1990


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An investigation of the effect of a favorable external quality assurance review on the scope of the external auditor's examination of an organization's financial statements

Toerncr, Michael Charles, Ph.D.
The Louisiana State University and Agricultural and Mechanical Col., 1990
AN INVESTIGATION OF THE EFFECT OF A FAVORABLE EXTERNAL QUALITY ASSURANCE REVIEW ON THE SCOPE OF THE EXTERNAL AUDITOR'S EXAMINATION OF AN ORGANIZATION'S FINANCIAL STATEMENTS

A Dissertation

Submitted to the Graduate Faculty of the Louisiana State University and Agricultural and Mechanical College in partial fulfillment of the requirements for the degree of Doctor of Philosophy

in

The Department of Accounting

by

Michael C. Toerner
B.S., Louisiana State University, 1971
M.S., Louisiana State University, 1978
December 1990
I want to thank the following people, all of whom played a major role in the completion of this paper. I thank God and the Lord Jesus Christ, who sustained me during the ten years that it took to complete my doctorate and who taught me more than I ever expected to learn.

Second, I thank my wife, Murphy, who typed every word of every draft of the proposal and the dissertation and whose support was a great source of encouragement. This dissertation is dedicated to her.

Next, I want to express my appreciation to my dissertation committee: Dr. Glenn Sumners, Dr. Stephen Looney, Dr. Vince Brenner, Dr. Nick Apostolou, Dr. Jerry Strawser, and Dr. Barbara Apostolou. Fourth, I thank my parents, who gave of themselves, their time, and their possessions to facilitate the completion of this project. Fifth, I thank the people who faithfully prayed for Murphy and me, especially the "1990 summer prayer group," the ladies who comprised the Women of the Word at the Chapel on the Campus Church, and the women of Bible Study Fellowship. Finally, I thank the staff members of SNCC, who provided valuable assistance in the data analysis phase of the study.
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ABSTRACT

The review team that performs an external quality assurance review of an organization's internal audit department examines factors that are very similar to those considered by the external auditor as part of the evaluation of the department. The purpose of the study was to explore the possibility that an external auditor would modify the scope of the audit work when an organization's internal audit department had received a favorable external quality assurance review. In addition, the study investigated the effect that the type of reviewer who performs an external review has on the scope of the external auditor's work.

Data with which to achieve the purposes of the study were obtained by sending questionnaires to audit partners, managers, and seniors working for Big 7 firms in twelve of the twenty largest United States cities. Analysis of the data revealed that the effect of a favorable external quality assurance review is generally limited to a statistically significant but immaterial reduction in the number of hours budgeted by the external auditor for the evaluation of the internal audit department. The data analysis also indicated that, in general, the type of reviewer who performs a favorable external quality assurance
review has no effect on the external auditor's development of a time budget for the audit of an organization's financial statements.
CHAPTER 1
INTRODUCTION

According to the Institute of Internal Auditors, Inc. (IIA), internal auditing is an independent appraisal function established within an organization to examine and evaluate the organization's activities (IIA 1978, introduction). In carrying out this responsibility, internal auditors often perform the following tasks (IIA 1981):

1. Examine the reliability and integrity of financial and operating information
2. Review the organization's internal control structure to determine the extent to which prescribed policies and procedures are being followed
3. Evaluate the effectiveness and the efficiency of the organization's operations

To provide internal auditors with guidance concerning the manner in which these tasks are to be performed, the IIA issued Standards for the Professional Practice of Internal Auditing (hereafter, Standards) in 1978. This document discusses five major areas or standards about which internal auditors need to be concerned. The

1

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Standards are as follows (IIA 1978):

Standard 100--Internal auditors should be independent of the activities they audit.

Standard 200--Internal audits should be performed with proficiency and due professional care.

Standard 300--The scope of the internal audit should encompass (a) the examination and evaluation of the adequacy and effectiveness of the organization's system of internal control and (b) the quality of performance in carrying out assigned responsibilities.

Standard 400--Audit work should include planning the audit, examining and evaluating information, communicating results, and following up.

Standard 500--The director of internal auditing should properly manage the internal audit department.

The Standards address items that are important to the effective functioning of an internal audit department. However, an internal audit director who incorporates these Standards into a procedures manual and instructs his/her staff concerning their significance cannot guarantee that they will be implemented. For this reason, the IIA, in Guideline 560 of its discussion of Standard 500, called upon the internal audit director to use a quality assurance program to obtain information about the extent to which the internal audit department's operations comply with IIA, organizational, and departmental standards (IIA 1978).

According to the IIA (1986, par. 560.01) an effective quality assurance program consists of three elements: supervision, internal reviews, and external
reviews. Supervision involves making sure that the internal audit engagement is properly planned and that the work of subordinates is appropriately directed and reviewed. An internal review consists of an in-house evaluation of the internal audit department's operations and is performed by the department's own staff members. An external review represents an independent, third-party assessment of the internal audit department's operations.

Each of these elements is essential to the proper functioning of a quality assurance program. However, the external auditor might be more interested in an external review than in supervision or an internal review for two reasons. First, the external review encompasses more than the "supervision" phase of the quality assurance program. Second, the external review is performed by a reviewer who is independent of the internal audit department being evaluated.

The external auditor's potential interest in an external quality assurance review raises the question of how the review might affect the external auditor's audit of an organization whose internal audit department has undergone such a review. This question is the study's primary research question. This question will be discussed more fully later in this chapter, as will the elements of a quality assurance program and the external auditor's
reliance on internal auditors.

Quality Assurance Programs for Internal Auditors

As mentioned earlier, an internal audit department's quality assurance program consists of supervision, internal reviews, and external reviews. Supervision occurs at several levels of an internal audit project (IIA 1986, par. 560.02.2). First, an internal audit department supervisor must properly plan the engagement. That is, he/she must make sure that the work which will be performed will achieve the engagement's objectives and that subordinates, if any, understand the work which they are to perform. The second level of supervision occurs while the engagement field work is being performed. At this level, the supervisor answers subordinates' questions, reviews their work, and determines that the performance of audit program steps is adequately documented in the work papers. The third level of supervision occurs when the supervisor determines that the report which will be issued on the engagement is consistent with the documented findings.

Adequate supervision is essential if the internal audit department is to produce quality work. However, the existence of an "adequate supervision" standard does not guarantee that adequate supervision actually occurs. Consequently, the head of the internal audit department must take steps to determine the extent to which adequate
supervision and other important procedures are implemented within the department. The information which the internal audit director needs can be obtained through an internal review of the department's operations.

An internal review is performed by a team of internal audit staff members selected by the internal audit director. The review team examines both the department's operating procedures and the work papers prepared on a sample of internal audit projects in an attempt to assess the extent to which the department has complied with IIA, organizational, and departmental standards. In addition, the review team solicits comments from auditees concerning their perceptions of the internal audit department's effectiveness and responsiveness to management's needs. Upon completion of its work, the review team issues a report describing its findings and, if appropriate, its suggestions for strengthening the internal audit department.

As important as an internal review is to an organization's internal audit director, its findings could be challenged on the grounds that the review team is not independent of the entity (i.e., the internal audit department) which it audited. Thus, one reason why the internal audit director should arrange for an external review.

---

1The discussion in this paragraph is based on IIA (1986, pars. 560.03.1-560.03.6).
review is to obtain an independent assessment of the quality of the department's operations. Second, because external reviewers have diverse backgrounds and a broad range of experience, an external review can provide a fresh perspective on the internal audit department's operations.

An external review may be performed by internal auditors from organizations other than the organization being reviewed, CPAs, or other outside consultants (IIA 1986, par. 560.04.30). The review team generally performs the procedures shown in Table 1-1 to determine the extent to which the internal audit department has complied with IIA, organizational, and departmental standards. Upon completion of these procedures, the external review team issues a report which summarizes its findings.

In light of the foregoing, one can identify several reasons why an organization's internal audit department should maintain a quality assurance program (IIA 1986; National Commission on Fraudulent Financial Reporting 1987). First, a quality assurance program enhances the internal audit department's ability to efficiently and effectively perform the tasks which it undertakes. Second, a quality assurance program provides reasonable assurance that the department's operations comply with IIA, organizational, and departmental standards. Third, a quality assurance program provides the internal audit department with a vehicle for
TABLE 1-1
PROCEDURES PERFORMED BY AN EXTERNAL QUALITY ASSURANCE REVIEW TEAM

1. Obtains an understanding of the internal audit department's policies and procedures (IIA 1984a, par. I.B)

2. Surveys the audit committee, senior management, the person to whom the internal audit director reports, the organization's external auditors, and the heads of departments which were audited by the internal auditing department concerning their opinions of the nature, scope, and quality of the internal audit department's activities (IIA 1984a, pars. V.D-L)

3. Assesses the independence of the internal audit department and the qualifications of the department's staff members (IIA 1984a, pars. VII.A, VII.B)

4. Examines a representative sample of internal audit projects for evidence that:
   a. The engagement was adequately planned and supervised (IIA 1984a, pars. VII.C.2.b.(11)-(13), VII.D.2 & 3)
   b. The work described in the audit program was appropriate given the purpose of the engagement (IIA 1984a, par. VII.C.2.b.(15))
   c. Individual audit program steps were actually performed (IIA 1984a, par. VII.C.2.b.(14))
   d. The conclusions expressed in the report rendered by the internal audit department were consistent with the findings recorded in the work papers (IIA 1984a, par. VII.C.2.a.(4))
   e. The recommendations in the internal audit department's report were acted upon by a person in the organization with the authority to implement the recommendations (IIA 1984a, par. VII.C.2.b.(2))

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achieving a high level of credibility with management, the board of directors, and others who rely on the department's work. Finally, a quality assurance program helps the audit committee fulfill its oversight responsibility by providing documentation concerning the manner in which the internal audit department has discharged its duties.

**External Auditor Reliance on Internal Auditors**

The professional auditing literature has long recognized the need for the external auditor to obtain an understanding of an organization's internal control structure as part of the audit of the organization's financial statements. Indeed, the second standard of field work states (AICPA 1990, sec. AU 150.02):

A sufficient understanding of the internal control structure is to be obtained to plan the audit and to determine the nature, timing, and extent of tests to be performed.

According to Statement on Auditing Standards (SAS) No. 55, *Consideration of the Internal Control Structure in a Financial Statement Audit* (AICPA 1988a), an internal audit department is part of an organization's internal control structure—specifically, its control environment\(^2\) (AICPA 1988a, par. 9). Consequently, to comply

\(^2\)The control environment represents "the overall attitude, awareness, and actions of the board of directors, management, owners, and others concerning the importance of control and its emphasis in the entity" (AICPA 1988a, par. 9).
with the second standard of field work, the external auditor must obtain an understanding of an organization's internal audit department as part of his/her audit of the organization's financial statements.

The external auditor generally obtains an understanding of an organization's internal audit department by inquiring of management and internal audit personnel, reading the department's charter, and reviewing copies of internal audit reports (AICPA 1989, par. 4). As he/she does these things, the external auditor, in addition to learning about the internal audit department, gains insight into the relevance of the department's activities to the audit of the organization's financial statements. Internal audit activities that are relevant to the audit of the financial statements include (1) evaluating the effectiveness of the organization's control policies and procedures and (2) performing audit procedures related to the reliability of financial information and the safeguarding of assets (AICPA 1989, pars. 5, 6).

If the external auditor decides that the internal audit department's activities are relevant to the audit of the financial statements, he/she must then decide whether to use the department's work in planning the audit. In making this decision, the external auditor must consider, for the financial statement assertions to which the internal
audit department's work relates, such things as (AICPA 1989, pars. 7, 22, 23):

1. Whether the assertions are "high risk" assertions (i.e., whether they are associated with material account balances)

2. The nature of the assertions (i.e., objective vs. subjective)\(^3\)

3. The efficiency of using the internal audit department’s work

If the external auditor decides to use the internal audit department’s work in planning the audit, he/she must evaluate the department’s competence, objectivity, and effectiveness (AICPA 1989, pars. 7, 19). The factors which the external auditor considers when making these evaluations are shown in Table 1-2. The external auditor obtains information with which to evaluate the effectiveness of the internal audit department’s work by testing account balances and transactions similar to those tested by the internal auditors and/or by reviewing internal audit department work papers (AICPA 1989, par. 20). If the external auditor believes that the internal audit department is sufficiently competent, objective, and effective, he/she may use the department’s work to reduce one or more of the following (AICPA 1989, par. 12):

\(^3\)Objective assertions involve existence or occurrence and are generally easy to verify. Subjective assertions involve valuation and are not as easily verified.
**TABLE 1-2**

FACTORS CONSIDERED BY EXTERNAL AUDITORS IN EVALUATING INTERNAL AUDIT DEPARTMENT CHARACTERISTICS

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Factors Considered</th>
</tr>
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| Competence:     | 1. Quality assurance program  
2. Hiring policies  
3. Continuing education program  
4. Background of internal audit staff members  
5. Practices regarding the assignment of staff members to engagements and the supervision/review of staff members’ work |
| Objectivity:    | 1. Organizational level to which the department reports  
2. Access which the internal audit director has to the board of directors  
3. Procedures to ensure staff members' independence from the personnel/ functions being audited |
| Effectiveness:  | 1. Appropriateness of work performed, given the engagement’s objective  
2. Adequacy of audit work programs  
3. Sufficiency of work paper documentation  
4. Appropriateness of work paper conclusions  
5. Consistency of report with documented findings |

Source: AICPA 1988b, pars. 8, 9, 17; AICPA 1989, pars. 9, 10, 19.
1. The procedures which he/she must perform to obtain an understanding of the organization’s control structure

2. The tests of controls which he/she must perform to determine the likelihood that the organization’s control procedures will detect or prevent material financial statement errors

3. The substantive tests which he/she must perform to evaluate the validity of material financial statement assertions

Formulation of the Research Question

Of the three components of a quality assurance program, an external review is likely to be more important to the external auditor than supervision or an internal review. Indeed, knowing that internal audit engagements have been properly supervised does not tell the external auditor about other important aspects of the internal audit department’s operations (for example, the department’s objectivity and effectiveness). Likewise, an internal review, while informative, might be considered suspect because it is performed by the department’s own staff members. Only an external review gives the external auditor an independent assessment of the full range of the internal audit department’s activities.

An analysis of IIA (1984a, pars. VII.A-C) reveals that the factors which an external review team considers during its conduct of a quality assurance review of an internal audit department are practically the same as the
factors in Table 1-2. This finding is significant for two reasons. First, it suggests that the external auditor might be able to substitute the external quality assurance review team's report for some of the audit procedures which would otherwise be performed to evaluate the internal audit department. Second, it suggests that the external auditor and the external review team are likely to reach the same conclusion concerning the internal audit department's quality. The confirmation by the external review team of the external auditor's assessment of the internal audit department might give the external auditor more confidence in the internal audit department or in his/her assessment of the department. This increased confidence might, in turn, convince the external auditor to reduce the scope of the audit work more than he/she would have in the absence of the external quality assurance review.

These possibilities raise the primary research question:

What effect does an external quality assurance review have on the external auditor's development of a time budget for the audit of an organization whose internal auditing department has undergone such a review?

The secondary research question is:

What effect does the type of reviewer who performs an external quality assurance review have on the external auditor's development of a time budget for the audit of an organization whose internal audit department has undergone such a review?
Research Method

Data with which to answer the research questions were obtained by sending questionnaires to external auditors working for Big 7 CPA firms* in twelve of the twenty largest United States cities. Each subject received either a control questionnaire or one of five experimental questionnaires.

Each experimental questionnaire contained the following information:

1. Condensed financial statements for a hypothetical organization
2. A description of the organization's internal audit department
3. A favorable external quality assurance review report
4. The actual and the budgeted hours associated with the prior year's external audit of the organization's financial statements
5. The number of hours that the external quality assurance review team devoted to its evaluation of the organization's internal audit department

The experimental questionnaires differed only in the type of reviewer who performed the external quality assurance review. The control questionnaire contained all of the

---

*At the time the research was conducted, Touche Ross and Deloitte Haskins & Sells had not merged. Consequently, reference is made throughout this paper to Big 7 CPA firms despite the fact that only six international firms are currently in existence.
above data except Items 3 and 5.

Each participant (whether he/she received a control questionnaire or an experimental questionnaire) prepared a time budget for the current year's audit of the organization described in the questionnaire. The Bonferroni multiple comparison procedure and a nonparametric multiple comparison procedure were used to identify significant differences between (1) the control questionnaire and a given type of experimental questionnaire and (2) pairs of experimental questionnaires.

Significance of the Study

This study is important for several reasons. First, it addresses a subject (i.e., external auditor reliance on internal auditors) which the AICPA's Auditing Standards Board is currently deliberating. Second, the study is the first to investigate the effect that a new factor (namely, a favorable external quality assurance review) has on the external auditor's assessment of an internal audit department. Quality assurance has been part of the professional internal audit literature since 1978, when the Standards were issued. In 1986, however, the IIA issued Statement on Internal Auditing Standards (SIAS) No. 4, Quality Assurance. SIAS No. 4 significantly expanded the guidance provided by the Standards concerning an internal audit department's maintenance of a quality assurance
program. Indeed, the importance of SIAS No. 4 can be gleaned from Nelson (1988).

The third reason why the study is important is that it has the potential to impact professional auditing practice. As mentioned earlier, the AICPA is currently attempting to provide the external auditor with guidance concerning reliance on the work of internal auditors. The study might prove useful to the AICPA in this effort since it will gather information on a subject which the AICPA has not yet addressed (AICPA 1989)--namely, the impact of an external quality assurance review on the external auditor's development of an audit time budget.

Fourth, the study will provide evidence concerning the effect that a favorable external quality assurance review and the type of reviewer who performs such a review have on the scope of the external auditor's work. This information could be useful to internal audit directors in increasing external auditor reliance on the internal audit function. This, in turn, should reduce audit costs without a corresponding reduction in audit quality.
 Previous research concerning the external auditor's reliance on an organization's internal audit department has focused primarily on the following areas:

1. Identifying the factors which external auditors and others consider most representative of an internal audit department's competence, objectivity, and effectiveness (Gibbs and Schroeder 1979, 1980; Brown and Karan 1986; and Messier and Schneider 1988)

2. Determining the relative importance of the internal audit department's competence, objectivity, and effectiveness in the overall assessment of its strength (Brown 1983; Schneider 1984, 1985; Brown and Karan 1986; and Messier and Schneider 1988)

3. Determining the extent to which the external auditor reduces the scope of his/her work in response to internal audit activity (Schneider 1985; Margheim 1986)

The foregoing studies do not deal with the effect that an external quality assurance review has on the external auditor. Nevertheless, since these studies represent the work which has been done to date in the area of external auditor reliance on internal auditors, they will be discussed in more detail in the sections which follow.
In addition, the last section of this chapter will describe the research which has been conducted on the subject of external quality assurance reviews.

Factors Used to Evaluate Competence, Objectivity, and Effectiveness

Table 2-1 shows that three research studies have investigated a number of items in an attempt to identify the factors which are most closely related to an internal audit department's competence, objectivity, and effectiveness. This section describes these studies in detail and summarizes their findings.

Gibbs and Schroeder

Gibbs and Schroeder (1979, 1980) performed an "open response" study in an attempt to provide external auditors with a list of factors which could be used to evaluate an internal audit department's competence. Gibbs and Schroeder began their study by sending questionnaires to five hundred internal auditors selected at random from the IIA's 1976 membership directory and two hundred Big 8 CPA firm partners and managers. The latter had experience auditing organizations with internal audit departments and were selected by a contact person within each Big 8 firm.

