Supplies**  
Evaluation of Internal Control-Revenue Cycle  
Sales, Cost of Sales, Accounts Receivable  
 12/31/76                      12/31/77

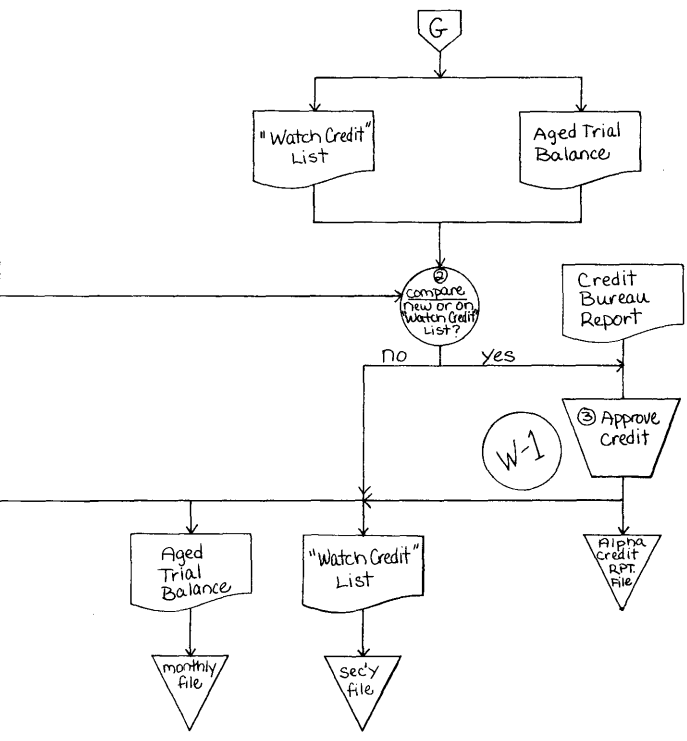
W.P. No.	1-1
Accountant	JT
Date	6/29/76
Reviewed 7/15/77 JT	

- Procedure
- ① All orders are either received in the mail or phoned in by the customer. Procedures are the same for either method. Order is entered on a three-part, pre-numbered, sales invoice. Approximately 20,000 invoices are processed annually. Invoices are issued sequentially.
  
  - ② If customer is new or on a "watch Credit" List, Manager or Assistant Manager must approve credit; otherwise invoice is initialed and forwarded.
  
  - ③ Get credit bureau report. If credit is not approved, customer is contacted and other terms are arranged or invoice is voided. Invoice is initialed and forwarded.
  
  - ④ Distribute Invoice copies:  
 No. 1 and No. 2 are given to the warehouse foreman who assigns warehousemen to fill orders.  
 No. 3 is filed numerically. File is reviewed monthly. Older unmatched invoices are discussed with the dispatcher.
  
  - ⑤ Orders are filled by warehousemen, using invoice copies. Items short or not in stock are lined out. Filing order includes complete preparation for shipping. Method of shipping depends on size and weight of shipment. Filing order also includes preparation of packing slip. Packing slip assigned same number as invoice.

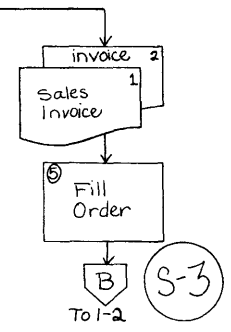


Manager's Office

From 1-4



Warehouse



**Olde Oak Framing Supplies**  
Evaluation of Internal Control-Revenue Cycle  
Sales, Cost of Sales, Accounts Receivable  
 12/31/76                      12/31/77