Each internal auditor was asked to list the factors which he/she would use to evaluate another internal audit department's competence if he/she were performing a
TABLE 2-1

ITEMS INVESTIGATED BY RESEARCHERS INTERESTED IN THE FACTORS ASSOCIATED WITH INTERNAL AUDIT DEPARTMENT COMPETENCE, OBJECTIVITY, AND EFFECTIVENESS

<table>
<thead>
<tr>
<th>Factor</th>
<th>G&amp;S</th>
<th>B&amp;K</th>
<th>M&amp;S</th>
</tr>
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<tbody>
<tr>
<td>IA staff’s knowledge of organization’s operations</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Quantity and quality of supervision within IA department</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Educational background of IA staff</td>
<td>*</td>
<td>N</td>
<td>*</td>
</tr>
<tr>
<td>IA staff’s knowledge of auditing techniques</td>
<td>*</td>
<td>N</td>
<td>*</td>
</tr>
<tr>
<td>IA department’s continuing education program</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Independence of IA staff members</td>
<td>*</td>
<td>N</td>
<td>*</td>
</tr>
<tr>
<td>Organizational level to which IA department reports</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IA department’s ability to investigate all areas of organization</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Top management support of IA department</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>External auditor satisfaction with IA department in prior years</td>
<td>N</td>
<td>*</td>
<td>N</td>
</tr>
<tr>
<td>Adequacy of IA follow-up procedures</td>
<td>N</td>
<td>*</td>
<td>N</td>
</tr>
<tr>
<td>Top management readiness to act on IA recommendations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adequacy of scope of IA department audits</td>
<td>*</td>
<td>N</td>
<td>*</td>
</tr>
<tr>
<td>Adequacy of IA work papers/reports</td>
<td>N</td>
<td>N</td>
<td>*</td>
</tr>
<tr>
<td>Nature of IA department audit techniques</td>
<td>N</td>
<td>N</td>
<td>*</td>
</tr>
</tbody>
</table>

*--Factor was included in the indicated study.
N--Factor was not included in the indicated study.
G&S--Gibbs and Schroeder (1979,1980)
M&S--Messier and Schneider (1986)
peer review of that department. External auditors were asked to specify the criteria which they currently used or which they considered to be potentially useful in evaluating the competence of internal audit departments. Approximately 22% of the internal auditors and 72% of the external auditors completed the experimental task.

From the list of factors which the internal and the external auditors specified, Gibbs and Schroeder identified fifty-four items which had been mentioned by at least ten respondents (regardless of type). Upon reviewing these items, Gibbs and Schroeder found that some were more descriptive of objectivity and effectiveness than they were of competence. Consequently, Gibbs and Schroeder altered the nature of their study. Rather than limiting their investigation to factors associated with competence, Gibbs and Schroeder decided to research the factors associated with competence, objectivity, and effectiveness.

To accomplish this purpose, Gibbs and Schroeder formed an "expert panel" consisting of thirteen Big 8 CPA firm partners and managers, twelve internal audit directors, and fourteen academicians. For each of the fifty-four items mentioned above, each panel member was presented with three seven-point scales. On the first scale, the panelist indicated the extent to which he/she believed that the item was associated with competence. The second and the third
scales were reserved for the panelist's assessment of the item's association with objectivity and effectiveness, respectively.

For each of the fifty-four items, Gibbs and Schroeder computed the mean of the scores which the expert panel members had specified for that item when it was used to evaluate an internal audit department's competence. Next, each item's mean score was compared with the overall mean competence score specified for all fifty-four items. An item was considered an "important" measure of competence if its mean score exceeded the overall mean competence score by at least one standard deviation. Using this definition of importance, Gibbs and Schroeder identified eleven items which were important measures of an internal audit department's competence. Gibbs and Schroeder used similar procedures to identify nine items which were important measures of objectivity and thirteen items which were significant performance measures.

Having identified the factors which were associated with competence, objectivity, and effectiveness, Gibbs and Schroeder next attempted to determine the relative significance of these factors. For the "competence" variable, Gibbs and Schroeder proceeded as follows.

First, Gibbs and Schroeder selected for further analysis the first five items in the list of items...
considered to be important measures of an internal audit department's competence. These five items were then defined at two levels—satisfactory and unsatisfactory. Next, thirty-two cases (representing a completely crossed $2^5$ experimental design) describing internal audit departments with varying degrees of competence were developed and incorporated into a questionnaire. Twenty-five copies of this questionnaire were sent to a contact partner at each Big 8 CPA firm. The partners and managers who received the questionnaires from the contact partners were asked to evaluate the competence of each of the thirty-two internal audit departments on a four-point scale. Gibbs and Schroeder then used an ANOVA model to determine which of the five competence measures described in the case scenarios had the greatest statistical significance. The results of the ANOVA analysis are shown in Table 2-2.

For reasons which Gibbs and Schroeder did not explain, the factors associated with objectivity and effectiveness were not analyzed using an ANOVA model. Rather, the expert panel members ranked, in order of importance, the factors associated with objectivity. Gibbs and Schroeder then computed the mean rank for each factor. These ranking and averaging procedures were repeated for the factors associated with effectiveness. Gibbs and Schroeder's findings appear in Table 2-2.
### TABLE 2-2

**RELATIVE IMPORTANCE OF THE FACTORS ASSOCIATED WITH INTERNAL AUDIT COMPETENCE, OBJECTIVITY, AND EFFECTIVENESS**

<table>
<thead>
<tr>
<th>Characteristic/Factor Considered</th>
<th>G&amp;S</th>
<th>B&amp;K</th>
<th>M&amp;S</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Competence:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IA staff’s knowledge of organization’s operations</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Supervision within IA department</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Educational background of IA staff</td>
<td>3</td>
<td>N</td>
<td>4</td>
</tr>
<tr>
<td>IA staff’s knowledge of auditing techniques</td>
<td>4</td>
<td>N</td>
<td>1</td>
</tr>
<tr>
<td>IA department’s continuing education program</td>
<td>5</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td><strong>Objectivity:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Independence of IA staff members</td>
<td>1</td>
<td>N</td>
<td>1</td>
</tr>
<tr>
<td>Organizational level to which IA department reports</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>IA department’s ability to investigate all areas of organization</td>
<td>3</td>
<td>2</td>
<td>N</td>
</tr>
<tr>
<td>Top management support of IA department</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td><strong>Effectiveness:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Top management readiness to act on IA recommendations</td>
<td>1</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Top management support of IA department</td>
<td>2</td>
<td>*</td>
<td>**</td>
</tr>
<tr>
<td>Adequacy of scope of IA department audits</td>
<td>3</td>
<td>N</td>
<td>1</td>
</tr>
<tr>
<td>Adequacy of IA work papers/reports</td>
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<td>N</td>
<td>2</td>
</tr>
<tr>
<td>Nature of IA department audit techniques</td>
<td>N</td>
<td>N</td>
<td>3</td>
</tr>
<tr>
<td>Supervision within IA department</td>
<td>4</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>External auditor satisfaction with IA department in prior years</td>
<td>N</td>
<td>1</td>
<td>N</td>
</tr>
<tr>
<td>Adequacy of IA follow-up procedures</td>
<td>N</td>
<td>2</td>
<td>N</td>
</tr>
</tbody>
</table>

Note: A "1" in this table signifies that the indicated factor was most closely associated with the indicated characteristic. The two 1’s shown for competence under M&S indicate these factors were of equal importance.
N--Factor was not included in the indicated study.
*--Factor was the sixth most important effectiveness measure.
**--Researchers did not use this factor to measure effectiveness.
G&S--Gibbs and Schroeder (1979, 1980)
M&S--Messier and Schneider (1988)

Brown and Karan

Although they framed their research within the context of SAS No. 9, Brown and Karan (1986) were primarily interested in whether external auditors operationalize the provisions of authoritative auditing pronouncements in the manner intended by standards-setting bodies such as the Auditing Standards Board. Despite this emphasis, some of Brown and Karan's findings are relevant to the current study. These findings are discussed below.

Brown and Karan sent questionnaires to sixty past and present members of either the Auditing Standards Executive Committee or the Auditing Standards Board. Each questionnaire contained information about a hypothetical manufacturing organization, a copy of SAS No. 9, and twenty internal audit cases. The cases were formed by combining different levels of the eight factors shown in Table 2-1. Each participant was asked to:
1. Identify the SAS No. 9 variable with which he/she believed each factor was most closely associated

2. Allocate one hundred points among the three SAS No.9 variables as an indication of his/her assessment of the relative importance of each variable

3. Indicate on a four-point scale the extent to which competence, objectivity, and high-quality performance were present in each of the twenty cases

4. Show on a seven-point scale his/her assessment of the reliability of each of the twenty hypothetical internal audit departments

Twenty-nine questionnaire recipients actually performed the experimental tasks. The factors which these respondents associated with each SAS No. 9 variable are shown in Table 2-2. The relative importance which the respondents attributed to each of these variables is discussed below in the section entitled "Relative Importance of Competence, Objectivity, and Effectiveness."

Messier and Schneider

Messier and Schneider (1988) used the Analytic Hierarchy Process (AHP) in an attempt to identify the factors which external auditors considered most important in their evaluations of internal audit departments. To gather information for their study, Messier and Schneider sent questionnaires to a total of twenty-two supervisors and managers working for the Big 8 CPA firms in Atlanta. The
participation of these individuals was arranged through a contact person at each Big 8 firm. Each participant received a questionnaire which described a hypothetical manufacturing organization and three levels of internal audit department characteristics. Level 1 consisted of the three SAS No. 9 variables (i.e., competence, objectivity, and effectiveness). Level 2 provided, for each SAS No. 9 variable, three or four factors which might reasonably be considered to be associated with that variable. These factors are identified in Table 2-1. Level 3 specified, for each Level 2 factor, two or three items which seemed descriptive of that factor.

Each subject made pairwise comparisons of the characteristics at a given level, after which Messier and Schneider used the AHP to identify the characteristics which the participants deemed most important at that level. Table 2-2 shows the results of the Level 2 comparisons.

**Relative Importance of Competence, Objectivity, and Effectiveness**

The previous section discussed the results of research studies which were designed to identify factors which were most representative of an internal audit department's competence, objectivity, and effectiveness. This section will examine those studies which have shed light on the relative importance of competence, objectivity,
<table>
<thead>
<tr>
<th>Factor</th>
<th>B</th>
<th>S</th>
<th>B&amp;K</th>
<th>M&amp;S</th>
</tr>
</thead>
<tbody>
<tr>
<td>IA staff's knowledge of organization's operations</td>
<td>*</td>
<td>N</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Organizational level to which IA department reports</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>External auditor satisfaction with IA department in prior years</td>
<td>*</td>
<td>N</td>
<td>*</td>
<td>N</td>
</tr>
<tr>
<td>IA department's continuing education program</td>
<td>*</td>
<td>N</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Adequacy of IA follow-up procedures</td>
<td>*</td>
<td>N</td>
<td>*</td>
<td>N</td>
</tr>
<tr>
<td>Adequacy of supervision within IA department</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Adequacy of IA staff's auditing experience</td>
<td>N</td>
<td>*</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Independence of IA staff members</td>
<td>N</td>
<td>*</td>
<td>N</td>
<td>*</td>
</tr>
<tr>
<td>Adequacy of scope of IA department audits</td>
<td>N</td>
<td>*</td>
<td>N</td>
<td>*</td>
</tr>
<tr>
<td>Adequacy of IA department work paper documentation</td>
<td>N</td>
<td>*</td>
<td>N</td>
<td>*</td>
</tr>
<tr>
<td>IA department's ability to investigate all areas of organization</td>
<td>N</td>
<td>N</td>
<td>*</td>
<td>N</td>
</tr>
<tr>
<td>Top management support of IA department</td>
<td>N</td>
<td>N</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Educational background of IA staff</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>*</td>
</tr>
<tr>
<td>IA staff's knowledge of auditing techniques</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>*</td>
</tr>
<tr>
<td>Nature of IA audit techniques</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>*</td>
</tr>
</tbody>
</table>

*--Factor was included in the indicated study.
N--Factor was not included in the indicated study.
B--Brown (1983)
S--Schneider (1984, 1985)
M&S--Messier and Schneider (1988)
and effectiveness in the overall assessment of an internal audit department's strength. Table 2-3 summarizes the factors that were investigated in the research studies described in this section.

Brown

Brown (1983) attempted to identify the characteristics which most heavily influence the external auditor's overall judgment concerning the reliability of an internal audit department. To accomplish this purpose, Brown mailed a total of 120 questionnaires to contacts at four Big 8 CPA firms. He instructed these contacts to distribute the questionnaires to staff members who had at least three years audit experience and some supervisory responsibility for clients with internal audit departments.

Each questionnaire contained thirty-two principal cases and sixteen repeat cases. Brown constructed the principal cases by first selecting six factors which previous research and his own discussions with Big 8 practitioners indicated were important considerations in the external auditor's review of an organization's internal audit function. These factors are shown in Table 2-3. Next, Brown specified two levels for each factor--namely, the factor was either present in or absent from the hypothetical audit department described in the questionnaire. By combining factors with different levels,
Brown developed the thirty-two principal cases which each questionnaire contained.

For each case (principal and repeat), each participant indicated on a seven-point scale his/her assessment of the reliability of the internal audit department described in the case. Each participant also allocated one hundred points among the six factors to indicate the relative importance which he/she attributed to each.

Brown used an ANOVA model to identify the extent to which each of the six factors influenced the participants' judgments concerning internal audit department reliability. An omega square analysis based on the ANOVA results indicated that the order in which the factors influenced the participants' judgments was as follows. The most significant factor is listed first, while the omega square statistic is shown in parentheses.

1. External auditor satisfaction with the internal audit department in prior years (0.25)
2. Organizational level to which the internal audit department reports (0.19)
3. Adequacy of supervision within the internal audit department (0.13)
4. Adequacy of internal audit department follow-up procedures (0.10)
5. Internal audit department's continuing education program (0.04)
6. Internal audit staff’s knowledge of the organization’s operations (0.03)

The omega square statistics suggest that the participants’ evaluations of internal audit reliability were most influenced by an effectiveness measure—namely, external auditor satisfaction with the internal audit department in prior years. The second and the third most important influences on the participants’ reliability judgments were objectivity and competence, respectively. Table 2-4 compares these findings with those of the other researchers described in this section.

Schneider (1984)

Schneider (1984) was interested in the manner in which external auditors combine and weigh the SAS No. 9 variables to form an assessment of the strength of an organization’s internal audit function. Schneider carried out his research in three stages.

In the first stage, Schneider identified five factors which could reasonably be considered to be related to an internal audit department’s competence. Five different factors were specified for objectivity and yet another five factors were identified for effectiveness. Each of these fifteen factors was defined at two levels:
1. Level # 1--The factor was present in a hypothetical manufacturing organization's internal audit department.

2. Level # 2--The factor was missing from the internal audit department.

By varying the levels of the fifteen characteristics, Schneider developed thirty-two cases for each SAS No. 9 variable.

Schneider then requested a contact person at each Big 8 CPA firm in Columbus, Ohio to select for participation in the study audit managers and supervisors who had audited large manufacturing organizations with internal audit departments. Seven of the Big 8 firms provided a total of twenty-six subjects from three of their Ohio offices. Each participant was then sent a questionnaire containing all of the cases for one of the SAS No. 9 variables and was asked to indicate on a ten-point scale his/her assessment of the strength of the internal audit department described in each case. A multidimensional scaling technique was used to identify, for each SAS No. 9 variable, the two factors which accounted for the most variance in the participants' ratings. The factors so identified are shown in Table 2-3.

In Stage 2 of his research, Schneider attempted to specify realistic and materially different levels for each of the six factors identified in Stage 1. Schneider
accomplished this by first specifying eight levels for each Stage 1 factor. Schneider then developed, for each SAS No. 9 variable, a questionnaire which showed all of the possible ways in which the levels of the factors associated with this variable could be paired. Next, each participant was sent a questionnaire dealing with a SAS No. 9 variable other than the one which he had evaluated in Stage 1. The participant was asked to make dissimilarity comparisons between the pairings specified in the questionnaire. Schneider used a multidimensional scaling technique to identify four levels for each Stage 1 factor.

In Stage 3 of his study, Schneider combined the six factors from Stage 1 with the levels from Stage 2 to develop sixty-four cases. Each recipient of the Stage 3 questionnaire was asked to indicate, on a 100-point ordinal scale, his/her assessment of the strength of the internal audit departments described in the cases.

Eighteen of the twenty-six external auditors who received the Stage 3 questionnaire actually performed the experimental task. The responses of these eighteen individuals were analyzed using axiomatic conjoint measurement to determine whether each individual's assessment of internal audit department strength could be represented by a linear model in which the dependent variables were competence, objectivity, and effectiveness.
The responses of three individuals could not be described by a linear model and were excluded from further consideration. The ordinal-scale "strength" value specified by each of the remaining fifteen respondents for each Stage 3 case was converted to an interval-scale value using MONANOVA. The average interval-scale value for each case was then used to obtain a measure of the relative importance of each SAS No. 9 variable in the respondents' overall evaluation of internal audit department strength. The results of this analysis are shown in Table 2-4.

Schneider (1985)

Using the definitions and the levels of competence, objectivity, and effectiveness which he developed in his 1984 study, Schneider (1985) developed sixteen cases describing hypothetical internal audit departments. Schneider then constructed a questionnaire which contained all of these cases and which described the hypothetical organization which had been described in Schneider (1984). Next, Schneider asked a contact person at each Big 8 CPA firm in Atlanta to select for participation in his current study managers, principals, and/or supervisors who had audited organizations with internal audit departments. A total of twenty individuals (representing all of the Big 8 firms) participated in the study. Each of the participants performed the following tasks:
1. Ranked the internal audit departments described in the sixteen cases in terms of their relative strength

2. Indicated, for each case, the number of hours which he/she would budget for the audit of the hypothetical organization's revenue cycle, given that three hundred hours would be needed to audit the revenue cycle if the organization did not have an internal audit department

Since this section is devoted to a discussion of the relative importance of the SAS No. 9 variables, only Schneider's analysis of the results of the first experimental task will be mentioned. The results of the second task will be discussed later.

Schneider used numerical conjoint measurement to transform each respondent's rankings of the sixteen cases into interval-scale values. The average interval-scale value for each case was then used to obtain a measure of the relative importance of each SAS No. 9 variable. The results of this analysis are shown in Table 2-4.

Brown and Karan

As discussed earlier, Brown and Karan (1986) asked each participant in their study to allocate one hundred points among competence, objectivity, and effectiveness as an indication of his/her assessment of the relative importance of each variable. Brown and Karan's findings are presented in Table 2-4.
### TABLE 2-4
RELATIVE IMPORTANCE OF COMPETENCE, OBJECTIVITY, AND EFFECTIVENESS

<table>
<thead>
<tr>
<th>Research Study</th>
<th>Relative Importance Of</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Competence</td>
</tr>
<tr>
<td>Brown (1983)</td>
<td>3</td>
</tr>
<tr>
<td>Schneider (1984)</td>
<td>2</td>
</tr>
<tr>
<td>Schneider (1985)</td>
<td>1*</td>
</tr>
<tr>
<td>Brown &amp; Karan (1986)</td>
<td>1*</td>
</tr>
<tr>
<td>Messier &amp; Schneider (1988)</td>
<td>1</td>
</tr>
</tbody>
</table>

Note: A "1" in this table signifies that the indicated variable had the greatest effect on the overall assessment of internal audit department strength.

*The participants in this study indicated that these variables were of approximately equal importance.