W.P. No.	1-2
Accountant	JT
Date	6/29/76
Reviewed 7/15/77 JT	

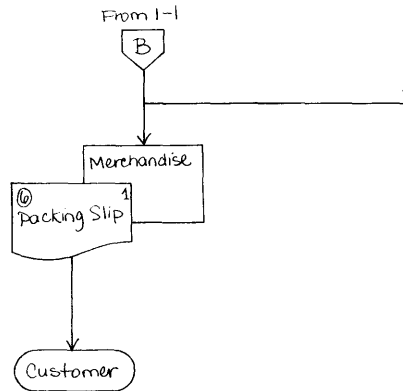
Procedure

- ⑥ One copy of packing slip is included with merchandise being sent to customer.
- ⑦ Match corrected invoice copies No. 1 and No. 2 with final packing slip prepared by Warehousemen. Invoice copies are returned to the general office.
- ⑧ Match invoice copies No. 1 and No. 2 received from Dispatcher with control copy No. 3.  
 Line out short or out of stock items on copy No. 3. Prepare "Out of Stock" report for Manager to use in purchasing decisions.
- ⑨ Price and extend all three invoice copies for delivered items using the most current selling prices. These are kept in a loose-leaf notebook for general office use.
- ⑩ Distribute invoice copies:  
 No. 1 - Batch file  
 No. 2 - Customer Suspense file  
 No. 3 - Numerical file  
 If an invoice is voided, copy No. 2 is filed with copy No. 3 and copy No. 1 is included with others in Batch file.
- ⑪ At the end of each month missing invoices are accounted for, a reconciliation is prepared and follow-up on missing invoices is documented.
- ⑫ A second clerk checks prices to a separately maintained loose-leaf notebook and also checks extensions and footing. This step was added as a result of the 12/31/76 management letter. Clerk # 3 initials invoice after checking.

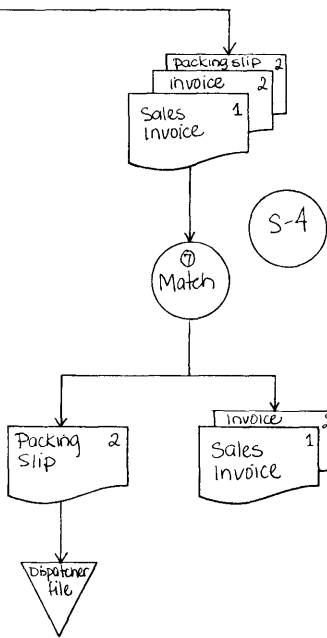
Personnel

- Dispatcher
- Dispatcher
- Clerk # 1
- Clerk # 1
- Clerk # 3
- Clerk # 2
- Clerk # 3