Messier and Schneider

Like the Brown and Karan (1986) study, the Messier and Schneider (1988) study was described in the preceding section. Therefore, only Messier and Schneider's findings regarding the relative importance of the SAS No. 9 variables will be discussed at this point. Messier and Schneider used the Analytic Hierarchy Process to analyze the pairwise
comparisons which the participants in their study made of the SAS No. 9 variables. The results of this analysis appear above in Table 2-4.

Reduction of External Audit Scope In Response to Internal Audit Activity

The preceding sections described the research studies which have investigated (1) the factors which are generally associated with the SAS No. 9 variables and (2) the relative importance of each variable in an overall assessment of internal audit department strength. The current section will describe those studies which have attempted to determine the effect of internal audit activity on the external auditor's work. These studies, while they do not deal with the subject of the current study, are similar to the latter in that they attempted to measure a particular aspect of external auditor reliance on internal audit activity.

Schneider (1985)

As already indicated, Schneider (1985) presented the twenty external auditors in his study with background information about a hypothetical organization and sixteen cases describing internal audit departments with varying degrees of reliability. Each participant specified, for each case, the number of hours which he/she would budget for the audit of the hypothetical organization's revenue cycle,
given that three hundred hours would be needed to audit the revenue cycle in the absence of an internal audit department. Schneider found that, on average, the external auditors in his study reduced the number of hours budgeted for the audit of the revenue cycle by approximately 38% as a result of the hypothetical organization's maintenance of an internal audit department. Schneider also discovered that the participants disagreed concerning the amount by which they were willing to reduce the scope of their work. Indeed, when he computed the average work reduction specified by a given participant for all sixteen cases, Schneider found that the averages ranged from 7% to 77%. Thus, some uncertainty seems to exist concerning the effect of internal audit activity on the external auditor's substantive testing.

**Margheim**

Margheim (1986) examined the extent to which the external auditor adjusts the scope of his/her work in situations in which the organization which he/she is auditing has an internal audit department. To do this, Margheim sent questionnaires to one thousand CPAs who worked for Big 8 CPA firms in the thirty largest United States cities and who had been AICPA members for at least three years. The CPAs were randomly selected from the AICPA List of Members (the last edition of which was issued in 1984)
and then randomly assigned to either a control group or one of four experimental groups.

The members of the control group received a questionnaire which contained:

1. Background information about a hypothetical organization and its accounts receivable
2. The actual number of hours incurred on last year's audit in connection with each of nine audit work program steps. Four of these steps involved tests of controls (i.e., compliance tests), while the remaining five steps represented substantive tests

The members of the experimental groups were sent questionnaires which contained, in addition to the above data, information about the organization's internal audit department and a description of the work which the internal auditors had performed in the receivables area during the current year.

The characteristics of the internal audit departments described in the experimental questionnaires were developed in the following manner. First, Margheim decided to treat competence and effectiveness as one variable in an effort to avoid unrealistic combinations of the two. Next, operational definitions were formulated for a "high" level and a "low" level of the competence/effectiveness variable (referred to hereafter as work) and a "high" level and a "low" level of objectivity. Internal
audit department descriptions were then generated by combining each level of work with each level of objectivity. Each experimental questionnaire contained one of the four resulting work/objectivity combinations.

Each subject, whether he/she received a control questionnaire or an experimental questionnaire, was asked to specify the number of hours which he/she would budget for each of the nine audit work program steps in the questionnaire. Two hundred and sixty-seven CPAs (representing 29% of the questionnaires which proved to be deliverable to CPAs whose area of specialization was not taxation) actually performed the experimental task. Statistical analysis of the responses revealed the following:

1. The mean number of hours specified by the control group for each of the nine audit work program steps differed significantly from the mean number of hours specified by the experimental groups which had received questionnaires in which the work variable was at the "high" level.

2. The mean number of hours budgeted for the audit of the receivables area declined by approximately 19% as the work variable moved from the "low" level to the "high" level.

3. The number of hours budgeted for the performance of the individual audit work program steps affected by internal audit activity declined significantly as the work variable moved from the "low" level to the "high" level. This was true of program steps involving tests of controls and substantive tests.
4. Objectivity (regardless of level) had no effect on either the number of hours budgeted for the audit of the receivables area or the number of hours budgeted for individual audit work program steps.

These findings suggest that significant reductions in audit time tend to occur when the external auditor perceives the internal audit department to have a high level of competence/effectiveness.

Previous Research Involving External Quality Assurance Reviews

Anderson

The only research study undertaken to date on the subject of external quality assurance reviews is Anderson (1983). This study, however, did not involve external auditors. Rather, Anderson examined external quality assurance reviews from the standpoint of internal audit directors, the members of management to whom the internal audit directors reported administratively, and audit committee members (Anderson 1983, 134). In developing his research questionnaire, Anderson speculated, using Guideline 560.04 of Standards as support, that an external quality assurance review could be performed by any of the following (Anderson 1983, 5):

1. The CPA firm which currently audits the organization's financial statements
2. A CPA firm other than the one which currently audits the organization's financial statements

3. A team of internal auditors assembled by the organization being reviewed and consisting of internal auditors working for other organizations within the same industry as the organization being reviewed

4. A team of internal auditors assembled by the organization being reviewed and consisting of internal auditors working for organizations in industries different from the industry of the organization being reviewed

5. A team of internal auditors assembled by the IIA's Director of Quality Assurance Review Service

6. Outside consultants

Anderson asked each participant in his study to indicate which of the above reviewers (excluding outside consultants) he/she would most want to perform an external quality assurance review. Internal audit directors specified reviewers 3 and 1 as their first and second choices, respectively, for external reviewers. Management representatives selected reviewers 1 and 3 as their first and second choices, while audit committee members preferred reviewers 1 and 2. All of the participants, however, indicated that they would approve each of the reviewers to which they were exposed except reviewer 4 (Anderson 1983, 6).
Summary

None of the research which has been conducted thus far has addressed the subject of this study—namely, the effect that an external quality assurance review of an organization’s internal audit department has on the external auditor’s development of a time budget for the audit of that organization. Previous research has, however, examined the relationship between internal audit activity and the external auditor. This research was examined in this chapter, with the following results.

Factors Associated with Competence, Objectivity, and Effectiveness

The studies which have attempted to identify the factors most closely associated with internal audit department competence, objectivity, and effectiveness are summarized in Table 2-2. This table indicates that individuals interested in external auditor reliance on internal auditors seem to agree about the factors that are most closely associated with internal audit department competence and objectivity. These individuals, however, appear to disagree concerning the factors that should be used to evaluate an internal audit department’s effectiveness. Part of this disagreement may stem from the fact that the researchers whose studies are shown in Table 2-2 defined effectiveness in different ways.
Relative Importance of Competence, Objectivity, and Effectiveness

The studies which have investigated the relative importance of competence, objectivity, and effectiveness in the overall assessment of internal audit department strength are compared in Table 2-4. A review of this table reveals that an internal audit department's effectiveness is the most important factor in an overall evaluation of its strength. Table 2-4 also indicates that disagreement exists concerning the relative importance of competence and objectivity. Some of this disagreement, however, may be attributable to the fact that different researchers defined competence and objectivity in different ways.

External Auditor Reliance on Internal Auditor Activity

As indicated earlier, two researchers have attempted to measure the extent to which the external auditor reduces the scope of his/her work in response to internal audit activity. Schneider (1985) found that the number of hours that the participants in his study budgeted for the audit of the revenue cycle in the absence of an internal audit department was approximately 38% higher than the number of hours specified in the presence of internal audit activity. Margheim (1986) observed that the number of hours that the external auditors in her study budgeted for the receivables area when the organization being audited did not have an
The internal audit department was significantly different (Margheim did not indicate the direction of the difference) from the number of hours budgeted in the presence of an internal audit department with a high level of competence/effectiveness. Margheim also found that an increase in internal audit competence/effectiveness from a low level to a high level resulted in a reduction in audit time for tests of controls and substantive tests.

These two studies are important to the current study for two reasons. First, both studies demonstrate that internal audit activity has a significant effect on the external auditor's development of a time budget. This finding is significant because it relieves the current study of the burden of making an *a priori* argument as to why the external auditor should be expected to reduce the scope of the audit work in light of internal audit activity.

Second, Margheim's study provides evidence that a high level of internal audit competence/effectiveness can reduce the amount of time that the external auditor budgets for tests of controls and substantive tests. This discovery is important in that it (1) provides support for the use of an "effective" internal audit department in the current study's experimental instrument and (2) demonstrates that time reductions are possible in two of the four audit areas with which the current study deals.
CHAPTER 3
RESEARCH METHOD

This chapter discusses the study's research method. In particular, it addresses the following issues: research questions, definition of terms, research hypotheses, research instrument, independent and dependent variables, statistical model, and statistical tests.

Research Questions

The study's primary research question is:

What effect does an external quality assurance review have on the external auditor's development of a time budget for the audit of an organization whose internal audit department has undergone such a review?

The study also investigated the following secondary question:

What effect does the type of reviewer who performs an external quality assurance review have on the external auditor's development of a time budget for the audit of an organization whose internal audit department has undergone such a review?

Definition of Terms

This study is the first to examine the external auditor's response to an external quality assurance review
of an internal audit department. Consequently, the terms which must be defined in order to answer the research questions can be defined in a number of ways. For example, "external quality assurance review" might have been favorable or unfavorable. Second, the external auditor's "audit" could have been either a continuing engagement or a first-time audit. Finally, the "internal audit department" may have been new or well-established. Since the study could not examine all possible definitions, the primary and the secondary research questions were answered within the context of the following variables:

1. A favorable external quality assurance review
2. A continuing audit engagement
3. A well-established internal audit department

These variables were chosen for the following reasons. A favorable external quality assurance review was selected because, in 93% of the external quality assurance reviews which the IIA has conducted to date, the internal audit department being reviewed has either fully, substantially, or adequately complied with the IIA's Standards. A continuing audit engagement was chosen

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5The percentage noted here was obtained from the IIA's Director of Professional Practices (telephone interview, September 1989), who indicated that the results of the IIA's external quality assurance reviews were not currently available for public distribution.
because the probability that an organization will, in the same year, change auditors and undergo a quality assurance review seems small. Finally, a well-established internal audit department was selected because such a department has had more time to implement the IIA's Standards and thus is more likely to be operating in a manner which would justify a favorable external quality assurance review report.

**Research Hypotheses**

**Primary Research Question**

As the external auditor gathers information about an organization's internal audit department (as required by AICPA 1975, par. 4), he/she forms an opinion concerning the quality of the department's operations. This opinion is likely to be the same as the external quality assurance review team's evaluation for two reasons. First, as discussed in Chapter 1, the external auditor and the external quality assurance review team base their evaluations of the internal audit department on essentially the same factors. Second, since the external auditor and the external reviewers are skilled in the exercise of professional judgment, both are likely to correctly assess the quality of the internal audit department's operations.

Reaching the same conclusion concerning the internal audit department that the external quality assurance review team reached might give the external auditor increased
confidence in (1) the department itself or (2) his/her assessment of the department. This increased confidence might lead the external auditor to reduce the audit work in certain areas to a greater extent than he/she would have in the absence of an external quality assurance review. The areas in which work reductions are possible are (AICPA 1989, par. 12):

1. The procedures which the external auditor performs to obtain an understanding of the organization's internal control structure

2. The tests of controls which the external auditor performs to determine the likelihood that the organization's control procedures will detect or prevent material financial statement errors

3. The substantive tests which the external auditor performs to evaluate the validity of material financial statement assertions

The extent to which the external auditor actually reduces the scope of his/her work in the above areas is currently unknown and was the subject of three of the first four hypotheses. These four hypotheses, in the null form, are as follows:

**H1**: A favorable external quality assurance review of an organization's internal audit department has no effect on the number of hours which the external auditor budgets for the **evaluation of an organization's internal audit department** on a continuing audit of the organization.

**H2**: A favorable external quality assurance review of an organization's internal audit department has no effect on the number of hours which the external auditor budgets for obtaining an
understanding of an organization's internal control structure on a continuing audit of the organization.

H3 : A favorable external quality assurance review of an organization’s internal audit department has no effect on the number of hours which the external auditor budgets for the performance of tests of controls on a continuing audit of the organization.

H4 : A favorable external quality assurance review of an organization's internal audit department has no effect on the number of hours which the external auditor budgets for the performance of substantive tests on a continuing audit of the organization.

The results of testing these hypotheses provided information with which to answer the primary research question. The manner in which the hypotheses were tested is described in the "Statistical Tests" section.

Secondary Research Question

H1 - H4 deliberately disregarded the effect that the composition of an external quality assurance review team might have on the external auditor. However, external auditors might have a preference for a certain type of reviewer and might be willing to reduce the scope of their work more for this reviewer than for other reviewers. This possibility was investigated in the following null hypothesis, which addressed the study's secondary research question:

H5 : The type of reviewer who renders a favorable external quality assurance review report on an organization’s internal audit department has no effect on the number of hours which the external
auditor budgets on a continuing audit of the organization for each of the areas described in H1 - H4.

Research Instrument

Data with which to test the hypotheses were obtained by means of questionnaires. This section describes the manner in which the questionnaires were constructed, pretested, and distributed.

Questionnaire Construction

As discussed in Chapter 2, Anderson (1983, 5, 6) found support among internal audit directors, top management, and audit committee members for the following types of external reviewers:

1. The CPA firm which currently audits the organization's financial statements
2. A CPA firm other than the one which currently audits the organization's financial statements
3. A team of internal auditors assembled by the organization being reviewed and consisting of internal auditors working for other organizations within the same industry as the organization being reviewed
4. A team of internal auditors assembled by the IIA's Director of Quality Assurance Review Service

These types of reviewers were included in the study in light of Anderson's finding. In addition, a fifth type of reviewer--outside consultant--was incorporated into the
study on the basis of the IIA's indication (1986, par. 560.04.3) that such a reviewer is capable of performing a quality assurance review. The "outside consultant" reviewer took the form of a team of faculty members who taught accounting at a near-by university.

A questionnaire (referred to hereafter as an experimental questionnaire) was developed for each type of reviewer. Thus, the study contained five experimental questionnaires, each of which consisted of the following (see Appendix A):

1. A condensed balance sheet and income statement for a hypothetical organization named XYZ Company

2. A brief description of XYZ Company's internal audit department

3. A favorable external quality assurance review report prepared by a particular type of reviewer. The report used in the study represented a condensed version of the report which the IIA distributes to individuals interested in the format of an external quality assurance review report.

4. A comparison of the actual and the budgeted hours associated with last year's audit of XYZ Company

5. The total number of hours which the external quality assurance review team devoted to its evaluation of XYZ Company's internal audit department. This data was obtained from the IIA's Director of Quality Assurance Review Service.
In addition to the five experimental questionnaires, the study contained a control questionnaire (Appendix B). The latter consisted of the same items as the experimental questionnaires except for items 3 and 5 above.

The balance sheet, income statement, actual audit hours, and budgeted audit hours for XYZ Company were based on similar items for three organizations which are currently audited by three different Big 7 CPA firms in the Baton Rouge/New Orleans (Louisiana) area. The characteristics of XYZ Company's internal audit department were derived through discussions with the internal audit directors of organizations in the Baton Rouge/New Orleans area and through reference to IIA (1984b).

Each participant (whether he/she received an experimental questionnaire or the control questionnaire) was told that:

1. He/she was in charge of the current year's audit of XYZ Company.

2. His/her firm had audited XYZ Company for the last five years, during which time XYZ Company had received clean audit opinions.

3. His/her firm had been pleased with the competence, objectivity, and effectiveness of XYZ Company's internal audit department on previous audits of XYZ Company's financial statements.

Each participant was then asked to answer two demographic questions. In addition, each participant was requested to
specify the number of hours which he/she would budget for the steps in the audit program for the current year's audit of XYZ Company. Table 3-1 shows the relationship between the hypotheses and the audit program steps.*

---

**TABLE 3-1**

RELATIONSHIP BETWEEN THE STUDY'S HYPOTHESES AND THE STUDY'S QUESTIONNAIRES

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Audit Area</th>
<th>Program Step in Questionnaires</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>1. Evaluating internal audit department</td>
<td>2</td>
</tr>
<tr>
<td>H2</td>
<td>2. Understanding internal control structure</td>
<td>3</td>
</tr>
<tr>
<td>H3</td>
<td>3. Performing tests of controls</td>
<td>4</td>
</tr>
<tr>
<td>H4</td>
<td>4. Performing substantive tests</td>
<td>5</td>
</tr>
</tbody>
</table>

*Audit program steps 1 and 6 dealt with planning the audit and preparing the audit report, respectively, and were outside the scope of the study. They were included in the audit program because such tasks are part of the budget preparation process on actual external audit engagements.
Questionnaire Pretest

The questionnaires were pretested to determine their clarity and their average completion time. A total of sixteen audit partners, managers, and seniors supplied by contacts at four Big 7 CPA firms in the Baton Rouge/New Orleans area provided feedback concerning both of these items.

Each questionnaire was evaluated by at least two, but not more than three, of the sixteen pretest participants. These evaluations revealed that each questionnaire could be completed in 10-30 minutes. The evaluations also resulted in the inclusion in each questionnaire of an explanation of the difference between the budgeted and the actual hours on last year's audit of XYZ Company's financial statements.

Questionnaire Distribution

Once the questionnaires were modified to reflect the comments of the pretest participants, a package containing a cover letter (Appendix C), one copy of each questionnaire, and a postage-paid return envelope was sent to contacts at Big 7 firms in twelve of the twenty largest United States cities. The firms to which questionnaire packages were sent and from which completed questionnaires were received are shown in Table 3-2. As Table 3-2 indicates, all Big 7 CPA firms participated in the study. Table 3-2 also

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<table>
<thead>
<tr>
<th>Sample Firms and Location</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>AA CL DHS EY PMM PW TR</td>
<td></td>
</tr>
<tr>
<td>New York</td>
<td>+</td>
</tr>
<tr>
<td>Houston</td>
<td>+</td>
</tr>
<tr>
<td>Dallas</td>
<td>+</td>
</tr>
<tr>
<td>San Francisco</td>
<td>+</td>
</tr>
<tr>
<td>St. Louis</td>
<td>+</td>
</tr>
<tr>
<td>Pittsburgh</td>
<td>+</td>
</tr>
<tr>
<td>Atlanta</td>
<td>*</td>
</tr>
<tr>
<td>Philadelphia</td>
<td>+</td>
</tr>
<tr>
<td>Los Angeles</td>
<td>*</td>
</tr>
<tr>
<td>Chicago</td>
<td>+</td>
</tr>
<tr>
<td>Miami</td>
<td>+</td>
</tr>
<tr>
<td>Boston</td>
<td>+</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Sent</strong></td>
<td>6 3 4 2 5 3 5 28</td>
</tr>
<tr>
<td><strong>Rec’d</strong></td>
<td>6 3 2 2 4 3 4 24</td>
</tr>
</tbody>
</table>

+--Questionnaire package sent and returned
*--Questionnaire package sent and not returned
AA--Arthur Andersen & Co.
CL--Coopers & Lybrand
DHS--Deloitte Haskins & Sells
EY--Ernst & Young
PMM--Peat Marwick Main & Co.
PW--Price Waterhouse
TR--Touche Ross

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demonstrates that questionnaires were returned by 86% (twenty-four of twenty-eight) of the Big 7 CPA firm practice units to which they were sent.

The questionnaires in each package were randomly ordered prior to the time the package was mailed. This was done to minimize the possibility that the order in which the questionnaires were placed in the packages might bias the participants' responses. In addition, the questionnaires were coded in such a way that respondents could be identified by CPA firm and city.