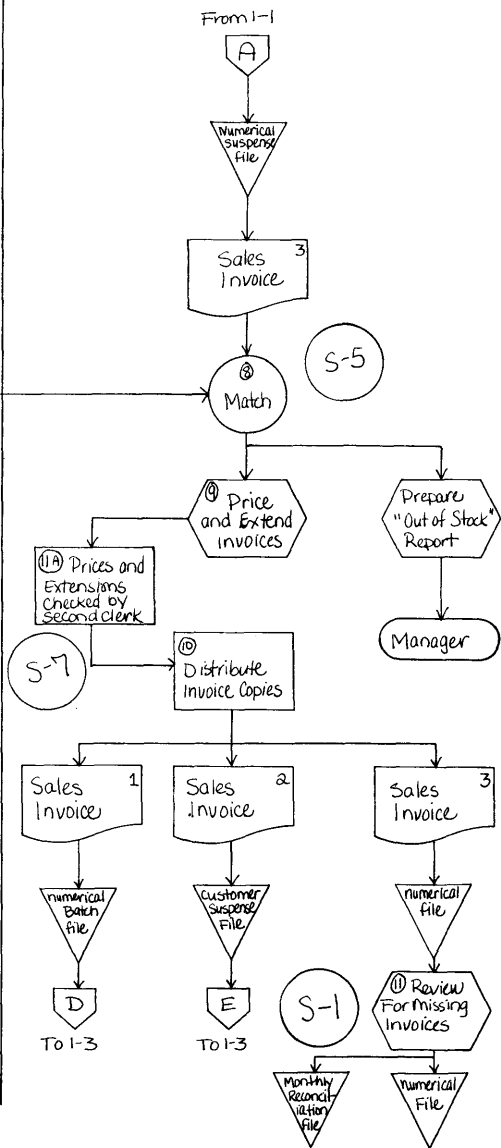
Warehouse







General Office



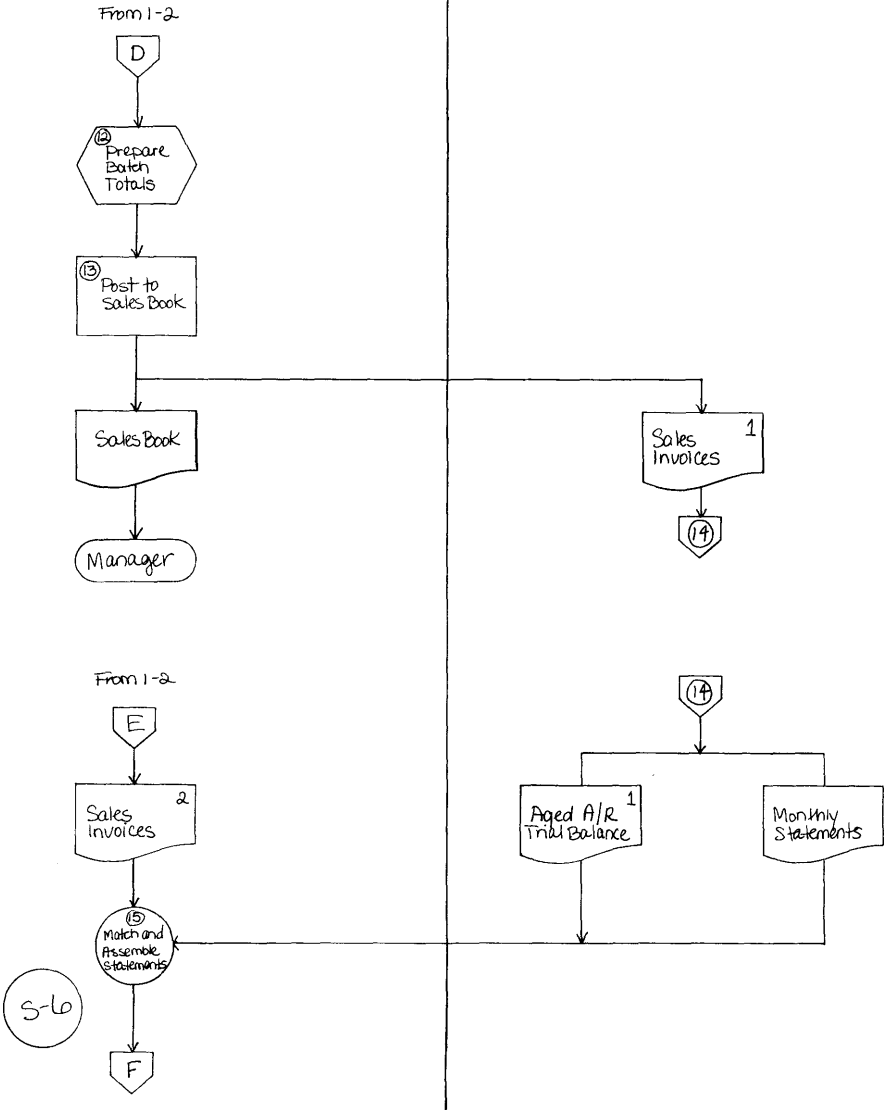
Olde Oak Framing Supplies  
Evaluation of Internal Control-Revenue Cycle  
Sales, Cost of Sales, Accounts Receivable  
12/31/76                      12/31/77

W.P. No.	1-3
Accountant	JT
Date	-6/29/76
Reviewed 7/15/77 JT	

<u>Procedure</u>	<u>Personnel</u>
<p>(12) Invoices are sent to data processing every 2-3 days in batches of 100. Before sending, the clerk prepares an adding machine tape of the invoices and attaches it to the top invoice, along with a notation of the range of invoice numbers in the batch. The batch is not all-inclusive of the numbers within this range because processing of orders is not necessarily sequentially completed.</p> <p>See memorandum of work paper 1-5 for summary of procedures to determine cost of sales.</p>	Clerk # 2
<p>(13) Record date and total amounts of invoices sent to data processing. This is written in a small "sales book" kept by the manager. He uses it only to "know where he stands" on sales from day to day.</p>	Clerk # 2
<p>(14) Data processing procedures are flow charted separately. Data processing internal controls are evaluated in conjunction with these flowcharts.*</p>	Data Processing
<p>(15) Upon receipt of the statements and aged trial balance, the clerk matches sales invoices from customer suspense file with the statements and attaches them with envelopes to the statements. She then gives the assembled statements and trial balance to the manager.</p> <p>At the end of each month, unmatched invoices in the customer suspense file are investigated.</p> <p>*Not included as a part of this exercise.</p>	Clerk # 4

General Office

Data Processing



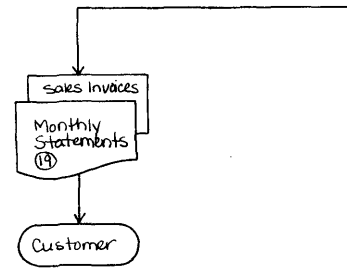
**Olde Oak Framing Supplies**

Evaluation of Internal Control-Revenue Cycle  
Sales, Cost of Sales, Accounts Receivable  
 12/31/76                      12/31/77