The cover letter which accompanied each questionnaire package instructed the contact person to:

1. Distribute the questionnaires to a total of six partners, managers, or seniors who had experience auditing organizations with internal audit departments and who did not regularly work together on actual audit engagements

2. Ask the six participants not to discuss the questionnaires among themselves

3. Return the completed questionnaires in the self-addressed, postage-paid envelope included in the questionnaire package

The use of a contact person is consistent with some of the studies described in Chapter 2--namely, Brown (1983), Schneider (1984 and 1985), and Messier and Schneider (1988).

---

*A practice unit is a Big 7 CPA firm office in a particular city.*
Independent and Dependent Variables

Table 3-3 shows that the research design for each audit area contained one dependent variable, one independent variable, and one blocking variable. The dependent variable was the number of hours specified by a given participant for a given audit area. In Table 3-3, the dependent variable takes the form $Y_{i,j,k}$ (for example, $Y_{1,1,1}$), where:

- $i$ is the participant's job status ($i = 1, \ldots 3$).
- $j$ is the reviewer who performed the external quality assurance review ($j = 1, \ldots 6$).
- $k$ is the subject number ($k = 1, \ldots n_i$).

The independent variable was the type of reviewer who performed the external quality assurance review. Table 3-3 indicates that the study involved five types of external reviewers (denoted A-E). These reviewers were identified earlier in the "Questionnaire Construction" subsection. In addition, Table 3-3 shows that the study employed a control group, which is designated "No Reviewer."*

The blocking variable was the position (i.e., partner, manager, or senior) of a particular respondent within a Big 7 CPA firm. The blocking variable was included

*For purposes of the study, the "no reviewer" scenario in Questionnaire 1 was considered to be a type of external reviewer despite the fact that such a classification is inconsistent with a strict interpretation of "type of reviewer." This was done to achieve a one-to-one match between questionnaires and types of reviewers.
TABLE 3-3
RESEARCH DESIGN FOR EACH AUDIT AREA

<table>
<thead>
<tr>
<th>Questionnaire</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>External</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reviewer A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reviewer B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reviewer C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reviewer D</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reviewer E</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Partner</th>
<th>Y111</th>
<th>Y211</th>
<th>Y311</th>
<th>Y411</th>
<th>Y511</th>
<th>Y611</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manager</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Senior</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>Ȳ.1</td>
<td>Ȳ.2</td>
<td>Ȳ.3</td>
<td>Ȳ.4</td>
<td>Ȳ.5</td>
<td>Ȳ.6</td>
</tr>
</tbody>
</table>

Note 1: Yi,k is the response for the kth participant who possessed job status "i" (partner = 1, manager = 2, senior = 3) and who received a questionnaire describing the jth type of external reviewer (no reviewer = 1, ...Reviewer E = 6).

Note 2: Ȳ.j is the mean response for the participants who received a questionnaire describing the jth type of external reviewer.

in the study because of the possibility that a participant's position might have an effect on his/her development of a time estimate for a given audit area. Hereafter, a participant's position within the Big 7 CPA firm for which he/she worked is referred to as the "job status" variable.
**Statistical Model**

Because the focus of the study was on individual audit areas rather than on the four audit areas taken as a whole, a separate ANOVA model was used for each audit area. The ANOVA models which were employed had the following form (Neter, Wasserman, and Kutner 1985, 685, 916-919):

\[(3.1) \quad Y_{ijk} = \mu + \beta_i + \gamma_j + \varepsilon_{ijk}\]

Where:

- \(Y_{ijk}\) = the number of hours specified by the \(k\) th participant who possessed job status "\(i\)" and who received a questionnaire describing the \(j\) th type of external reviewer.
- \(\mu\) = the population mean number of hours
- \(\beta_i\) = the effect of the \(i\) th job status blocking variable (\(i = 1, 2, 3\)).
- \(\gamma_j\) = the effect of the \(j\) th type of external reviewer (\(j = 1, \ldots 6\)).
- \(\varepsilon_{ijk}\) = a random error term.

Model (3.1) is based on the assumptions that, for a given audit area, the \(\varepsilon_{ijk}\) (1) are independent, (2) are normally distributed with a mean of zero, and (3) have equal variances (Neter, Wasserman, and Kutner 1985, 685).

**Statistical Tests**

This section discusses the following topics:

- analysis of the data for outlying observations,
- tests of the ANOVA assumptions,
- tests of \(H_1 - H_5\),
- selection of a
significance level, and construction of confidence intervals using multiple comparison procedures.

Outlier Analysis

Prior to conducting formal statistical tests of the hypotheses, the data were analyzed to determine whether outliers were present. This step was performed because outliers have the potential to disproportionately influence statistical analysis and may lead to erroneous inferences about the population being studied (Neter, Wasserman, and Kutner 1985, 114; Barnett and Lewis 1978, 4). The outlier analysis was conducted using tests described by Barnett and Lewis (1978, 90-102), as shown in Appendix F.

Tests of ANOVA Assumptions

Following the search for outliers, the assumptions underlying model (3.1) were tested for each audit area. The first assumption was that the error terms were independent of one another. The first stage of this test was the computation of a residual for each participant's response. The residual represented the amount by which the participant's response differed from the value predicted by model (3.1). The runs test (Gibbons 1976, 365-371), with a series of at least one minus sign or one plus sign constituting a run, was then employed to determine whether the pattern of residuals was random. This test was selected
because the number of runs is a reflection of the randomness (and, hence, the independence) of a series (Gibbons 1976, 365-366). Table E-1 presents the test statistic that was used in connection with the runs test.

The second assumption underlying model (3.1) was that, for a given audit area, the error terms were normally distributed. To test this assumption, the residuals calculated above were analyzed using the UNIVARIATE procedure in SAS. This procedure computed (1) a modified Kolmogorov-Smirnov D-statistic for the test of the null hypothesis that the residuals were normally distributed and (2) the p-value associated with this test statistic (SAS 1985, 1187). The Kolmogorov-Smirnov test is appropriate because, according to Conover (1980, 346), "the general feeling [among statisticians] seems to be that the Kolmogorov test is probably more powerful than the chi-square [goodness of fit] test in most situations."

When a set of data violates the assumptions underlying a statistical model, transformation of the original observations is appropriate (Neter, Wasserman, and Kutner 1985, 615). For audit areas with residuals that were not normally distributed, the transformations described by Kirk (1982, 82-83) were applied to the original data. The UNIVARIATE procedure was then used to analyze the residuals obtained from the transformed data.
The final assumption underlying model (3.1) was that, for a given audit area, the variances of the error terms were equal across questionnaires. For audit areas with residuals (whether based on the original or the transformed data) that were independent and normally distributed, Bartlett's test (Neter, Wasserman, and Kutner 1985, 618-620) was used to test this assumption (see Table E-2). Bartlett's test was selected because, unlike some other statistical tests, it did not require that the same number of participants complete each questionnaire (Neter, Wasserman, and Kutner 1985, 618). The p-value associated with the test statistic in Table E-2 was computed through reference to Neter, Wasserman, and Kutner (1985, 1076).

According to Neter, Wasserman, and Kutner (1985, 618), Bartlett's test can only be used when the underlying data are normally distributed. For this reason, Bartlett's test was not performed for audit areas with residuals that were not normally distributed and could not be transformed to achieve approximate normality.

Tests of H1 - H4

H1 dealt with the effect of a favorable external quality assurance review on audit area 1—the external auditor's evaluation of an organization's internal audit department. This hypothesis was tested by comparing the mean control group response for audit area 1 (denoted \( \bar{Y}_1 \)).
in Table 3-3) with the mean response of each experimental group, as follows: \( \bar{Y}_1. \) vs. \( \bar{Y}_2. \), \( \bar{Y}_1. \) vs. \( \bar{Y}_3. \), \ldots \( \bar{Y}_1. \) vs. \( \bar{Y}_e. \) (Neter, Wasserman, and Kutner 1985, 919).

H2 - H4 were tested in a manner similar to that described for H1. The only difference between these hypotheses and H1 was the audit area with which each hypothesis dealt. H2, for example, was concerned with the effect of a favorable external quality assurance review on audit area 2—the procedures performed by the external auditor to obtain an understanding of an organization's internal control structure.

H3 involved the effect of a favorable external quality assurance review on audit area 3—the tests of controls that the external auditor performs in connection with the audit of an organization's financial statements. This hypothesis was tested by comparing the mean control group response for audit area 3 with the mean response for each experimental group.

H4 dealt with the effect of a favorable external quality assurance review on audit area 4—the substantive tests that the external auditor performs as part of his audit of an organization's financial statements. This hypothesis was tested by forming individual comparisons between the mean control group response for audit area 4 and the mean response for each experimental group.
Test of H5

H5 was concerned with the effect that the type of reviewer who performs an external quality assurance review has on the time that the external auditor budgets for a particular audit area. For each audit area, H5 was tested by comparing the mean response for the questionnaire that described a particular external reviewer with the mean response for the questionnaires that described the other types of external reviewers. For example, the following comparisons were made to test H5 for audit area 1:

1. $\bar{Y}_a$ vs. $\bar{Y}_3$
2. $\bar{Y}_2$ vs. $\bar{Y}_4$
3. $\bar{Y}_2$ vs. $\bar{Y}_a$
4. $\bar{Y}_2$ vs. $\bar{Y}_e$
5. $\bar{Y}_3$ vs. $\bar{Y}_4$
6. $\bar{Y}_3$ vs. $\bar{Y}_a$
7. $\bar{Y}_3$ vs. $\bar{Y}_e$
8. $\bar{Y}_4$ vs. $\bar{Y}_a$
9. $\bar{Y}_4$ vs. $\bar{Y}_e$
10. $\bar{Y}_a$ vs. $\bar{Y}_e$

Similar comparisons were made to test H5 for audit areas 2-4.

Significance Level

The preceding discussion indicated that five pairwise comparisons were made to evaluate each of H1, H2, H3, and H4, while ten comparisons were used to assess H5. Thus, a total of fifteen pairwise comparisons were made for each audit area. Because more than one pairwise comparison was made for each audit area, the Type I error rate was
controlled at the family level (Neter, Wasserman, and Kutner 1985, 587). For each audit area, the family significance level was 0.15, as suggested by Gibbons (1976, 182):

As the number of [pairwise] comparisons increases, the overall level of significance is usually increased so that any possible single difference is more likely to be detected. The values recommended are in the vicinity of 0.15, 0.20, or even 0.25...

For a given audit area, then, a particular pairwise comparison was evaluated at a significance level of 0.01—that is, 0.15 ÷ 15 (Neter, Wasserman, and Kutner 1985, 582; Gibbons 1976, 187).

**Multiple Comparison Procedures**

As previously discussed, each hypothesis was tested by making pairwise comparisons of the participants' mean responses. The statistical significance of the difference between the mean responses involved in each comparison was determined as follows.

For an audit area in which none of the ANOVA assumptions were violated, either the test statistic in Table E-3 (hypotheses H1 - H4) or the one in Table E-4 (hypothesis H5) was computed for each pairwise comparison formed with data from that area. The p-value associated with the test statistic was then determined through reference to Neter, Wasserman, and Kutner (1985, 1074-1075). The mean responses involved in a pairwise comparison were considered to be significantly different if the two-tailed
p-value was less than or equal to the "individual statement" significance level of 0.01 (see 'Significance Level" above).

When two mean responses were found to be significantly different, the magnitude of the difference was estimated by using the Bonferroni multiple comparison procedure to construct simultaneous confidence intervals (see Tables E-5 and E-6). The Bonferroni procedure was selected because the pairwise comparisons of interest were specified prior to the conduct of the study (Neter, Wasserman, and Kutner 1985, 582). For audit areas in which model (3.1) and the Bonferroni procedure were applied to a transformation of the participants' responses, the end points of the Bonferroni confidence interval were converted from the "transformed" scale back into the scale in which the responses were originally expressed (Neter, Wasserman, and Kutner 1985, 617).

If at least one of the ANOVA assumptions was violated for a particular audit area, the participants' responses for that area were ranked from smallest to largest. A one-way analysis of variance was then applied to the resulting ranks, as suggested by Conover and Iman (1976, 1356):

If there is a parametric method available for analysis of the data, but the assumptions of the parametric method are not appropriate for the data, then one merely replaces the data with their ranks, ranking everything together from smallest to largest. Then the parametric method of analysis is applied to the ranks rather than
the original data. The idea of replacing the data with the ranks is to transform the original observations into numbers that more nearly satisfy the assumptions of the parametric model and at the same time retain all of the ordinal information contained in the original data.

The hypotheses related to this audit area were tested by forming pairwise comparisons of the mean ranks associated with different types of external reviewers. The test statistic in either Table E-7 (hypotheses H1 - H4) or Table E-8 (hypothesis H5) was then computed for each pairwise comparison (Gibbons 1976, 182, 189, 191). Next, the p-value associated with the test statistic was determined through reference to Gibbons (1976, 385). The mean ranks involved in a pairwise comparison were considered to be significantly different if the two-tailed p-value was less than or equal to the "individual statement" significance level of 0.01.

Summary

This chapter described the manner in which the questionnaires were constructed and the methodology used to test the hypotheses. The chapters that follow will present an analysis of the data gathered from the participants, discuss the conclusions drawn from the research, and suggest areas in which additional research seems warranted.
CHAPTER 4
DATA ANALYSIS

This chapter describes the results of the data analysis. In particular, it deals with the following: a summary of the participants' responses, testing of the ANOVA assumptions, and results of the tests of the hypotheses.

Data Summary

As mentioned in Chapter 3, questionnaire packages were sent to a total of twenty-eight Big 7 CPA firm practice units. Since each package contained six questionnaires, 168 external auditors (i.e., 28 X 6) were invited to participate in the study. Responses were actually received from 126 (or 75%) of the external auditors to whom questionnaires were sent.

Each completed questionnaire was reviewed for evidence that the participant may not have taken the questionnaire seriously or may have misunderstood the
experimental task. No such evidence was noted. In addition, the responses associated with each of the four audit areas were examined for possible outlying values (Barnett and Lewis 1978, 90-102). The outlier analysis (see Appendix F) resulted in the elimination of five participants. Thus, the hypotheses were tested using the responses of 121 external auditors. These responses are summarized in Appendix H.

Table 4-1 presents a breakdown of the responses by questionnaire and type of respondent. This table reveals that the responses were distributed fairly evenly among the six questionnaires. The table also shows that the sample included reasonable representation from partners, managers, and seniors.

**Tests of ANOVA Assumptions**

As mentioned in Chapter 3, the study involved four ANOVA models, one for each audit area. Each ANOVA model had the form shown in (3.1) and was based on three

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*Such evidence could have taken the form, among other things, of the specification of (1) the same number of hours for each audit program step or (2) total audit hours without an indication of how this total was allocated to individual audit areas.
assumptions. These assumptions were tested in the manner described in Appendix G, with the following results.

<table>
<thead>
<tr>
<th>Questionnaire</th>
<th>Average Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job Status</td>
<td>1 2 3 4 5 6 Total</td>
</tr>
<tr>
<td>Partner</td>
<td>6 3 8 4 4 5 30</td>
</tr>
<tr>
<td>Manager</td>
<td>12 7 10 14 9 9 61</td>
</tr>
<tr>
<td>Senior</td>
<td>4 8 3 4 4 7 30</td>
</tr>
<tr>
<td>Total</td>
<td>22 18 21 22 17 21 121</td>
</tr>
</tbody>
</table>

Note: The amounts in Columns 1 - 6 represent the number of participants of a given type (e.g., partners) who completed the indicated questionnaire. The amounts were the same for each of the study's four audit areas.

10Appendix D shows that, for each audit area, the interaction of the blocking variable and the independent variable was not statistically significant. For this reason, model (3.1) did not include a term representing the interaction of these two variables.
Independence Assumption

The first ANOVA assumption was that the error terms for a given audit area were independent of one another. As Table G-1 shows, this assumption was not violated for any audit area. This finding indicates that the error terms were not correlated (Neter, Wasserman, and Kutner 1985, 612).

Normality Assumption

The second ANOVA assumption was that, for a particular audit area, the error terms were normally distributed. Table G-2 indicates that this assumption was violated for each audit area. This absence of normality was addressed by transforming the original observations. Table G-2 reveals that, with two exceptions, none of the transformations resulted in a normal distribution for any audit area. For audit area 1, the following transformations produced residuals that were normally distributed:

1. \[ Y' = \sqrt{Y} \]
2. \[ Y' = \sqrt{Y + 1} \]

Transformation #1 was used in the study because it had the larger p-value in the test for normality (see Table G-2).
Equality-of-Variance Assumption

The third ANOVA assumption was that, for a given audit area, the error terms had equal variances across questionnaires. This assumption was tested only for the transformed data for audit area 1 since the data in the other audit areas were not normally distributed and no transformation to normality could be found. As indicated in Appendix G, the error terms based on the transformed observations for audit area 1 had equal variances.

Effect of Quality Assurance Review

Test of H1

H1 dealt with the effect of a favorable external quality assurance review on audit area 1—the external auditor's evaluation of an organization's internal audit department. For reasons already discussed, H1 was tested using transformed data rather than the participants' original responses. The results of the ANOVA analysis for H1 are shown in Appendix I. Table 4-2, on the other hand, presents the outcome of the pairwise comparisons that were used to test H1. As indicated in Table 4-2, Bonferroni confidence intervals were formed only for pairwise comparisons that involved statistically significant differences.

According to Table 4-2, the favorable external quality assurance review significantly affected the
### TABLE 4-2

**PAIRWISE COMPARISONS USED TO EVALUATE H1**

<table>
<thead>
<tr>
<th>Reviewers Compared</th>
<th>( \bar{Y}_{.1} )</th>
<th>Test Statistic</th>
<th>P-value</th>
<th>Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control, A</td>
<td>3.21</td>
<td>4.51</td>
<td>&lt;0.001*</td>
<td>1.8 ( \leq ) ( L_1 ) ( \leq ) 25.8</td>
</tr>
<tr>
<td>Control, B</td>
<td>2.10</td>
<td>3.08</td>
<td>0.002*</td>
<td>0.1 ( \leq ) ( L_2 ) ( \leq ) 15.2</td>
</tr>
<tr>
<td>Control, C</td>
<td>1.94</td>
<td>2.87</td>
<td>0.004*</td>
<td>0.03 ( \leq ) ( L_3 ) ( \leq ) 13.7</td>
</tr>
<tr>
<td>Control, D</td>
<td>1.79</td>
<td>2.48</td>
<td>0.014</td>
<td></td>
</tr>
<tr>
<td>Control, E</td>
<td>0.52</td>
<td>0.77</td>
<td>0.450</td>
<td></td>
</tr>
</tbody>
</table>

Note 1: \( \bar{Y}_{.1} \) is the mean *transformed* response for the control group for audit area 1. \( \bar{Y}_{.j} \) is the mean *transformed* response for the questionnaire that described the \( j \)th type of external reviewer (Reviewer A = 2, ...Reviewer E = 6) for audit area 1.

Note 2: Table E-3 illustrates the computation of the test statistics while Table E-5 demonstrates the calculation of the confidence intervals. The confidence intervals shown above are in the same units as the original data (i.e., hours).

Note 3: P-values were obtained through reference to Neter, Wasserman, and Kutner (1985, 1074-1075).

Note 4: Confidence intervals were not constructed for the last two pairwise comparisons because the means involved therein were not significantly different at the 0.01 significance level.