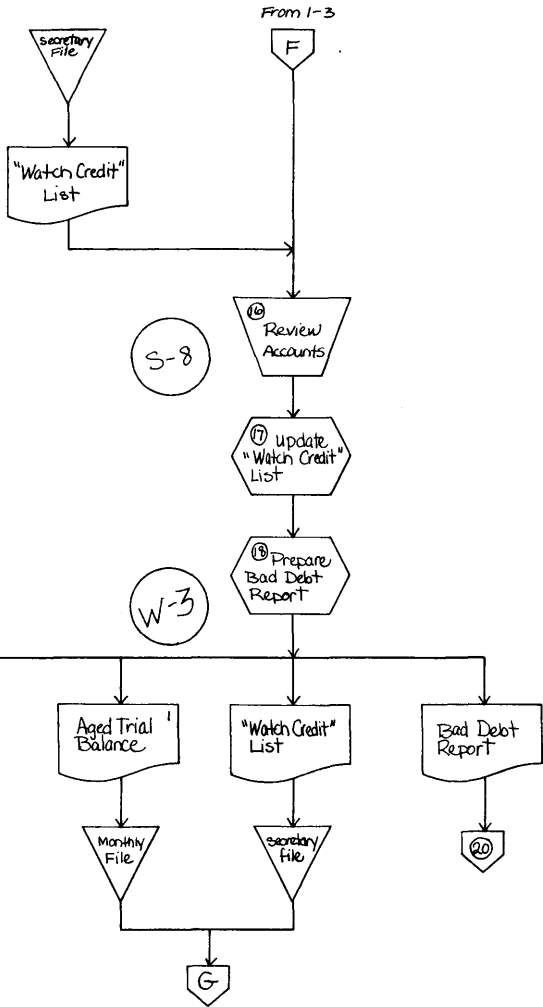
W.P. No.	1-4
Accountant	JT
Date	6/29/76

Reviewed 7/15/77 JT

<u>Procedure</u>	<u>Personnel</u>	<u>General Office</u>
(16) Manager reviews all accounts. He spot-checks some statements to the trial balance and some attachments to the statements. During his review, he makes general information notes and notes for follow-up calls to customers for collection, credit limit, etc. These notes are destroyed after he feels they are no longer needed.  During his review the manager also:	Manager	
(17) Updates a list of customers to "Watch Credit". He gives this to his secretary, who will notify him when one of these customers places an order.	Manager	
(18) Prepares a list of accounts to be written off as uncollectable, and attaches documentation of collection efforts; writes explanations for all accounts over sixty days; forwards report to controller.	Manager	
(19) Places monthly statements and invoice copies in envelopes and mails to customers.	Clerk # 4	
(20) See W/P 1-5 for narrative on bad debt review and write off.		



Manager's Office



# Bridging Workpapers

Olde Oak Framing Supplies  
Evaluation of Internal Control-Revenue Cycle  
Sales, Cost of Sales, Accounts Receivable

W.P. No.	2-1
Accountant	JT
Date	-6/29/76

Reviewed 7/15/77 JT

Audit Objectives	Ref.	Internal Control Strengths
<p>1. Proper recording of items shipped as sales and proper period cut-off.</p>	S-1	<p>Prenumbered sales invoices are:</p> <ol style="list-style-type: none"> <li>1) Prepared for all sales</li> <li>2) Issued sequentially</li> <li>3) Numerically accounted for</li> </ol>
	S-2	<p>After sales invoices are initialed, one copy is kept in the numerical suspense file until other copies of the invoice are returned from the warehouse.</p>
	S-3	<p>Sales invoices are required for warehouse personnel to fill an order.</p>
	S-4	<p>Dispatcher matches corrected sales invoice with packing slip of merchandise shipped.</p>
	S-5	<p>The general office clerk matches copies No. 1 and No. 2 of sales invoices received from the dispatcher with the control copy No. 3. The numerical suspense file is periodically reviewed for undelivered orders.</p>
	S-7	<p>An independent clerk checks pricing of invoice items and also checks extensions and footing.</p>

	Internal Control Weaknesses	Audit Implications	Audit Procedures	
			Interim	Final
		This helps insure that invoices are not lost or misused and they are forwarded for timely processing.	2 3a 3b	13
		Based on the flow of invoice copies, there would have to be at least two people involved for merchandise to leave the warehouse and all invoice records be lost. This separation helps insure that invoices don't get misplaced or misapplied and that orders are not shipped without an invoice record. Processing errors could still occur but the opportunity for intentional misapplication is greatly reduced.	3c	
		This procedure helps insure that all customer orders filled are documented and can be processed on a timely basis.	4	
		This insures that the sales invoice is an accurate representation of what merchandise was actually shipped.	5	
		This procedure helps insure that orders have been shipped and recorded.	3c	
		This helps insure that customer is billed the proper amount and that receivable corresponds to goods shipped.	6	

Olde Oak Framing Supplies  
Evaluation of Internal Control-Revenue Cycle  
Sales, Cost of Sales, Accounts Receivable

W.P. No.	2-2
Accountant	JT
Date	6/29/76
Reviewed 7/15/77 JT	

Audit Objectives	Ref	Internal Control Strengths
2. Propriety and collectibility of accounts receivable balances and proper period cut-off.	W-1	
	S-6	The sales invoice, customer suspense file is reviewed monthly for unmatched invoices.
	W-3	
	S-8	The manager reviews monthly statements and attached invoices and spot-checks some to the aged trial balance.