*--Significant at the 0.01 significance level
participants' responses when the review was performed by the following:

1. **Reviewer A**--The Big 7 CPA firm that currently audits the financial statements of the organization whose internal audit department was reviewed

2. **Reviewer B**--A Big 7 CPA firm other than the one that currently audits the organization's financial statements

3. **Reviewer C**--A team consisting of internal auditors who (a) worked in the same industry as the organization whose internal audit department was reviewed and (b) were selected by the organization's internal audit director

When the external quality assurance review is conducted by Reviewer A, the average time specified is between 1.8 and 25.8 hours less than the average time budgeted by the control group respondents. When Reviewer B performs the external review, the average time specified is between 0.1 and 15.2 hours less than that specified when the external quality assurance review is not performed. Finally, the mean response when the external review is undertaken by Reviewer C is between 0.03 and 13.7 hours smaller than the mean response in the absence of the review.

The reduction in audit time for audit area 1 in the presence of an external review performed by the Big 7 CPA

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11All of the reviewers mentioned in this chapter are the same as those noted in Table 3-3.
firm that currently audits the organization may be explained in one of two ways. First, the external auditor, due to a type of "bonding" with the firm for which he/she works, may be predisposed to look favorably on work performed by other members of the firm, even if the external auditor has no familiarity with the work of these individuals. Second, some of the reduction in audit time may reflect a concession to the auditee in light of the fact that the latter was billed for the performance of the external review. The "external review billing" was in addition to the regular external audit fee.

The reduction in audit time for audit area 1 when the external review was performed by Reviewer B--a Big 7 CPA firm other than the one that currently audits the organization--may be explained as follows. Big 7 CPA firm members regularly evaluate internal audit departments to comply with SAS No. 9 (AICPA 1975). Consequently, Reviewer B may have been perceived as having the technical ability needed to perform the external review and render an opinion on the internal audit department's operations.

An external quality assurance review performed by a team of internal auditors assembled by the organization's internal audit director also resulted in a statistically significant reduction in audit time for audit area 1. This reduction may have resulted from the participants' belief
that the internal audit director's knowledge of the internal audit department would enable him/her to formulate procedures that would lead to a proper assessment of the department's strengths and weaknesses.

The average number of hours that the control group participants budgeted for the external auditor's evaluation of the internal audit department was not significantly different from the average number of hours specified by the participants when the external review was performed by either of the following:

1. **Reviewer D**—A team of internal auditors assembled by the IIA's Director of Quality Assurance Review Service
2. **Reviewer E**—A team of accounting department faculty members

The lack of statistical significance for Reviewer D is surprising. Indeed, one would think that the IIA's Director of Quality Assurance Review Service, due to the nature of the position, would be as able as a Big 7 CPA firm member or an organization's internal audit director to lead an external review team to a proper assessment of an internal audit department's strengths and weaknesses. The participants, however, seem to feel otherwise. This feeling may have been based on the participants' perception that the Director of Quality Assurance Review Service is not as familiar as the internal audit director with the operations
of the internal audit department being reviewed. Alternatively, the participants may not have been familiar with the job responsibilities of the Director of Quality Assurance Review Service and may have incorrectly concluded that he/she did not have the technical ability to perform an external review.

The fact that the mean response of the participants in the presence of an external review performed by a team of accounting department faculty members was not significantly different from the control group's mean response may be attributable to two factors. The participants may have believed that the faculty members were not familiar with the operations of the internal audit department being reviewed, did not regularly evaluate internal audit departments, or both.

The test of H1, then, reveals that a favorable external quality assurance review, when performed by certain reviewers, results in a statistically significant reduction in the average amount of time that the external auditor devotes to the evaluation of the internal audit department. The finding that the control group's mean response was not significantly different from the average

These reductions were not material in relation to total audit time. This finding is not surprising, however, since the actual and budgeted times shown for this audit area in the time budget contained in each questionnaire were also immaterial in relation to total actual and budgeted audit time, respectively (see Appendices A and B).
amount of time budgeted in the presence of an external review performed under the supervision of the IIA's Director of Quality Assurance Review Service indicates that the IIA should consider taking steps to familiarize external auditors with the technical abilities of IIA staff members. This finding also underscores the importance of the AICPA's current work on a SAS that would replace SAS No. 9 (AICPA 1975). According to the AICPA (1989, par. 1), the purpose of the new SAS is to provide "guidance to an [external] auditor when considering the work of internal auditors in an audit performed in accordance with generally accepted auditing standards."

Finally, the finding that the average amount of time specified in the presence of an external review performed by a team of faculty members was not significantly different from the control group's mean response suggests that accounting department faculty members should consider the adoption of measures to better publicize their technical qualifications. These measures could take the form of faculty member involvement in local CPA organizations and/or the dissemination of information by the American Accounting Association.

Tests of H2 - H4

These hypotheses are discussed together in this subsection for two reasons. First, the same statistical
procedures were used to test each hypothesis. Second, the results of the statistical tests were almost identical.

H2 dealt with the effect of a favorable external quality assurance review on audit area 2—the procedures that the external auditor performs to obtain an understanding of an organization's internal control structure. H3 was concerned with the effect of a favorable external review on audit area 3—the tests of controls that the external auditor performs in connection with the audit of an organization's financial statements. Finally, H4 involved the effect of a favorable external quality assurance review on audit area 4—the external auditor's performance of substantive tests.

The tests of H2 - H4 were based on the ranks of the participants' responses for audit areas 2-4. Appendix I presents the results of the ANOVA analysis of the ranks, while Table 4-3 shows the outcome of the nonparametric multiple comparison procedure described in Table E-7.

For H2 (which was concerned with audit area 2), Table 4-3 indicates that, with one exception, the mean rank associated with the experimental questionnaires (i.e., Questionnaires 2-6) was not significantly different from the mean rank associated with the control questionnaire (i.e., Questionnaire 1). The exception occurred when the external quality assurance review was performed by the Big 7 CPA firm.
that currently audits the organization described in the questionnaire. In this situation, the average time budgeted by the participants in the presence of the external review was significantly less than the average time specified by the participants when the external review was not performed. Table 4-3 also shows that, for H3 and H4 (which dealt with audit areas 3 and 4, respectively), none of the differences

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**TABLE 4-3**

RESULTS OF THE PAIRWISE COMPARISONS MADE TO TEST H2 - H4

<table>
<thead>
<tr>
<th>Reviewers Compared</th>
<th>( \bar{Y}<em>{i} - \bar{Y}</em>{j} )</th>
<th>Test Statistic</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Audit Area 2:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control, A</td>
<td>27.59</td>
<td>2.572</td>
<td>0.010 *</td>
</tr>
<tr>
<td>Control, B</td>
<td>5.54</td>
<td>0.538</td>
<td>0.590</td>
</tr>
<tr>
<td>Control, C</td>
<td>13.53</td>
<td>1.330</td>
<td>0.184</td>
</tr>
<tr>
<td>Control, D</td>
<td>19.11</td>
<td>1.754</td>
<td>0.080</td>
</tr>
<tr>
<td>Control, E</td>
<td>8.75</td>
<td>0.850</td>
<td>0.396</td>
</tr>
<tr>
<td><strong>Audit Area 3:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control, A</td>
<td>17.22</td>
<td>1.56</td>
<td>0.118</td>
</tr>
<tr>
<td>Control, B</td>
<td>8.28</td>
<td>0.78</td>
<td>0.436</td>
</tr>
<tr>
<td>Control, C</td>
<td>17.14</td>
<td>1.64</td>
<td>0.102</td>
</tr>
<tr>
<td>Control, D</td>
<td>11.95</td>
<td>1.07</td>
<td>0.284</td>
</tr>
<tr>
<td>Control, E</td>
<td>11.56</td>
<td>1.09</td>
<td>0.276</td>
</tr>
<tr>
<td><strong>Audit Area 4:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control, A</td>
<td>-0.54</td>
<td>0.05</td>
<td>0.960</td>
</tr>
<tr>
<td>Control, B</td>
<td>-7.23</td>
<td>0.68</td>
<td>0.496</td>
</tr>
<tr>
<td>Control, C</td>
<td>-4.23</td>
<td>0.40</td>
<td>0.630</td>
</tr>
<tr>
<td>Control, D</td>
<td>-7.61</td>
<td>0.07</td>
<td>0.944</td>
</tr>
<tr>
<td>Control, E</td>
<td>-3.21</td>
<td>0.30</td>
<td>0.764</td>
</tr>
</tbody>
</table>
Note 1: \( \bar{Y}_i \) is the mean rank for Questionnaire 1, the control questionnaire. \( \bar{Y}_j \) is the mean rank for the questionnaire that described the \( j \)th type of external reviewer (Reviewer A = 2, ... Reviewer E = 6).

Note 2: The amounts shown for "Test Statistic" were obtained through use of the formula in Table E-7.

Note 3: The p-values were obtained from Gibbons (1976, 385).

*--Significant at the 0.01 significance level

between the control group and the experimental groups were statistically significant.

The participants' preference for an external review team composed of members of their own firms is not surprising and was addressed in the discussion of H1. However, this reviewer's lack of significance for audit areas 3 and 4 and the absence of statistical significance for any other external reviewer for audit areas 2-4 were unexpected.

As noted in the discussion of H1, the average time specified by the respondents for the external auditor's evaluation of the internal audit department in the presence of an external quality assurance review performed by three types of reviewers was significantly lower than the average time specified by the control group. This finding suggests that the general absence of statistically significant differences between the control group and the experimental
groups for audit areas 2-4 is not the result of the participants' lack of confidence in the external reviewers' ability to perform the review. This finding also implies that the external auditor was not already relying on the internal audit department to the maximum extent possible.

In light of the foregoing, the results for the tests of H2 - H4 indicate that the participants may have believed that internal audit activity, regardless of its nature, can only affect the external auditor's evaluation of the internal audit department. When the internal audit function is limited in this way, the effect of an external quality assurance review will be similarly limited.

Evidence that external auditors sometimes limit the impact of the internal audit function is found in an issues paper prepared by the Auditing Standards Board's Use of Internal Auditors Task Force (AICPA 1989), which is currently developing an exposure draft of a SAS which would supersede SAS No. 9 (AICPA 1975). Concerning the external auditor's reliance on internal auditors, the Task Force stated (AICPA 1989, Issues Summary, par. 5):

Some task force members believe that the results of any work performed by internal auditors can only affect the [external] auditor's control risk assessment. They believe that an internal audit department is part of the entity's internal control structure and, therefore, any work performed by the internal auditors can only reduce the [control] risk... This is true regardless of whether that work consists of either "test of control" type procedures or "substantive" procedures.
Alternatively, the results of the tests of H2 - H4 may stem from the fact that the IIA's emphasis on external reviews is relatively new, having begun in 1986 with the issuance of SIAS No. 4 (IIA 1986). Indeed, a large number of organizations may not yet have had an opportunity to arrange an external review of their internal audit departments. Consequently, the external auditors who audit these organizations may have no working knowledge of an external review or its benefits. Lacking this familiarity, the participants may have been reluctant to specify significant time reductions in audit areas other than the one that they may have intuitively believed was affected by the external review. This audit area was audit area 1—the external auditor's evaluation of the organization's internal audit department.

The tests of H2 - H4 raise the issue of whether the external auditor limits the effect of internal audit activity (and thus of an external quality assurance review) in the preparation of a time budget for the audit of an organization's financial statements. The AICPA should consider investigating this possibility and, if necessary, requiring the external auditor to weigh internal audit activity and external reviews thereof in the development of a time budget for all phases of the audit. AICPA action in this area could help the external auditor avoid duplicating
many of the procedures performed by the internal auditor.

The results of the tests of H2 - H4 also suggest that the IIA should contemplate surveying external auditors to determine their familiarity with external reviews and their perceptions of the benefits provided by such reviews. Depending on the survey results, the IIA could consider implementing a program designed to familiarize external auditors with external quality assurance reviews.

**Effect of Type of Reviewer**

H5 was concerned with the effect that the type of reviewer who performed the external quality assurance review had on the participants' time budget decisions for a given audit area. The reviewers that were considered are as follows:

1. **Reviewer A**—The Big 7 CPA firm that currently audits the organization's financial statements

2. **Reviewer B**—A Big 7 CPA firm other than the one that currently audits the organization's financial statements

3. **Reviewer C**—A team of internal auditors assembled by the organization's internal audit director

4. **Reviewer D**—A team of internal auditors assembled by the IIA's Director of Quality Assurance Review Service

5. **Reviewer E**—Faculty members who taught accounting at a university near the organization whose internal audit department was reviewed
As previously indicated, the tests of H1 - H4 involved comparing the average time specified by the control group for a particular audit area with the average time specified by the participants in the presence of an external review performed by each of the above reviewers. The test of H5, however, did not involve the control group. Rather, for each audit area, H5 was tested by comparing the mean response for a particular type of external reviewer with the mean responses for the other types of reviewers.

Audit Area 1

For audit area 1, H5 dealt with the effect that the type of external reviewer had on the time budgeted by the participants for the evaluation of an organization's internal audit department. The test of H5 for this audit area was based on the same ANOVA table as the test of H1. Table 4-4 shows the results of the pairwise comparisons made for this audit area.

Table 4-4 indicates that, with one exception, the type of reviewer who performed the external quality assurance review did not have a statistically significant effect (at the 0.01 alpha level) on the participants' responses. The exception involved Reviewer A (the Big 7 CPA firm that currently audits an organization's financial statements) and Reviewer E (accounting department faculty members). As Table 4-4 shows, the mean number of hours

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<table>
<thead>
<tr>
<th>Reviewers Compared</th>
<th>$\bar{Y}<em>{j} - \bar{Y}</em>{m}$</th>
<th>Test Statistic</th>
<th>P-value</th>
<th>Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>A, B</td>
<td>-1.1</td>
<td>-1.54</td>
<td>0.132</td>
<td></td>
</tr>
<tr>
<td>A, C</td>
<td>-1.3</td>
<td>-1.79</td>
<td>0.080</td>
<td></td>
</tr>
<tr>
<td>A, D</td>
<td>-1.4</td>
<td>-1.87</td>
<td>0.068</td>
<td></td>
</tr>
<tr>
<td>A, E</td>
<td>-2.7</td>
<td>-3.74</td>
<td>&lt;0.001*</td>
<td>-20.9 &lt; L_{25} ≤ -0.6</td>
</tr>
<tr>
<td>B, C</td>
<td>-0.2</td>
<td>-0.25</td>
<td>&gt;0.800</td>
<td></td>
</tr>
<tr>
<td>B, D</td>
<td>-0.3</td>
<td>-0.43</td>
<td>0.672</td>
<td></td>
</tr>
<tr>
<td>B, E</td>
<td>-1.6</td>
<td>-2.29</td>
<td>0.020</td>
<td></td>
</tr>
<tr>
<td>C, D</td>
<td>-0.1</td>
<td>-0.20</td>
<td>&gt;0.800</td>
<td></td>
</tr>
<tr>
<td>C, E</td>
<td>-1.4</td>
<td>-2.07</td>
<td>0.040</td>
<td></td>
</tr>
<tr>
<td>D, E</td>
<td>-1.3</td>
<td>-1.74</td>
<td>0.090</td>
<td></td>
</tr>
</tbody>
</table>

Note 1: $\bar{Y}_{j}$ is the mean transformed response for the questionnaire that described the $j$th type of external reviewer (Reviewer $A = 2$, ...Reviewer $D = 5$) for audit area 1. $\bar{Y}_{m}$ is the mean transformed response for the questionnaire that described the $m$th type of external reviewer (Reviewer $B = 3$, ...Reviewer $E = 6$) for audit area 1, $j < m$.

Note 2: Table E-4 illustrates the computation of the test statistics, while Table E-6 demonstrates the manner in which the confidence interval was formed. The confidence interval shown above is in the same units as the original data (i.e., hours).

Note 3: P-values were obtained through reference to Neter, Wasserman, and Kutner (1985, 1074-1075).
Note 4: Confidence intervals were not formed for pairwise comparisons that lacked statistical significance.

*--Significant at the 0.01 significance level

budgeted in the presence of Reviewer A is estimated to be between 0.6 and 20.9 hours less than the mean number of hours specified for Reviewer E. The reasons why the participants might have preferred an external quality assurance review performed by members of their own firms to a review performed by accounting department faculty members were described in the discussion of H1. The test of H1 revealed that the mean responses for Reviewers A, B, and C were significantly smaller than the control group’s mean response. Table 4-4, however, shows that the average hours specified by the participants for these reviewers were generally not significantly different from each other. This finding is somewhat surprising in light of the a priori expectation that, for the reasons enumerated in the discussion of H1, external auditors would specify greater time reductions in the presence of an external review performed by members of their own firms (Reviewer A). The finding in Table 4-4 suggests that the participants' primary concern was an external reviewer's technical ability. Once they had identified reviewers whom they considered technically competent, the participants were
indifferent to which of these reviewers performed the external review.

**Audit Areas 2 - 4**

Audit areas 2 - 4 are considered jointly for the reasons already described in the subsection entitled "Tests of H2 - H4." The test of H5 for these audit areas was based on the same ANOVA tables as the tests of H2 - H4.

For audit area 2, H5 was concerned with the effect that the type of external reviewer had on the number of hours that the external auditor devotes to obtaining an understanding of an organization's internal control structure. As far as audit area 3 was concerned, H5 dealt with the effect of the type of external reviewer on the time budgeted for the tests of controls that the external auditor performs in connection with the audit of an organization's financial statements. Finally, for audit area 4, H5 involved the effect that the type of external reviewer had on the time budgeted for the external auditor's performance of substantive tests.

Table 4-5 shows the results of the pairwise comparisons examined for audit areas 2 - 4. This table indicates that the type of reviewer who performs an external quality assurance review has no effect on the average time that the external auditor budgets for audit areas 2 - 4.
Possible explanations for this finding were discussed in the "Tests of H2 - H4" subsection.

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**TABLE 4-5**

RESULTS OF THE PAIRWISE COMPARISONS MADE TO TEST H5 FOR AUDIT AREAS 2 - 4

<table>
<thead>
<tr>
<th>Reviewers Compared</th>
<th>( \bar{Y}<em>{ij} - \bar{Y}</em>{im} )</th>
<th>Test Statistic</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Audit Area 2:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A, B</td>
<td>-22.05</td>
<td>2.03</td>
<td>0.021</td>
</tr>
<tr>
<td>A, C</td>
<td>-14.06</td>
<td>1.31</td>
<td>0.095</td>
</tr>
<tr>
<td>A, D</td>
<td>-8.48</td>
<td>0.74</td>
<td>0.230</td>
</tr>
<tr>
<td>A, E</td>
<td>-18.84</td>
<td>1.74</td>
<td>0.041</td>
</tr>
<tr>
<td>B, C</td>
<td>7.99</td>
<td>0.78</td>
<td>0.218</td>
</tr>
<tr>
<td>B, D</td>
<td>13.57</td>
<td>1.23</td>
<td>0.109</td>
</tr>
<tr>
<td>B, E</td>
<td>3.21</td>
<td>0.31</td>
<td>0.378</td>
</tr>
<tr>
<td>C, D</td>
<td>5.58</td>
<td>0.51</td>
<td>0.305</td>
</tr>
<tr>
<td>C, E</td>
<td>-4.78</td>
<td>0.46</td>
<td>0.323</td>
</tr>
<tr>
<td>D, E</td>
<td>-10.36</td>
<td>0.94</td>
<td>0.174</td>
</tr>
<tr>
<td><strong>Audit Area 3:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A, B</td>
<td>-8.94</td>
<td>0.80</td>
<td>0.212</td>
</tr>
<tr>
<td>A, C</td>
<td>-0.08</td>
<td>0.01</td>
<td>0.500</td>
</tr>
<tr>
<td>A, D</td>
<td>-5.27</td>
<td>0.45</td>
<td>0.326</td>
</tr>
<tr>
<td>A, E</td>
<td>-5.66</td>
<td>0.51</td>
<td>0.305</td>
</tr>
<tr>
<td>B, C</td>
<td>8.86</td>
<td>0.84</td>
<td>0.201</td>
</tr>
<tr>
<td>B, D</td>
<td>3.67</td>
<td>0.32</td>
<td>0.375</td>
</tr>
<tr>
<td>B, E</td>
<td>3.28</td>
<td>0.31</td>
<td>0.378</td>
</tr>
<tr>
<td>C, D</td>
<td>-5.19</td>
<td>0.46</td>
<td>0.323</td>
</tr>
<tr>
<td>C, E</td>
<td>-5.58</td>
<td>0.53</td>
<td>0.298</td>
</tr>
<tr>
<td>D, E</td>
<td>-0.39</td>
<td>0.03</td>
<td>0.488</td>
</tr>
<tr>
<td><strong>Audit Area 4:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A, B</td>
<td>-6.69</td>
<td>0.60</td>
<td>0.274</td>
</tr>
<tr>
<td>A, C</td>
<td>-3.89</td>
<td>0.33</td>
<td>0.371</td>
</tr>
<tr>
<td>A, D</td>
<td>-7.07</td>
<td>0.60</td>
<td>0.274</td>
</tr>
<tr>
<td>A, E</td>
<td>-2.67</td>
<td>0.24</td>
<td>0.405</td>
</tr>
<tr>
<td>B, C</td>
<td>3.00</td>
<td>0.28</td>
<td>0.390</td>
</tr>
<tr>
<td>B, D</td>
<td>-0.38</td>
<td>0.03</td>
<td>0.488</td>
</tr>
<tr>
<td>B, E</td>
<td>4.02</td>
<td>0.37</td>
<td>0.356</td>
</tr>
<tr>
<td>C, D</td>
<td>-3.38</td>
<td>0.30</td>
<td>0.382</td>
</tr>
<tr>
<td>Reviewers Compared</td>
<td>$\bar{Y}<em>{ij} - \bar{Y}</em>{im}$</td>
<td>Test Statistic</td>
<td>P-value</td>
</tr>
<tr>
<td>-------------------</td>
<td>-----------------</td>
<td>----------------</td>
<td>--------</td>
</tr>
<tr>
<td>C, E</td>
<td>1.02</td>
<td>0.10</td>
<td>0.460</td>
</tr>
<tr>
<td>D, E</td>
<td>4.40</td>
<td>0.39</td>
<td>0.348</td>
</tr>
</tbody>
</table>

Note 1: $\bar{Y}_{ij}$ is the mean rank for the questionnaire that described the $j$th type of external reviewer (Reviewer A = 2, ...Reviewer D = 5). $\bar{Y}_{im}$ is the mean rank for the questionnaire that described the $m$th external reviewer (Reviewer B = 3, ...Reviewer E = 6), $j < m$.

Note 2: The amounts shown for "Test Statistic" were obtained through use of Table E-8.

Note 3: The p-values were obtained from Gibbons (1976, 385).

The test of H5, then, dispels the *a priori* expectation that, for the reasons described in the "Test of H1" subsection, the average time budgeted for an audit area in the presence of an external review performed by the Big 7 CPA firm that currently audits an organization would be significantly lower than the average time specified when the external review was performed by some other reviewer. In dispelling this expectation, the study provides support for an organization's selection of an external reviewer on the basis of the reviewer's perceived ability to do both of the following (IIA 1986, pars. 560.01.2, 560.04.1, and 560.04.5):

1. Provide senior management and the audit committee with assurance that the internal
2. Make recommendations for improving the internal audit department’s operations

Summary of the Results

Table 4-6 summarizes the results of the tests of the hypotheses. As far as the effect of a favorable external quality assurance review is concerned, this table shows the following. First, the external review resulted in a significant reduction in the average time budgeted for the external auditor’s evaluation of an organization’s internal audit department when the review was performed by any of the following:

1. The Big 7 CPA firm that currently audits the organization
2. A Big 7 CPA firm other than the one that currently audits the organization
3. A team of internal auditors assembled by the organization’s internal audit director

Second, when performed by the Big 7 CPA firm that currently audits the organization, the external quality assurance review led to a significant reduction in the average time that the external auditor devotes to obtaining an understanding of the organization’s internal control structure. Third, the external quality assurance review did not have a significant effect on the average amount of time
<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Effect of quality assurance review:</strong>&lt;br&gt;H1</td>
<td>Reject when the review is performed by an organization's current external auditors, a Big 7 CPA firm other than the current external auditors, or a team of internal auditors assembled by the organization's internal audit director (1)</td>
</tr>
<tr>
<td>H2</td>
<td>Reject when the review is performed by an organization's current external auditors (1)</td>
</tr>
<tr>
<td>H3</td>
<td>Fail to reject</td>
</tr>
<tr>
<td>H4</td>
<td>Fail to reject</td>
</tr>
<tr>
<td><strong>Effect of type of reviewer:</strong>&lt;br&gt;H5 (audit area 1)</td>
<td>Reject for the pairwise comparison of the organization's current external auditors and accounting department faculty members (1)</td>
</tr>
<tr>
<td>H5 (audit area 2)</td>
<td>Fail to reject</td>
</tr>
<tr>
<td>H5 (audit area 3)</td>
<td>Fail to reject</td>
</tr>
<tr>
<td>H5 (audit area 4)</td>
<td>Fail to reject</td>
</tr>
</tbody>
</table>

(1) -- Rejected at a family-wise significance level of 0.15 (or a per-comparison level of 0.15 \(\div\) 15 = 0.01).
that the external auditor budgets for the performance of either tests of controls or substantive tests.

Table 4-6 reveals the following concerning the effect of the type of reviewer who performed the external quality assurance review. First, with one exception, the type of external reviewer did not significantly affect the average time budgeted for the external auditor's evaluation of an organization's internal audit department. The participants did, however, specify significantly fewer hours on the average when the external review was performed by the organization's current external auditors than when the review was performed by accounting department faculty members. Second, H5 was not rejected for audit areas 2-4 for any pair of reviewers, indicating that the type of reviewer did not significantly affect the amount of time that the participants budgeted for these areas.
CHAPTER 5

SUMMARY AND CONCLUSIONS

This chapter presents a discussion of the results of the tests of the hypotheses and the implications of the findings. In addition, the chapter describes the study’s limitations and offers suggestions for future research.

Implications

Chapter 1 indicated that the factors the external auditor considers in the evaluation of an internal audit department are generally the same as those examined by an external quality assurance review team. For this reason, one might expect a favorable external quality assurance review to result in a reduction in audit time for those areas in which scope reductions in response to internal audit activity are possible.

Based upon the results of this study, however, this is not the case. On the contrary, the effect of a favorable external quality assurance review is limited primarily to the external auditor’s evaluation of the internal audit department. In addition, the study found that a favorable external review can significantly reduce the average time
that the external auditor budgets for obtaining an understanding of an organization's internal control structure, but only when the review is performed by an organization's current external auditors. Finally, the study revealed that the type of reviewer generally has no effect on the external auditor's development of a time budget for the audit of an organization's financial statements.

These findings suggest that the external auditor tends to disregard the effect that internal audit activity has on the development of a time budget for the audit of an organization's financial statements. The AICPA should consider investigating this possibility and, if necessary, implementing corrective measures.

Second, the findings raise the issue of the extent to which the IIA has succeeded in (1) familiarizing external auditors with the benefits of external reviews and (2) portraying internal auditors and IIA personnel as technically competent professionals. The IIA should consider examining this issue and, where appropriate, implementing programs designed to broaden external auditors' perceptions of external reviews and the capabilities of accounting professionals who do not work for Big 7 CPA firms.
Third, the results indicate that accounting department faculty members and/or the American Accounting Association should contemplate adopting measures to acquaint external auditors with the technical qualifications of faculty members. These measures could take the form of faculty involvement in local CPA organizations and/or the dissemination of information by the American Accounting Association.

Finally, since the type of external reviewer appears to have little effect on the external auditor's development of a time budget, an organization should select an external reviewer on the basis of the reviewer's perceived ability to furnish senior management and the audit committee with evidence concerning the internal audit department's efficiency and effectiveness.

Limitations of the Research

The first limitation is that the study examined the effect of one type of external quality assurance review report within the context of a particular external audit situation. Results other than those described herein may have been obtained had a different audit situation been investigated.

The second limitation stems from the fact that, despite the study's attempt to provide the participants with information which would be available during a normal audit
engagement, the experimental task may not have been representative of the time budget decision that the external auditor makes in an actual audit setting. This limitation, however, is not unique to this study. Rather, it is the price that researchers often pay to gather data in a manner which is cost-effective and which does not greatly disrupt the professional activities of the individuals about whose behavior information is desired.

Third, the study examined the effect of a favorable external quality assurance review. Different results may have been obtained had the study investigated an unfavorable external quality assurance review.

Fourth, the study’s results are not generalizable to all external auditors since, due to practical considerations, the participants were not randomly selected. Rather, commitments to participate in the study were first obtained from Big 7 CPA firm audit partners. These contact partners then selected individual partners, managers, and seniors to perform the experimental task. This selection technique was also used by Brown (1983), Schneider (1984 and 1985), and Messier and Schneider (1988).

Fifth, the external quality assurance review was mentioned on two pages of each experimental questionnaire. In addition, each experimental questionnaire contained the text of the external quality assurance review report.
Despite these citations and the lack of evidence to the contrary, the participants may not have observed the manipulated variable (i.e., the external quality assurance review).

Finally, the participants were not observed or supervised during their completion of the experimental task. Nevertheless, since each participant received a questionnaire from a "contact" partner and was answerable to the latter for its completion, the participants are expected to have conscientiously completed their questionnaires.

**Suggestions for Future Research**

To provide additional information concerning the external auditor's response to an external quality assurance review, future research could address the following topics. First, the study could be replicated with one difference—a first-time audit scenario could be substituted for the current study's "continuing engagement" scenario. An external quality assurance review report might prove especially useful to the external auditor on a first-time engagement due to his/her lack of familiarity with the organization being audited.

Second, future research could address the effect that an unfavorable external quality assurance review has on the external auditor's time budget decisions. An unfavorable review might cause the external auditor to
question the adequacy of an organization's internal control structure and, thus, might result in an increase in budgeted audit time. A study of the external auditor's reaction to an unfavorable quality assurance review would provide the AICPA with information that could be used to develop auditing procedures for situations in which an organization's internal control structure is weak or deficient.

Third, the current study took place within the context of an established internal audit department. Future research could investigate the impact of an external quality assurance review on the external auditor when an internal audit department is relatively new (i.e., one or two years old). In such a situation, the external auditor is not likely to be satisfied with the adequacy of the department's operations. An external review would provide the external auditor with information that he/she could use to enhance his/her assessment of the department's quality.

Fourth, the current study investigated the situation in which the external auditor's assessment of the internal audit department was the same as the conclusion reached by the team that performed the external quality assurance review. Future research could examine the effect of an external review whose findings are different from the external auditor's assessment. Such a review would provide the external auditor with new information about the internal
audit department and would furnish insight into the issues that the external auditor considers when making time budget decisions.

Finally, while external auditors are interested in the work of internal auditors, the primary beneficiaries of internal audit activity are senior management, the audit committee, and other members of the organization (IIA 1978, introduction). Future research could investigate the effect that an external review (either favorable or unfavorable) has on these groups' perceptions of the internal audit department's efficiency and effectiveness.
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Conover, W.J. Practical Nonparametric Statistics (Second 


APPENDIX A

EXPERIMENTAL QUESTIONNAIRE
INTRODUCTION

Assume that you are in charge of the audit of XYZ Company for the year ended June 30, 1989. Please familiarize yourself with the accompanying material and then answer the questions on page 6 of the questionnaire.

BACKGROUND

XYZ Company is a publicly-held company which ranks in the top 25% of the companies in its industry in terms of financial strength. Since its inception, XYZ Company has received unqualified audit opinions on its financial statements.

Your firm has audited XYZ Company for the last five years. During that time, your firm has rendered clean opinions on XYZ Company's financial statements. Your firm has also been very satisfied with the competence, objectivity, and effectiveness of XYZ Company's internal audit department.

SUMMARY FINANCIAL DATA

XYZ Company's controller has provided you with the following financial information.

<table>
<thead>
<tr>
<th></th>
<th>(unaudited)</th>
<th>(audited)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6/30/89</td>
<td>6/30/88</td>
<td>(000's omitted)</td>
</tr>
<tr>
<td>Total assets</td>
<td>$4,794,086</td>
<td>$4,208,210</td>
</tr>
<tr>
<td>Total liabilities</td>
<td>4,479,790</td>
<td>3,961,633</td>
</tr>
<tr>
<td>Stockholders' equity</td>
<td>314,296</td>
<td>246,577</td>
</tr>
<tr>
<td>Gross income</td>
<td>396,412</td>
<td>347,444</td>
</tr>
<tr>
<td>Net income (after income taxes)</td>
<td>36,315</td>
<td>32,259</td>
</tr>
</tbody>
</table>
INTERNAL AUDIT FUNCTION

The director of XYZ Company's internal audit department has provided you with the following information. The internal audit department has been in existence for 15 years and consists of 35 auditors. All of the internal auditors have college degrees in business-related fields (accounting, finance, etc.). Approximately one-half of the internal audit staff (and every auditor who is either a senior or a manager) has some type of professional certification (e.g., CIA or CPA). All of the internal auditors (regardless of certification) receive 40 hours of continuing education each year.

The internal audit director reports to XYZ Company's audit committee chairman, who meets regularly with the director to discuss the progress of current projects and the nature of future projects. Most of these projects are "operational" in nature. That is, they focus on the accounting systems and the control procedures related to the company's major functional areas.

CURRENT YEAR OPERATIONS

During the fiscal year ended June 30, 1989, XYZ Company made no changes in either its top management personnel or the nature of its operations. In fact, with the one exception described below, XYZ Company's operations during the current fiscal year were the same as during the fiscal year ended June 30, 1988.

During the fiscal year ended June 30, 1989, XYZ Company's internal audit department voluntarily underwent an external quality assurance review. The purpose of the review was to determine the extent to which the internal audit department's operations complied with (1) the Institute of Internal Auditor's Standards for the Professional Practice of Internal Auditing and (2) policies established by XYZ Company and the internal audit department itself. No such review was performed during the fiscal year ended June 30, 1988. The current year's external review was the first which the internal audit department had received in its 15-year history.

The external review was performed by (one of the reviewers listed on pages 50 and 51). The review team spent a total of 392 hours evaluating XYZ Company's internal audit department and rendered the report shown on pages 4 and 5 of the questionnaire.
Your review of the workpapers for the audit of XYZ Company's financial statements for the year ended June 30, 1988 revealed the following.

<table>
<thead>
<tr>
<th>Audit hours devoted to:</th>
<th>Budgeted Hours</th>
<th>Actual Hours*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Planning the engagement....................................</td>
<td>190</td>
<td>250</td>
</tr>
<tr>
<td>2. Evaluating the internal audit function.......................</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>3. Obtaining an understanding of XYZ Company's control structure</td>
<td>250</td>
<td>250</td>
</tr>
<tr>
<td>4. Tests of controls (i.e., compliance tests)...................</td>
<td>1,090</td>
<td>1,140</td>
</tr>
<tr>
<td>5. Substantive tests............................................</td>
<td>2,670</td>
<td>3,115</td>
</tr>
<tr>
<td>6. Preparing the audit report..................................</td>
<td>200</td>
<td>225</td>
</tr>
<tr>
<td>Total audit hours...............................................</td>
<td>4,460</td>
<td>5,040</td>
</tr>
</tbody>
</table>

* The differences between the actual and the budgeted hours were caused by the following:

1. XYZ Company's accounting department did not prepare some of the necessary audit schedules on a timely basis.
2. Some of the members of the audit team had not previously worked on the XYZ Company audit.
3. XYZ Company made minor changes in its accounting system.

Note: The hourly data shown above relates to a fiscal year (June 30, 1988) in which XYZ Company's internal audit department did not undergo an external quality assurance review. During the year ended June 30, 1988, a team consisting of (one of the reviewers listed on pages 50 and 51) performed an external quality assurance review of XYZ Company's internal audit department. The review team spent a total of 392 hours performing the external quality assurance review.
QUALITY ASSURANCE REVIEW REPORT

To the Board of Directors
XYZ Company

We performed a quality assurance review of the internal audit department of XYZ Company for the period July 1, 1988 through June 30, 1989. We made a preliminary visit to XYZ Company's internal audit department from April 3, 1989 through April 7, 1989. The field work for our review began on July 3, 1989 and ended on July 14, 1989.

The primary objective of our review was to determine whether the internal audit department was in compliance with The Institute of Internal Auditors' (IIA) Standards for the Professional Practice of Internal Auditing. Other objectives were to (1) determine whether the internal audit department was in compliance with audit policies and procedures established by XYZ Company and the internal audit department itself and (2) provide, as needed, recommendations for improving the internal audit function.

Our review included:

1. Reviewing a self-study report prepared by the Director of Internal Audit. This report described the internal audit department's organizational structure, function, operating environment, policies, and procedures.

2. Surveying management officials whose departments were audited by the internal audit department during the period July 1, 1988 - June 30, 1989 concerning their opinions of the scope, nature, and quality of internal auditing within XYZ Company.

3. Interviewing the audit committee chairman, the Company's President, other members of senior management, the Director of Internal Audit, internal audit department staff persons, and the engagement partner from the CPA firm which audited XYZ Company's financial statements for the year ended June 30, 1988.

4. Reviewing the policies and procedures used to manage the internal audit department.
5. Examining the work papers prepared in connection with a random sample of internal audit projects completed during the period July 1, 1988 through June 30, 1989 for evidence that:

   a. The engagement was properly planned and supervised.
   b. The audit work program was appropriate given the purpose of the engagement.
   c. Individual audit program steps were actually performed.
   d. The conclusions expressed in the report rendered by the internal audit department were consistent with the findings documented in the work papers.

   In our opinion, the internal audit department of XYZ Company complies with (1) the IIA’s Standards for the Professional Practice of Internal Auditing and (2) the policies and procedures established by XYZ Company and the internal audit department itself. In particular, we believe that:

   1. The access which the Director of Internal Audit has to the Company’s president and audit committee chairman establishes and promotes the independence of the internal audit department.
   2. The internal audit department has free and unrestricted access to information, properties, and personnel during the conduct of its audits.
   3. The internal audit staff possesses the knowledge and the skills needed to practice the profession of internal auditing.
   4. Individual audit programs are well-thought-out. The performance of specific program steps (including supervisory review) is well documented in the work papers.
   5. The internal audit department’s review of XYZ Company’s control structure provides reasonable assurance that XYZ Company’s accounting system and control procedures are functioning as intended.

   We acknowledge the excellent cooperation and assistance given to the review team by XYZ Company’s personnel. All of those interviewed offered candid and constructive comments. We will be pleased to review with you any of the matters covered in our report.

   Very truly yours,
   Quality assurance review team
EXPERIMENTAL TASK

I. Please indicate in the space below the number of hours which you would budget for the audit of XYZ Company’s June 30, 1989 financial statements.

Audit hours devoted to: 

1. Planning the engagement 
2. Evaluating the internal audit function 
3. Obtaining an understanding of XYZ Company’s control structure 
4. Tests of controls (i.e., compliance tests) 
5. Substantive tests 
6. Preparing the audit report 

Total audit hours

II. Please provide the following information concerning your accounting background.

A. What is your present job title?
   ______Partner ______Senior
   ______Manager ______Other (specify)

B. How long have you been in public accounting?
   ______ years

Thank you for participating in this study.
APPENDIX B

CONTROL QUESTIONNAIRE
INTRODUCTION

Assume that you are in charge of the audit of XYZ Company for the year ended June 30, 1989. Please familiarize yourself with the accompanying material and then answer the questions on page 4 of the questionnaire.