	Internal Control Weaknesses	Audit Implications	Audit Procedures	
			Interim	Final
	The manager prepares the "watch Credit" list and also approves extension of credit.	We cannot rely on the "watch Credit" list as a control to prevent sales to known bad accounts.		15
		This helps insure that: <ul style="list-style-type: none"> <li>1. All invoices sent to data processing were processed timely;</li> <li>2. A monthly customer statement was prepared; and</li> <li>3. Sales invoices appear on the aged trial balance.</li> </ul>	7	
	The manager approves credit and also prepares the list of accounts receivable to be written off.	We cannot be sure that bad accounts have been written off, particularly those less than sixty days old.		15
		This helps insure the accuracy and completeness of the monthly statements and aged trial balance.	8	

**Olde Oak Framing Supplies**  
**Planning Memo**  
**12/31/77**

*The Economy*

Real economic growth slowed down this summer, increasing uncertainty about the durability of the current business expansion, but it is now widely believed that what lies ahead is a more modest rate of growth rather than a recessionary trend. Preliminary government estimates of the increase in real GNP for the third quarter are in the 3 to 5 percent range, which contrasts with the 7.7 percent and 6.2 percent recorded for the first two quarters. At a recent meeting of economists and business leaders sponsored by the Conference Board, an economic research organization, the consensus was that economic growth for 1978 would not exceed 4.5 percent. Industrial output was down .5 percent in August, the first decline in seven months. However, the Commerce Department's Index of Leading Indicators, which declined in May and June and rose only .2 percent in July, rose .8 percent in August. Inflation moderated during the summer as consumer prices rose only .4 percent in July and .3 percent in August, but government spokesmen still consider the underlying rate to be 6 percent.

*The Industry*

The picture frame and frame supply industry is reasonably stable, with fluctuations generally tied to economic growth or decline. The industry consists of approximately twenty large manufacturers of framing stock in the United States, who supply a large number of wholesale outlets. The wholesale outlets, in turn, supply many small picture framing retail businesses. Product lines are stable with only a few new frame designs added each year. Accordingly, inventory levels tend to remain at a relatively constant level. Also, the retail outlets tend to purchase from the same wholesaler on a repeat basis. Competition among wholesalers is usually in the form of quantity discounts or special prices on discontinued lines.

*Nature of Business*

Olde Oak Framing Supplies, organized in 1938 under the laws of California, is a large wholesaler located in Los Angeles. The product line consists of finished and unfinished picture frame stock, assembled picture frames, matting, cut glass, and miscellaneous related supplies. Orders are primarily received by mail, with the purchaser making the selection from a catalog. Telephone orders are also received, but not to the extent of mail orders. Olde Oak Framing Supplies is the largest wholesaler on the west coast and supplies retailers as far east as St. Louis and New Orleans. All facilities are in one location in Los Angeles. Profits for the company have been stable for the last five years and are slightly above industry average.

*Objectives*

Olde Oak Framing Supplies has not been aggressive in recent years in expanding to new product lines or seeking an expanded customer base. The main objective

appears to be to maintain status quo in relationship to competitors by providing quality products and services to their existing customers.

### *Ownership*

Olde Oak Framing Supplies is primarily family owned. Andrew Cole, son of the founder of the company, is president and chairman of the board and is also the majority shareholder (60 percent). Other major shareholders are Stephanie Andrews, his sister, who is on the board of directors, and Richard Liggett, the family and business attorney. Both own 12 percent of the outstanding shares. The remaining 16 percent of shares are owned by various employees who have purchased through a company purchase plan.

### *Accounting System*

The company has an IBM System 3 minicomputer, on which they maintain inventory, accounts receivable, payroll, and the general ledger. The computer also prepares monthly invoices, a monthly print-out of the general ledger, and a monthly aging of accounts receivable ("watch credit" list).

### *Management*

Key management personnel are all college educated and exhibit a high degree of business knowledge. Andrew Cole, president, has a BBA, and he worked at all levels of the business when his father was president. Theodore Jones, controller, has an MBA and is knowledgeable about the EDP system; he has been with the company ten years. Jack Zachery, vice-president, has a BBA and directs the marketing needs of the company.

### *Audit Completion Requirements*

Our audit firm, \_\_\_\_\_, has been engaged to report on the financial statements of Olde Oak Framing Supplies for the year ended December 31, 1977. One use of the report will be to aid in seeking financing for construction of new facilities in a recently opened industrial park. New facilities are required because of the age and location of the current facilities. The board of directors would prefer that the report be presented to them on March 15, 1978. To meet this deadline, the report must be in print by approximately February 28, 1978.