BACKGROUND

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Your firm has audited XYZ Company for the last five years. During that time, your firm has rendered clean opinions on XYZ Company’s financial statements. Your firm has also been very satisfied with the competence, objectivity, and effectiveness of XYZ Company’s internal audit department.

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The internal audit director reports to XYZ Company's audit committee chairman, who meets regularly with the director to discuss the progress of current projects and the nature of future projects. Most of these projects are "operational" in nature. That is, they focus on the accounting systems and the control procedures related to the company's major functional areas.

CURRENT YEAR OPERATIONS

During the fiscal year ended June 30, 1989, XYZ Company made no changes in either its top management personnel or the nature of its operations. In fact, with the one exception described below, XYZ Company's operations during the current fiscal year were the same as during the fiscal year ended June 30, 1988.
Your review of the workpapers for the audit of XYZ Company's financial statements for the year ended June 30, 1988 revealed the following.

<table>
<thead>
<tr>
<th>Audit hours devoted to:</th>
<th>Budgeted Hours</th>
<th>Actual Hours*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Planning the engagement......................</td>
<td>190</td>
<td>250</td>
</tr>
<tr>
<td>2. Evaluating the internal audit function.......</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>3. Obtaining an understanding of XYZ Company's control structure.........</td>
<td>250</td>
<td>250</td>
</tr>
<tr>
<td>4. Tests of controls (i.e., compliance tests)......</td>
<td>1,090</td>
<td>1,140</td>
</tr>
<tr>
<td>5. Substantive tests.........................</td>
<td>2,670</td>
<td>3,115</td>
</tr>
<tr>
<td>6. Preparing the audit report........................</td>
<td>200</td>
<td>225</td>
</tr>
<tr>
<td>Total audit hours.................................</td>
<td>4,460</td>
<td>5,040</td>
</tr>
</tbody>
</table>

* The differences between the actual and the budgeted hours were caused by the following:

1. XYZ Company's accounting department did not prepare some of the necessary audit schedules on a timely basis.

2. Some of the members of the audit team had not previously worked on the XYZ Company audit.

3. XYZ Company made minor changes in its accounting system.
EXPERIMENTAL TASK

I. Please indicate in the space below the number of hours which you would budget for the audit of XYZ Company's June 30, 1989 financial statements.

Audit hours devoted to:  

<table>
<thead>
<tr>
<th></th>
<th>Budgeted Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Planning the engagement</td>
<td></td>
</tr>
<tr>
<td>2. Evaluating the internal audit function</td>
<td></td>
</tr>
<tr>
<td>3. Obtaining an understanding of XYZ Company's control structure</td>
<td></td>
</tr>
<tr>
<td>4. Tests of controls (i.e., compliance tests)</td>
<td></td>
</tr>
<tr>
<td>5. Substantive tests</td>
<td></td>
</tr>
<tr>
<td>6. Preparing the audit report</td>
<td></td>
</tr>
</tbody>
</table>

Total audit hours:               

II. Please provide the following information concerning your accounting background.

A. What is your present job title?
   _____Partner       _____Senior
   _____Manager       _____Other (specify) __________

B. How long have you been in public accounting?
   _____years

Thank you for participating in this study.
Dear ______:

Thank you for your willingness to participate in the study which I am conducting concerning external auditor reliance on internal auditors. Please distribute the enclosed questionnaires to partners, managers, and/or seniors who (1) have experience auditing companies with internal audit departments and (2) do not regularly work together on actual audit engagements. The type of experience (e.g., banking, manufacturing) which these individuals have is irrelevant for the purpose of the study.

When you distribute the questionnaires, please tell each participant:

1. To allow 20-30 minutes to complete the questionnaire.

2. Not to discuss the questionnaire with the other participants.

3. To return the questionnaire to you as soon as possible, but no later than one week after he/she receives the questionnaire. I know that your staff members are busy, but I believe that one week is sufficient given the time required to complete the questionnaire.

Once you have received all of the completed questionnaires, please mail them to me in the enclosed return envelope. I sincerely appreciate your participation in this study. The responses of your staff members will be held in strict confidence and will only be used to develop summary statistics.

Sincerely yours,

Michael C. Toerner, CPA
Doctoral Candidate
Louisiana State University
APPENDIX D

STATISTICAL SIGNIFICANCE OF THE INTERACTION OF THE BLOCKING VARIABLE AND THE INDEPENDENT VARIABLE
### TABLE D-1

**STATISTICAL SIGNIFICANCE OF THE INTERACTION OF THE BLOCKING VARIABLE AND THE INDEPENDENT VARIABLE**

<table>
<thead>
<tr>
<th>Audit Area</th>
<th>F-ratio</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluating internal audit department</td>
<td>0.67</td>
<td>0.754</td>
</tr>
<tr>
<td>Understanding control structure</td>
<td>0.17</td>
<td>0.998</td>
</tr>
<tr>
<td>Performing tests of controls</td>
<td>0.37</td>
<td>0.957</td>
</tr>
<tr>
<td>Performing substantive tests</td>
<td>0.74</td>
<td>0.686</td>
</tr>
</tbody>
</table>

Note: The values in this table were generated using the SAS GLM procedure and model (3.1) adjusted for inclusion of an interaction term.
TABLE E-1
TEST STATISTIC FOR THE RUNS TEST

\[ Z = - \frac{U + 0.5 - 1.0 - \frac{2 \cdot m \cdot n}{N}}{\sqrt{\frac{(2 \cdot m \cdot n) \cdot [(2 \cdot m \cdot n) - N]}{(N^2) \cdot (N - 1)}}} \]

Where:

- \( U \) = the total number of runs in the data for a given audit area.
- \( m \) = the number of positive residuals or the number of negative residuals, whichever is smaller.
- \( n \) = the number of positive residuals or the number of negative residuals, whichever is larger.
- \( N \) = the total number of participants.

Source: Gibbons (1976, 367)
TABLE E-2
BARTLETT’S TEST

\[ B = \frac{1}{C} \cdot \left[ \left( \frac{\text{df}_T}{\log MSE} \right) - \sum \left( \frac{\text{df}_j}{\log s_j^2} \right) \right] \]

Where:

\[ C = 1 + \left( \frac{1}{3 \cdot (r-1)} \cdot \left[ \sum \frac{1}{\text{df}_j} - \frac{1}{\text{df}_T} \right] \right) \]

\( \text{df}_T = \) the total degrees of freedom associated with a given audit area (i.e., \( \text{df}_T = 121 - 6 = 115 \)).

\( \text{df}_j = \) the degrees of freedom associated with the questionnaire that described the \( j \)th type of external reviewer (i.e., \( \text{df}_j = n_j - 1 \)).

\( s_j^2 = \) the estimated variance of the residuals associated with the responses for the questionnaire that described the \( j \)th type of external reviewer.

\( n_j = \) the number of participants who completed the questionnaire that described the \( j \)th type of external reviewer.

\( r = \) the total number of questionnaires (i.e., six).

\[ \text{MSE} = \frac{1}{\text{df}_T} \cdot \sum (\text{df}_j \cdot s_j^2) \]

Source: Neter, Wasserman, and Kutner (1985, 618-619)
TABLE E-3
TEST STATISTIC FOR THE PARAMETRIC ANALYSIS
OF HYPOTHESES H1 - H4

\[ B' = \frac{\hat{L}_m}{s(\hat{L}_m)} \]

Where:

- \( B' \) = the t-value associated with 113 degrees of freedom*.
- \( \hat{L}_m = \bar{Y}_1 - \bar{Y}_j \).
- \( \bar{Y}_1 \) = the mean response for Questionnaire 1, the control questionnaire.
- \( \bar{Y}_j \) = the mean response for the questionnaire that described the j th type of external reviewer (Reviewer A = 2, ...Reviewer E = 6)

\[ s(\hat{L}_m) = \sqrt{\frac{\text{MSE}}{\sum \frac{c_j^2}{n_j}}} \]

- \( \text{MSE} \) = the mean square error term in the ANOVA table obtained by applying the SAS GLM procedure.
- \( c_j = 1.0 \) for the control questionnaire and -1.0 for the questionnaire that described the j th type of external reviewer.
- \( n_j \) = the number of participants who completed either the control questionnaire or the questionnaire that described the j th type of external reviewer.

Source: Neter, Wasserman, and Kutner (1985, 572, 582, and 920)
The number of degrees of freedom was \((N - n - p + 1)\), where \(N\) was the total number of participants (121), \(n\) was the number of "job status" classifications (3), and \(p\) was the number of questionnaires (6) (Kirk 1982, 288).
TABLE E-4

TEST STATISTIC FOR THE PARAMETRIC ANALYSIS OF H5

\[ B' = \frac{\hat{L}_{j,m}}{s(\hat{L}_{j,m})} \]

Where:

\[ B' = \text{the t-value associated with 113 degrees of freedom}^* \]

\[ \hat{L}_{j,m} = \bar{Y}.j - \bar{Y}.m, \quad 2 \leq j \leq m \leq 6 \]

\( \bar{Y}.j \) = the mean response for the questionnaire that described the jth type of external reviewer (Reviewer A = 2, ...Reviewer D = 5).

\( \bar{Y}.m \) = the mean response for the questionnaire that described the mth type of external reviewer (Reviewer B = 3, ...Reviewer E = 6).

\[ s(\hat{L}_{j,m}) = \sqrt{\text{MSE} \cdot \sum \frac{c_j^2}{n_j}} \]

\( \text{MSE} \) = the mean square error term in the ANOVA table obtained by applying the SAS GLM procedure.

\( c_j = 1.0 \) for the questionnaire that described the jth type of external reviewer and -1.0 for the questionnaire that described the mth type of external reviewer.

\( n_j \) = the number of participants who completed the questionnaire that described either the jth or the mth types of external reviewers.

Source: Neter, Wasserman, and Kutner (1985, 572, 582, and 920)

* The determination of the degrees of freedom is discussed in Table E-3.
TABLE E-5

BONFERRONI CONFIDENCE INTERVAL CORRESPONDING TO HYPOTHESES H1 - H4

\[ \hat{L}_m \pm B \cdot s(\hat{L}_m) \]

Where:

- **B** = the t-value associated with a confidence level of \((1 - \left[ \alpha / 2g \right])\) and 113 degrees of freedom*. As discussed in the "Significance Level" subsection, \(\alpha\) was 0.15.

- **g** = the total number of pairwise comparisons made with data from audit area k. For each audit area, "g" was fifteen, as indicated in the "Significance Level" subsection.

\(\hat{L}_m\) and \(s(\hat{L}_m)\) are the same as they were in Table E-3.

Source: Neter, Wasserman, and Kutner (1985, 572, 582, and 920)

* The determination of the degrees of freedom is discussed in Table E-3.
TABLE E-6
BONFERRONI CONFIDENCE INTERVAL CORRESPONDING TO H5

\[ \hat{\mathcal{L}}_{j,m} \pm B \cdot s(\hat{\mathcal{L}}_{j,m}) \]

Where:

- \( B \) is the same as it was in Table E-5.
- \( \hat{\mathcal{L}}_{j,m} \) and \( s(\hat{\mathcal{L}}_{j,m}) \) are the same as they were in Table E-4.

Source: Neter, Wasserman, and Kutner (1985, 572, 582, and 920)
TABLE E-7

TEST STATISTIC FOR THE NONPARAMETRIC ANALYSIS OF HYPOTHESES H1 - H4

\[ Z = \frac{1 \bar{Y}_{.1} - \bar{Y}_{.j}}{\sqrt{\left( \frac{N \cdot (N + 1)}{12} - \frac{\sum \mu^3 - \sum \mu}{12 \cdot (N - 1)} \right) \left( \frac{1}{n_1} + \frac{1}{n_j} \right)}} \]

Where:

\( Z \) = the test statistic

\( \bar{Y}_{.1} \) = the mean rank for Questionnaire 1, the control questionnaire.

\( \bar{Y}_{.j} \) = the mean rank for the questionnaire that described the \( j \)th type of external reviewer (Reviewer A = 2, ...Reviewer E = 6).

\( N \) = the total number of responses.

\( \mu \) = the number of tied observations.

\( \frac{\sum \mu^3 - \sum \mu}{12 \cdot (N - 1)} \) = an adjustment factor introduced into the study because the data contained a large number of ties.

\( n_1 \) = the number of participants who completed Questionnaire 1, the control questionnaire.

\( n_j \) = the number of participants who completed a questionnaire that described the \( j \)th type of external reviewer.

Source: Gibbons (1976, 182-192)
TABLE E-8
TEST STATISTIC FOR THE NONPARAMETRIC ANALYSIS OF H5

\[
Z = \frac{|\bar{Y}.j - \bar{Y}.m|}{\sqrt{\left(\frac{N \cdot (N + 1)}{12} - \frac{\sum \mu^3 - \sum \mu}{12 \cdot (N - 1)}\right) \cdot \left(\frac{1}{n_j} + \frac{1}{n_m}\right)}}
\]

Where:

- \(Z\), \(N\), and \(\mu\) are as defined in Table E-7.
- \(\bar{Y}.j\) = the mean rank for the questionnaire that described the \(j\) th type of external reviewer (Reviewer A = 2, ... Reviewer D = 5).
- \(\bar{Y}.m\) = the mean rank for the questionnaire that described the \(m\) th type of external reviewer (Reviewer B = 3, ... Reviewer E = 6).
- \(n_j\) = the number of participants who completed a questionnaire that described the \(j\) th type of external reviewer.
- \(n_m\) = the number of participants who completed a questionnaire that described the \(m\) th type of external reviewer.

Source: Gibbons (1976, 182-192)
APPENDIX F

SEARCH FOR OUTLIERS
Audit Area 1

Audit area 1 represented the external auditor’s evaluation of the internal audit function and corresponded to step 2 of the work program in the participants’ questionnaires. The determination of whether the hours budgeted by one or more of the participants for this program step were outliers proceeded as follows. First, the SAS GLM procedure was used to compute a residual for each participant’s response. The residual represented the amount by which the participants’ response deviated from the value predicted by the following model (Neter, Wasserman, and Kutner 1985, 916):

\[(F.1) \ Y_{ijk} = \mu + \beta_i + \gamma_j + \epsilon_{ijk} \]

Where:

\[ Y_{ijk} \] = the number of hours specified by the kth participant who possessed job status “i” and who received a questionnaire describing the jth type of external reviewer.

\[ \mu \] = the population mean number of hours

\[ \beta_i \] = the effect of the ith job status blocking variable (i = 1, 2, 3).

\[ \gamma_j \] = the effect of the jth type of external reviewer (j = 1, ...6).

\[ \epsilon_{ijk} \] = a random error term.

Model (F.1) is based on the assumptions that, for a given audit area, the \[ \epsilon_{ijk} \] (1) are independent, (2) are normally distributed with a mean of zero, and (3) have equal
variances (Neter, Wasserman, and Kutner 1985, 685).

Following the computation of the residuals, the SAS SORT procedure was used to arrange the residuals in order from smallest to largest. Next, the MEANS procedure was employed to calculate the standard deviation of the residuals. Procedures described by Barnett and Lewis (1978, 90-96) were then used to determine whether any of the participants' responses could be considered outliers.

According to Barnett and Lewis (1978, 93-94), one may conclude, with a probability of \((1 - \alpha)\), that an observation is an outlier if:

\[
\frac{r}{s} > cv
\]

Where:

- \( r \) = the residual associated with the observation.
- \( s \) = the standard deviation of the sample which contains the observation.
- \( cv \) = the critical value tabulated by Barnett and Lewis (1978, Table VIIa, \( \alpha = 0.05 \)).

For audit area 1, the largest negative residual and the largest positive residual were each divided by the standard deviation of the residuals and the quotients compared with the critical value of 3.288 [interpolated through reference to Barnett and Lewis (1978, Table VIIa, \( \alpha = 0.05 \)]. The absolute value of the quotient for the largest negative
residual was only 1.72, indicating that the observation associated with this residual was not an outlier. On the other hand, the ratio \( r/s \) was 5.677 for the largest positive residual, 4.722 for the second largest positive residual, and 2.748 for the third largest positive residual. These findings suggested that the observations associated with the two largest positive residuals were outliers.

The determination as to whether these two observations were "upper" outliers was made by calculating the following test statistic (Barnett and Lewis 1978, 96):

\[
(F.3) \quad T = \frac{SS_r}{SS_t}
\]

Where:

- \( SS_r = \) the total sum of squares computed by applying model (F.1) to all of the participants' responses other than those suspected of being outliers.
- \( SS_t = \) the total sum of squares computed by applying model (F.1) to all of the participants' responses.

The values of \( SS_r \) and \( SS_t \) were determined using the SAS GLM procedure. Substitution of these values into (F.3) yielded a test statistic of 0.545. Since the test statistic was less than the critical value of 0.887 [interpolated through reference to Barnett and Lewis (1978, Table IXb, \( \alpha = 0.05 \)], the two spurious observations were deemed outliers.
(Barnett and Lewis 1978, 96) and excluded from the data analysis.

**Audit Area 2**

The search for outliers in audit area 2 was conducted in a manner similar to the area 1 search. The SAS GLM procedure and ANOVA model (F.1) were used to compute residuals for the responses of all of the participants other than the two whose responses were deemed to be outliers for audit area 1. The SAS MEANS procedure was then used to determine the standard deviation of the residuals. Next, the SAS SORT procedure ranked the residuals in order from smallest to largest.

The largest negative residual and the largest positive residual were each divided by the standard deviation of the residuals, as shown in (F.2). The absolute value of the quotient for the largest negative residual was 2.581, while the quotient for the largest positive residual was 2.954. Neither of these quotients exceeded the critical value of 3.282 [interpolated through reference to Barnett and Lewis (1978, Table VIIa, $\alpha = 0.05$)]. This finding led to the conclusion that none of the responses for audit area 2 were outliers.

**Audit Area 3**

As was true of audit area 2, the search for outliers
in audit area 3 began by employing the SAS GLM procedure and ANOVA model (F.1) to compute residuals for the responses of all of the participants except the two whose responses were found to be outliers for audit area 1. Next, the SAS MEANS procedure calculated the standard deviation of the residuals, after which the SORT procedure arranged the residuals in order from smallest to largest.

The largest negative residual and the largest positive residual were then divided by the standard deviation of the residuals, as shown in (F.2). The absolute value of the quotient for the largest negative residual was 3.079, which was not statistically significant when compared with the critical value of 3.262 [interpolated through reference to Barnett and Lewis (1978, Table VIIa. $\alpha = 0.05$)]. The quotient for the largest positive residual was 3.602, which was significant at the 0.05 alpha level. The quotient for the second largest positive residual, however, was only 1.902, which was not statistically significant at $\alpha = 0.05$. In light of these findings, the observation associated with the largest positive residual was considered an outlier and excluded from the data analysis.

**Audit Area 4**

The search for outliers in audit area 4 proceeded in a manner similar to that described for areas 1-3. That is, the SAS GLM procedure and ANCOVA model (F.1) generated
residuals for the responses of all of the participants except the two whose responses were found to be outliers in audit area 1 and the one whose response was deemed an outlier for area 3. Next, the SAS MEANS procedure was employed to calculate the standard deviation of the residuals and the SORT procedure was used to rank the residuals in order from smallest to largest.

The largest negative residual and the largest positive residual were then divided by the standard deviation of the residuals, as shown in (F.2). The quotient for the largest positive residual was 2.881, which was not statistically significant when compared with the critical value of 3.279 [interpolated through reference to Barnett and Lewis (1978, Table VIIa, \( \alpha = 0.05 \)]. The absolute value of the quotient for the largest negative residual was 4.821. The absolute values of the quotients for the second and the third largest negative residuals were 3.684 and 3.092, respectively. These findings suggested that the observations associated with the largest and the second largest negative residuals were outliers.