### *Audit Personnel*

The audit personnel are

Partner-in-charge	J. Abbott
Engagement manager	W. Barnes
Senior	John Thomas
Computer audit specialist	B. Rogers
Statistical audit specialist	E. Summers
Tax	P. Baca

The total staff time for this year's examination should approximate 600 hours.

### *Critical Audit and Accounting Areas*

Accounts receivable and inventories continue to be critical audit areas, representing 24.0 percent and 26.0 percent respectively of total assets at September 30, 1977.

### *Internal Auditor Involvement*

Historically, the internal auditor, Paul Jones, has been our liaison with the various client personnel. We reviewed the internal audit function in accordance with firm standards and concluded that we could rely on the work of the internal auditor. Accordingly, he will assist us in the following areas:

1. Cash balances.
2. Accounts receivable confirmation control and follow-up under close supervision.
3. Vouching of fixed asset additions and deletions.
4. Coordination of search for unrecorded liabilities.

### *Audit Schedule*

As in the past, client assistance will be used in connection with the preparation of schedules and working papers. Internal audit will coordinate and assign the responsibility of completing audit analysis schedules to other accounting staff members, based on the individual's account responsibility.

1. Interim should accomplish the following:
  - a. Detail review of internal controls, including the data processing system.
  - b. Compliance tests of identified strengths of the revenue and purchasing cycles.
  - c. Schedule of the year-end inventory observations.
  - d. Schedule of the search for unrecorded liabilities.
  - e. Executing the confirmation of accounts receivable.
  - f. Performing other substantive tests of the revenue and purchasing cycles (as considered necessary).
  - g. Tests of fixed asset transactions.

All possible auditing will be performed on the September 30 balances with a roll forward at final.

2. The final examination work will consist of performing and following up any detail test work not completed at the interim examination, testing final balances on accounts verified as of interim dates (to include a review of the roll-forward period), and verifying any remaining account balances that we could not audit at interim. Accounts that will be reviewed as of December 31, 1977, are
  - a. Inventory
    - Observing physical inventories
    - Price testing
    - Testing cutoff procedures
  - b. Accounts payable
    - Searching for unrecorded liabilities
    - Testing vouchered items for propriety

Management letter comments will be reviewed with the respective responsible personnel whose names are included on the distribution of copies. Copies of all comments will be left with client personnel.

## Comparative Financial Statements

### Olde Oak Framing Supplies

#### *Comparative Balance Sheet Analysis 12/31/77*

<u>Assets</u>	<u>9/30/77</u>	<u>9/30/76</u>
Current assets		
Cash	\$ 354,600	\$ 336,870
Accounts receivable	1,778,832	1,689,890
Inventory	1,927,068	1,830,715
Prepaid expenses	<u>27,300</u>	<u>25,935</u>
Total current assets	<u>4,087,800</u>	<u>3,883,410</u>
Property, plant, and equipment		
Land	875,900	875,900
Buildings and improvements	2,713,300	2,624,135
Automobiles and trucks	135,300	124,400
Furniture and fixtures	<u>880,800</u>	<u>750,500</u>
	4,605,300	4,375,035
Less accumulated depreciation	<u>1,316,900</u>	<u>1,124,100</u>
Net property, plant, and equipment	<u>3,288,400</u>	<u>3,250,935</u>
Other assets	<u>35,600</u>	<u>33,400</u>
	<u>\$7,411,800</u>	<u>\$7,167,745</u>
<u>Liabilities and Stockholders' Equity</u>		
Current liabilities		
Notes payable to bank	\$ 800,000	\$ 725,000
Current installments of long-term debt	225,000	225,000
Accounts payable	731,900	534,400
Accrued expenses	176,800	118,800
Income taxes	<u>64,300</u>	<u>32,800</u>
Total current liabilities	<u>1,998,000</u>	<u>1,636,000</u>
Long-term debt, excluding current installments	<u>3,010,000</u>	<u>3,235,000</u>
Stockholders' equity		
Common stock	500,000	500,000
Retained earnings	<u>1,903,800</u>	<u>1,796,745</u>
Total stockholders' equity	<u>2,403,800</u>	<u>2,296,745</u>
	<u>\$7,411,800</u>	<u>\$7,167,745</u>