The determination of whether these two observations were outliers was made in the manner described by Barnett and Lewis (1978, 100) for two "lower" outliers. To determine whether the observation with the most negative residual was an outlier, the SAS UNIVARIATE procedure
computed the skewness of the participants' responses. This was done because, according to Barnett and Lewis (1978, 100), the skewness is the test statistic. The UNIVARIATE procedure revealed that the absolute value of the skewness was 2.021, which exceeded the critical value of 0.366 [interpolated through reference to Barnett and Lewis (1978, Table XIVA, $\alpha = 0.05$)]. Since the test statistic exceeded the critical value, the author concluded that the observation with the most negative residual was an outlier and excluded it from the study.

The "outlier" status of the observation with the second largest negative residual was determined in a manner similar to that described above. The observation with the largest negative value was excluded from the sample and the UNIVARIATE procedure applied to the remaining observations. The UNIVARIATE procedure indicated that the absolute value of the skewness was 1.577, which exceeded the critical value of 0.367 [interpolated through reference to Barnett and Lewis (1978, Table XIVA, $\alpha = 0.05$)]. In light of this finding, the observation with the second largest negative residual was deemed an outlier and discarded from the data analysis.
## Summary

As discussed above, application of the procedures described by Barnett and Lewis (1978, 90-102) resulted in the identification of five outliers, as follows:

<table>
<thead>
<tr>
<th>Audit Area</th>
<th>Number of Outliers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>5</strong></td>
</tr>
</tbody>
</table>

All five outliers were excluded from the data analysis.
APPENDIX G

TESTS OF ANOVA ASSUMPTIONS
Independence Assumption

The first ANOVA assumption is that the error terms for a given audit area are independent of one another. This assumption was tested by first using the SAS GLM procedure to obtain, for a given audit area, a residual for each of the 121 responses in that area. Next, the runs test (Gibbons 1976, 365-370) was used to determine whether the pattern of residuals was consistent with the pattern found in a random sample. Application of this test required computation of the "Z" test-statistic shown in Table E-1. As Table G-1 indicates, the test statistic was not significant at the 0.05 level for any of the study's audit areas. This finding led to the conclusion that the independence assumption was not violated for any audit area.

Normality Assumption

The second ANOVA assumption is that, for a given audit area, the error terms are normally distributed. This assumption was tested by applying the UNIVARIATE procedure in SAS to the residuals generated by the GLM procedure. Table G-2 shows the values of the modified Kolmogorov-Smirnov D statistic calculated by the UNIVARIATE procedure for each of the study's four audit areas. As this table indicates, the residuals were not normally distributed for any audit area.
TABLE G-1

RESULTS OF THE TEST OF THE ANOVA MODEL INDEPENDENCE ASSUMPTION

<table>
<thead>
<tr>
<th>Audit Area</th>
<th>Test Statistic</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1 - Evaluating internal audit department</td>
<td>0.19</td>
<td>0.8494</td>
</tr>
<tr>
<td>H2 - Understanding control structure</td>
<td>1.42</td>
<td>0.1556</td>
</tr>
<tr>
<td>H3 - Performing tests of controls</td>
<td>1.48</td>
<td>0.1388</td>
</tr>
<tr>
<td>H4 - Performing substantive tests</td>
<td>1.86</td>
<td>0.0602</td>
</tr>
</tbody>
</table>

Note: The p-values were obtained through reference to Gibbons (1976, 376, 385).

This absence of normality was addressed by applying the transformations shown in Table G-2 to the original data in each audit area (Kirk 1982, 82-83). The UNIVARIATE procedure was then applied to the residuals produced by the GLM procedure for the transformed observations. Table G-2 shows that, with two exceptions, none of the transformations resulted in a normal distribution for any of the study's audit areas. For audit area 1, transformations 1 and 2
produced residuals that were normally distributed. Transformation 1, however, was selected for use in the study because it had the larger p-value.

<table>
<thead>
<tr>
<th>Audit Area</th>
<th>Modified Kolmogorov-Smirnov D Statistic</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Evaluating internal audit department:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Original data</td>
<td>0.1398</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Transformations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. ( Y' = \sqrt{Y} )</td>
<td>0.0755</td>
<td>(&lt; 0.01 ) *</td>
</tr>
<tr>
<td>2. ( Y' = \sqrt{Y + 1} )</td>
<td>0.0767</td>
<td>(&lt; 0.01 ) *</td>
</tr>
<tr>
<td>3. ( Y' = \log_{10}(Y) )</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>4. ( Y' = \log_{10}(Y + 1) )</td>
<td>0.1456</td>
<td>(&lt; 0.01 )</td>
</tr>
<tr>
<td>5. ( Y' = \frac{1}{Y} )</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>6. ( Y' = \frac{1}{Y + 1} )</td>
<td>0.3139</td>
<td>(&lt; 0.01 )</td>
</tr>
<tr>
<td>2. Understanding control structure:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Original data</td>
<td>0.1347</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Transformations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. ( Y' = \sqrt{Y} )</td>
<td>0.1623</td>
<td>(&lt; 0.01 )</td>
</tr>
<tr>
<td>2. ( Y' = \sqrt{Y + 1} )</td>
<td>0.1620</td>
<td>(&lt; 0.01 )</td>
</tr>
<tr>
<td>Audit Area</td>
<td>Modified Kolmogorov-Smirnov D Statistic</td>
<td>P-value</td>
</tr>
<tr>
<td>------------</td>
<td>----------------------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>3. $Y' = \log_{10}(Y)$</td>
<td>0.2133</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>4. $Y' = \log_{10}(Y + 1)$</td>
<td>0.2126</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>5. $Y' = 1/Y$</td>
<td>0.2693</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>6. $Y' = 1/(Y + 1)$</td>
<td>0.2694</td>
<td>&lt; 0.01</td>
</tr>
</tbody>
</table>

3. Performing tests of controls:

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Original data</td>
<td>0.1492</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Transformations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. $Y' = \sqrt{Y}$</td>
<td>0.1726</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>2. $Y' = \sqrt{Y + 1}$</td>
<td>0.1726</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>3. $Y' = \log_{10}(Y)$</td>
<td>0.2184</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>4. $Y' = \log_{10}(Y + 1)$</td>
<td>0.2180</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>5. $Y' = 1/Y$</td>
<td>0.2530</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>6. $Y' = 1/(Y + 1)$</td>
<td>0.2524</td>
<td>&lt; 0.01</td>
</tr>
</tbody>
</table>

4. Performing substantive tests:

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Original data</td>
<td>0.1951</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Transformations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. $Y' = \sqrt{Y}$</td>
<td>0.2124</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>2. $Y' = \sqrt{Y + 1}$</td>
<td>0.2124</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>3. $Y' = \log_{10}(Y)$</td>
<td>0.2244</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>4. $Y' = \log_{10}(Y + 1)$</td>
<td>0.2243</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Audit Area</td>
<td>Modified Kolmogorov-Smirnov D Statistic</td>
<td>P-value</td>
</tr>
<tr>
<td>------------</td>
<td>--------------------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>5.  $Y' = 1 / Y$</td>
<td>0.2550</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>6.  $Y' = 1 / (Y + 1)$</td>
<td>0.2549</td>
<td>&lt; 0.01</td>
</tr>
</tbody>
</table>

*--Not significant at the 0.05 significance level

N/A--Audit area 1 contained six observations that were zero. Since the indicated mathematical operation is not defined for zero the transformation was not performed.

---

**Equality-of-Variance Assumption**

The third ANOVA assumption is that, for a given audit area, the error terms have equal variances across questionnaires. The tests that are available for evaluating this assumption require that the observations be normally distributed (Neter, Wasserman, and Kutner 1985, 618). Consequently, the "equal variance" assumption was tested only for audit area 1, since the data in the other audit areas were not normally distributed.

The test of the "equal variance" assumption for audit area 1 began with the use of the GLM procedure to compute residuals for the transformed observations. Next, the MEANS procedure was used to compute, for each
questionnaire, the variance of the residuals associated with the participants' responses (as transformed).

Substitution of data values into Table E-2 revealed that the test statistic for Bartlett's test was 5.509. The p-value for this test statistic was 0.49, which was determined through reference to tabled values of the chi-square distribution for five (i.e., \( r - 1 = 6 - 1 = 5 \)) degrees of freedom (Neter, Wasserman, and Kutner 1985, 619, 1076). The large p-value led to the conclusion that the error terms for the transformed data for audit area 1 had equal variances.
APPENDIX H

SUMMARY OF PARTICIPANTS' RESPONSES
TABLE H-1
SUMMARY OF PARTICIPANTS' RESPONSES

<table>
<thead>
<tr>
<th>Audit Area 1</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Quest. 1</td>
<td>47.3</td>
<td>57.0</td>
<td>36.5</td>
<td>50.6</td>
</tr>
<tr>
<td></td>
<td>(31.4)</td>
<td>(16.6)</td>
<td>(20.9)</td>
<td>(22.5)</td>
</tr>
<tr>
<td>Quest. 2</td>
<td>15.0</td>
<td>16.4</td>
<td>23.8</td>
<td>19.4</td>
</tr>
<tr>
<td></td>
<td>(13.2)</td>
<td>(20.1)</td>
<td>(24.3)</td>
<td>(20.6)</td>
</tr>
<tr>
<td>Quest. 3</td>
<td>25.0</td>
<td>27.5</td>
<td>29.3</td>
<td>26.8</td>
</tr>
<tr>
<td></td>
<td>(14.9)</td>
<td>(21.5)</td>
<td>(18.5)</td>
<td>(17.9)</td>
</tr>
<tr>
<td>Quest. 4</td>
<td>19.8</td>
<td>27.9</td>
<td>54.0</td>
<td>31.1</td>
</tr>
<tr>
<td></td>
<td>(17.7)</td>
<td>(21.8)</td>
<td>(34.6)</td>
<td>(30.7)</td>
</tr>
<tr>
<td>Quest. 5</td>
<td>17.5</td>
<td>37.1</td>
<td>37.5</td>
<td>32.6</td>
</tr>
<tr>
<td></td>
<td>(9.6)</td>
<td>(32.1)</td>
<td>(43.5)</td>
<td>(30.9)</td>
</tr>
<tr>
<td>Quest. 6</td>
<td>40.0</td>
<td>41.7</td>
<td>50.7</td>
<td>44.3</td>
</tr>
<tr>
<td></td>
<td>(39.4)</td>
<td>(20.3)</td>
<td>(22.1)</td>
<td>(25.4)</td>
</tr>
<tr>
<td>Avg.</td>
<td>29.3</td>
<td>35.6</td>
<td>38.2</td>
<td>34.7</td>
</tr>
<tr>
<td></td>
<td>(24.8)</td>
<td>(27.1)</td>
<td>(27.7)</td>
<td>(26.7)</td>
</tr>
</tbody>
</table>

Audit Area 2

| Quest. 1      | 225.0 | 233.3 | 218.8 | 228.4 | 250 | 250 |
|               | (112.9) | (22.2) | (85.1) | (66.1) |   |   |
| Quest. 2      | 156.7 | 193.6 | 181.9 | 182.2 | 250 | 250 |
|               | (77.7) | (73.5) | (66.4) | (57.9) |   |   |
| Quest. 3      | 227.5 | 217.5 | 225.0 | 222.4 | 250 | 250 |
|               | (45.3) | (74.6) | (25.0) | (57.5) |   |   |
|---------|-------|-------|------|-------|-------------------|------|------|
|         | 215.0 | 205.0 | 193.8| 204.8 |                   | 250  | 250  |
|         | (23.8 )| (57.2)| (71.8)| (53.7)|                   |      |      |
| Quest. 5 | 172.5 | 198.9 | 187.5| 190.0 |                   | 250  | 250  |
|         | (91.4 )| (77.5)| (47.9)| (71.6)|                   |      |      |
| Quest. 6 | 224.0 | 225.6 | 205.0| 218.3 |                   | 250  | 250  |
|         | (68.0 )| (35.0)| (39.9)| (44.6)|                   |      |      |
| Avg.    | 210.3 | 213.4 | 198.8| 209.0 |                   | 250  | 250  |
|         | (73.0 )| (57.8)| (56.5)| (61.4)|                   |      |      |

Audit Area 3

| Quest. 1 | 1,015.0 | 1,030.0 | 1,132.5 | 1,044.5 | 1,090 | 1,140 |
|          | (318.4 )| (102.8)| (269.9)| (204.7)|      |      |
| Quest. 2 | 773.3   | 874.3   | 940.6   | 886.9   | 1,090 | 1,140 |
|          | (392.6 )| (283.5)| (386.8)| (34.4)|      |      |
| Quest. 3 | 1,003.8 | 1,009.0 | 1,033.3 | 1,010.5 | 1,090 | 1,140 |
|          | (170.1)| (251.1)| (57.7)| (197.3)|      |      |
| Quest. 4 | 1,070.0 | 802.1   | 940.0   | 875.9   | 1,090 | 1,140 |
|          | (46.9 )| (313.9)| (257.7)| (287.0)|      |      |
| Quest. 5 | 925.0   | 933.3   | 975.0   | 941.2   | 1,090 | 1,140 |
|          | (350.0)| (375.1)| (50.0)| (306.9)|      |      |
| Quest. 6 | 978.0   | 1,017.8 | 978.6   | 995.2   | 1,090 | 1,140 |
|          | (362.5)| (367.8)| (135.0)| (293.7)|      |      |
| Avg.     | 977.0   | 940.3   | 988.8   | 961.4   | 1,090 | 1,140 |
|          | (269.2)| (233.0)| (242.6)| (274.1)|      |      |

Audit Area 4

<p>| Quest. 1 | 2,195.0 | 2,620.0 | 2,625.0 | 2,505.0 | 2,670 | 3,115 |
|          | (741.7)| (220.5)| (330.4)| (458.1)|      |      |
| Quest. 2 | 2,566.7 | 2,641.4 | 2,453.1 | 2,545.3 | 2,670 | 3,115 |
|          | (189.3)| (115.7)| (665.0)| (446.0)|      |      |</p>
<table>
<thead>
<tr>
<th>Question</th>
<th>Partner (Ptr.)</th>
<th>Manager (Mgr.)</th>
<th>Senior (Sr.)</th>
<th>Average (Avg.)</th>
<th>Budget (Bud.)</th>
<th>Actual (Act.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quest. 3</td>
<td>2,673.1</td>
<td>2,494.0</td>
<td>2,683.3</td>
<td>2,589.3</td>
<td>2,670</td>
<td>3,115</td>
</tr>
<tr>
<td></td>
<td>(428.8)</td>
<td>(356.3)</td>
<td>(246.6)</td>
<td>(369.1)</td>
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<tr>
<td>Quest. 4</td>
<td>2,642.5</td>
<td>2,532.9</td>
<td>2,600.0</td>
<td>2,565.0</td>
<td>2,670</td>
<td>3,115</td>
</tr>
<tr>
<td></td>
<td>(96.0)</td>
<td>(493.7)</td>
<td>(424.3)</td>
<td>(424.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quest. 5</td>
<td>2,700.0</td>
<td>2,656.7</td>
<td>2,900.0</td>
<td>2,724.1</td>
<td>2,670</td>
<td>3,115</td>
</tr>
<tr>
<td></td>
<td>(163.3)</td>
<td>(307.4)</td>
<td>(734.8)</td>
<td>(404.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quest. 6</td>
<td>2,414.0</td>
<td>2,626.7</td>
<td>2,500.0</td>
<td>2,533.8</td>
<td>2,670</td>
<td>3,115</td>
</tr>
<tr>
<td></td>
<td>(384.7)</td>
<td>(293.6)</td>
<td>(600.0)</td>
<td>(424.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avg.</td>
<td>2,523.2</td>
<td>2,588.2</td>
<td>2,589.2</td>
<td>2,572.3</td>
<td>2,670</td>
<td>3,115</td>
</tr>
<tr>
<td></td>
<td>(450.4)</td>
<td>(331.4)</td>
<td>(541.0)</td>
<td>(418.9)</td>
<td></td>
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</tr>
</tbody>
</table>

Note: All of the above amounts are expressed in terms of hours. For each type of respondent (e.g., partner), the top amount is the mean number of hours specified for a given questionnaire by that type of respondent. The amount in parentheses is the standard deviation of the hours budgeted by this type of respondent for the indicated questionnaire.
APPENDIX I

RESULTS OF THE ANOVA ANALYSIS
<table>
<thead>
<tr>
<th>H1 / Audit Area 1:</th>
<th>( F )-value</th>
<th>( P )-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Original data:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Questionnaire</td>
<td>4.44</td>
<td>0.001</td>
</tr>
<tr>
<td>Job Status</td>
<td>1.43</td>
<td>0.24</td>
</tr>
<tr>
<td><strong>Transformed data:</strong></td>
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<td></td>
</tr>
<tr>
<td>Questionnaire</td>
<td>5.58</td>
<td>0.00001</td>
</tr>
<tr>
<td>Job Status</td>
<td>0.99</td>
<td>0.38</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>H2 / Audit Area 2:</th>
<th>( F )-value</th>
<th>( P )-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Original data:</strong></td>
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<td></td>
</tr>
<tr>
<td>Questionnaire</td>
<td>1.69</td>
<td>0.14</td>
</tr>
<tr>
<td>Job Status</td>
<td>0.30</td>
<td>0.74</td>
</tr>
<tr>
<td><strong>Rank transformation:</strong></td>
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<td></td>
</tr>
<tr>
<td>Questionnaire</td>
<td>1.54</td>
<td>0.18</td>
</tr>
<tr>
<td>Job Status</td>
<td>0.62</td>
<td>0.54</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>H3 / Audit Area 3:</th>
<th>( F )-value</th>
<th>( P )-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Original data:</strong></td>
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<td></td>
</tr>
<tr>
<td>Questionnaire</td>
<td>1.35</td>
<td>0.25</td>
</tr>
<tr>
<td>Job Status</td>
<td>0.46</td>
<td>0.63</td>
</tr>
<tr>
<td><strong>Rank transformation:</strong></td>
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<td></td>
</tr>
<tr>
<td>Questionnaire</td>
<td>0.71</td>
<td>0.62</td>
</tr>
<tr>
<td>Job Status</td>
<td>0.37</td>
<td>0.69</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>H4 / Audit Area 4:</th>
<th>( F )-value</th>
<th>( P )-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Original data:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Questionnaire</td>
<td>0.61</td>
<td>0.69</td>
</tr>
<tr>
<td>Job Status</td>
<td>0.29</td>
<td>0.75</td>
</tr>
<tr>
<td><strong>Rank transformation:</strong></td>
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<td></td>
</tr>
<tr>
<td>Questionnaire</td>
<td>0.19</td>
<td>0.97</td>
</tr>
<tr>
<td>Job Status</td>
<td>0.28</td>
<td>0.76</td>
</tr>
</tbody>
</table>

**Note:** The amounts shown above were generated by applying the SAS GLM procedure and model (3.1) to the participants' responses.
VITA

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Candidate: Michael C. Toerner

Major Field: Accounting

Title of Dissertation: AN INVESTIGATION OF THE EFFECT OF A FAVORABLE EXTERNAL QUALITY ASSURANCE REVIEW ON THE SCOPE OF THE EXTERNAL AUDITOR'S EXAMINATION OF AN ORGANIZATION'S FINANCIAL STATEMENTS

Approved:

[Signatures]

Dean of the Graduate School

EXAMINING COMMITTEE:

[Signatures]

Date of Examination: September 20, 1990

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