**Olde Oak Framing Supplies**  
**Comparative Income Statement Analysis**  
 12/31/77

	Nine Months Ended	
	<u>9/30/77</u>	<u>9/30/76</u>
Net sales	\$6,875,000	\$6,531,250
Cost of sales	<u>4,812,500</u>	<u>4,571,875</u>
Gross profit	2,062,500	1,959,375
Selling, general, and administrative expenses	<u>1,546,600</u>	<u>1,463,625</u>
Operating income	515,900	495,750
Other income (deductions)		
Interest expense	(74,300)	(59,800)
Other, net	<u>15,400</u>	<u>1,800</u>
	<u>(58,900)</u>	<u>(61,600)</u>
Earnings before income taxes	457,000	434,150
Income taxes	<u>160,000</u>	<u>157,150</u>
Net earnings	297,000	271,000
Retained earnings, beginning of period	1,636,800	1,539,745
Dividends paid	<u>(30,000)</u>	<u>(20,000)</u>
Retained earnings, end of period	<u><u>\$1,903,800</u></u>	<u><u>\$1,796,745</u></u>

**Miscellaneous Items**

**Olde Oak Framing Supplies**

*Evaluation of Internal Control-Revenue Cycle*  
*Cost of Sales Procedures*

W.P. No.  
 Accountant  
 Date

Cost of sales is estimated monthly on the basis of samples drawn from the prior month's sales. Cost of sales is adjusted to actual as a result of the annual physical inventory adjustment.

The monthly sample consists of the highest dollar amount invoice from each batch that is processed. A copy of the invoice in the batch with the highest total dollar amount is made. These copies are forwarded to the purchasing clerk, who determines the actual cost of the items sold, using the most recent purchase prices available.

At the end of the month, the "costed" copies are forwarded to the controller. Using the ratio of sample invoice cost to sample invoice sales, a clerk estimates cost of sales and makes the appropriate journal entry.

# APPENDIX B

## Example of Sample Size Rationale Documentation Checklist

Audit Procedure \_\_\_\_\_

1. Check appropriate objective(s) of the audit procedure.
  - a. \_\_\_\_\_ This is a substantive test that tests for
    - \_\_\_\_\_ The validity of recorded transactions (balances).
    - \_\_\_\_\_ The proper authorization of transactions (balances).
    - \_\_\_\_\_ The assignment of a proper initial economic value to a transaction (balance) for purposes of recording.
    - \_\_\_\_\_ The accurate recording of transactions (balances).
    - \_\_\_\_\_ The accurate recording of transactions (balances) to reflect current economic value.
  - b. \_\_\_\_\_ This is a compliance test that tests for
    - \_\_\_\_\_ Control over validity of recorded transactions (balances).
    - \_\_\_\_\_ Control over proper authorization of transactions (balances).
    - \_\_\_\_\_ Control over assignment of a proper initial economic value.
    - \_\_\_\_\_ Control over accuracy of recording of transactions (balances).
    - \_\_\_\_\_ Control over proper valuation of transactions (balances).

*Note:* If the test has dual purposes, check appropriate boxes in both (a) and (b).

2. Check the kind(s) of audit risk this procedure is designed to identify.
  - \_\_\_\_\_ Overstatement of account balance
  - \_\_\_\_\_ Understatement of account balance
  - \_\_\_\_\_ Accounting control deficiency
  - \_\_\_\_\_ Other (specify) \_\_\_\_\_
3. Specify an approximate range of sample sizes you are considering.
  - \_\_\_\_\_ The largest sample size you would propose if all factors pointed to a large sample size.
  - \_\_\_\_\_ The smallest sample size you would propose if all factors pointed to a small sample size *and* you still decide to perform the procedure.





\_\_\_\_\_ Other procedures are available that would gather more evidence at the same cost (specify below).

\_\_\_\_\_ Other (specify below).

b. Results of other audit procedures.

\_\_\_\_\_ Other tests performed this year (specify below).

\_\_\_\_\_ Tests performed in prior year (specify below).

c. Other (specify).

9. Describe briefly how you plan to evaluate the results of this procedure (e.g., what effect will errors have on the evaluation; what kinds of conclusions can be reached?).

10. Describe briefly how you combined the preceding factors to reach a sample size decision.

11. Explain your recommended sample size.

# APPENDIX C

## Tables on Sample Size Recommendations

Figure C.1  
Sample Size Recommendations for Audit Procedure E-5,  
Packing Slip Comparison

Control Treatment	Guidance Treatment				
	No Guidance	Narrative Guidance	Structured Guidance	Statistical Approach	Manager Review
Fair	50	50	60	0	50
	150	150	40	300	50
	100	59	100	59	150
	0	0	59	100	50
	59	300	100	59	0
	0	0	150	150	0
	59	50	75	50	0
	200	300	80	100	150
	75	50	60	60	100
	60	75	30	65	65
	0	0	0	392	120
	0	40	50	0	59
	150	59	60	0	100
	100	59	75	0	75
	200	50	100	150	75
	50	150	75	0	
	25	100	0	0	
	75	50	150		
50					
Strong	30	100	75	0	59
	70	0	100	59	59
	0	59	100	99	59
	59	0	30	150	59
	59	0	200	59	59
	59	59	60	400	59
	50	50	75	0	59
	150	25	69	0	59
	0	30	0	59	60
	59	50	60	65	200
	50	59	0	75	59
	59	84	100	150	75
	0	54	50	0	40
	79	75	125	65	10
	60	75	60	59	100
	75	50	0	0	
	59	150	100	150	
	59	83			

*Note:* Zero entries represent either that the step was eliminated or that no explicit scope recommendation was made (i.e., missing observations).

Figure C.2

Sample Size Recommendations for Audit Procedure E-6b, c,  
Pricing Test

Control Treatment	Guidance Treatment				
	No Guidance	Narrative Guidance	Structured Guidance	Statistical Approach	Manager Review
Fair	100	83	59	0	59
	59	71	35	149	0
	100	59	10	59	88
	59	75	0	100	59
	59	300	80	59	250
	100	100	59	0	0
	59	79	59	59	59
	200	90	0	65	59
	75	79	59	65	65
	75	75	135	65	59
	0	80	0	59	59
	59	59	59	116	59
	150	67	59	0	100
	59	0	59	59	75
	100	0	59	59	75
	75	75	75	0	
	59	75	0	0	
	0	75	75		
	40				
	Strong	30	59	25	59
75		0	50	121	59
109		59	15	99	59
59		20	0	150	59
59		0	59	59	59
59		59	75	149	59
59		50	59	0	59
0		25	69	65	59
0		20	0	59	45
59		59	59	65	0
59		59	0	24	59
59		59	59	65	40
0		59	30	0	25
59		45	59	65	20
60		59	59	59	59
59		100	59	59	
59		59	59	59	
59		59			

*Note:* Zero entries represent either that the step was eliminated or that no explicit scope recommendation was made (i.e., missing observations).

Figure C.3

Sample Size Recommendations for Audit Procedure E-9,  
Posting Test

Control Treatment	Guidance Treatment				
	No Guidance	Narrative Guidance	Structured Guidance	Statistical Approach	Manager Review
Fair	50	25	80	150	75
	59	100	0	300	75
	100	59	25	59	100
	30	25	20	100	100
	59	300	59	100	0
	100	0	100	100	250
	59	59	0	200	0
	200	0	0	65	59
	0	59	59	100	100
	0	0	100	0	65
	0	0	0	392	100
	0	59	59	0	75
	150	59	100	0	75
	59	45	50	0	75
	50	100	0	150	0
	50	0	0	0	0
	0	50	0	0	0
	0	0	100		
	25				
Strong	30	0	0	0	59
	33	0	75	59	59
	50	0	40	99	50
	59	0	25	60	59
	60	0	0	0	0
	59	0	75	300	59
	50	0	30	0	59
	0	25	59	0	59
	50	10	0	59	60
	59	59	59	65	200
	60	0	0	25	59
	0	59	100	100	50
	0	59	150	0	20
	25	50	59	65	10
	0	50	0	0	80
	75	0	250	0	
	100	0	50	100	
59	59				

Note: Zero entries represent either that the step was eliminated or that no explicit scope recommendation was made (i.e., missing observations).

Figure C.4

Sample Size Recommendations for Total Confirmations (Positives Plus  
Negatives) for Audit Procedure E-10, Confirmations

Control Treatment	Guidance Treatment				
	No Guidance	Narrative Guidance	Structured Guidance	Statistical Approach	Manager Review
Fair	547	515	405	513	392
	352	439	480	915	0
	0	316	394	0	439
	501	195	350	601	275
	439	439	149	427	425
	364	300	515	915	194
	294	0	475	226	394
	410	394	0	314	335
	316	649	400	361	369
	249	438	0	243	316
	475	265	439	392	370
	615	979	200	915	150
	154	297	294	775	694
	502	0	0	915	294
	500	439	0	0	300
	491	0	325	0	
	420	420	0	0	
	271	275	630		
	194	0	0		
	Strong	276	385	160	904
125		230	439	0	0
316		135	494	0	244
394		191	394	0	300
314		0	439	341	319
556		0	161	551	276
349		194	0	287	235
244		349	375	601	159
0		399	149	221	232
479		439	439	359	269
260		439	241	180	271
207		382	400	784	345
276		225	0	0	316
300		439	200	314	0
297		244	240	668	319
0		200	320	629	
194		294	417	466	
253		0			

Note: Zero entries represent either that the step was eliminated or that no explicit scope recommendation was made (i.e., missing observations).

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