A Study of Task Uncertainty
Associated with
Public Accounting Firm Services

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(ABSTRACT)

Relative levels of task uncertainty associated with various CPA firm services were examined in this study. Additionally, tests to determine whether systematic variation occurs at the office or at the firm level were conducted.

Multiple measures of task uncertainty were developed. Multiple analysis of variance techniques were used to analyze data drawn from audit, tax, actuarial and benefits consulting, and general business consulting engagements. Data was drawn from two office of one Big Six CPA firm.

As expected, after comparing audit and tax engagements from two office, the null hypothesis that there was no difference in task uncertainty levels between offices on either service type could not be rejected. The null hypothesis that no difference in levels of task uncertainty between the four
service types exist was rejected. This result was also consistent with expectations.

These findings provide empirical support for an assumption made by previous researchers that the individual firm is the appropriate level for analysis. Additionally, results suggest that, at the firm level, differences in levels of task uncertainty do exist. In general, audit and tax services appear to involve lower levels of task uncertainty than do consulting services; however, it should be noted that significant differences also existed between consulting services.

The implications of these results for future research are that the firm appears to be the appropriate organizational level for examining research questions related to CPA firms. Also, consulting services need to be considered not as one service type, but potentially as distinct from one another. Future research involving other Big Six firms as well as second and third-tier firms could lead to greater generalizability of these results.
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Chapter 1

Introduction

1.0 Motivation for the Research

Historically, researchers in auditing have attempted to provide evidence regarding the nature of and market for auditing and other services provided by public accounting firms. For example, researchers have addressed issues such as the pricing of audit services (Simunic [1980], Simon and Francis [1988]), competition (Dopuch and Simunic [1980]) and industry concentration (Danos and Eichenseher [1986]). An additional aspect of the practice of public accountancy is examined in this study. In recent years, the mix of services provided by CPA firms has changed, and the non-audit service portion has experienced considerable growth. Relative to audit services, management advisory services and
other non-audit services are becoming increasingly important as sources of revenue for public accounting firms (Eveloff [1988]). One survey reported that for fiscal year 1988, the contribution to worldwide revenues generated by consulting services ranged from 9% to 36% for the twelve largest public accounting firms and that consulting services' revenues are growing at an annual rate in excess of 30%, more than double the rate for audit services' revenues (Wall Street Journal [June 26, 1988]). More recently, consulting services of one Big Six firm increased from 19% of total firm revenue in 1987 to 24% in 1991, while tax and auditing services declined as a percentage of total revenue (Public Accounting Report [January 15, 1992]). These data suggest that provision of consulting services is lucrative for public accounting firms.

Growth rates of non-audit services provided differ among large firms (Public Accounting Report [March 15, 1989]), and some firms promote consulting services more aggressively than others (Wall Street Journal [December 12, 1988]). Also, many second- and third-tier CPA firms do not exhibit the same revenue growth pattern and product service mix (Public Accounting Report [February 15, 1989]). The observed behavior of large public accounting firms suggests that firms view different services as having differing
levels of business risk. Further, firms have differing risk preferences and, hence, differing desired service mixes.

A public accounting firm faces risk to its professional reputation and practice as well as risk of financial loss from the effects of litigation and/or unfavorable publicity arising in connection with the provision of audit, tax, and consulting services to clients. Litigation exposure has increased substantially in recent years.¹ Watson [1975] suggests that the audit subunit faces relatively less uncertainty than does the consulting subunit. That conclusion was challenged by Bamber and Bylinski [1982] in light of technological changes associated with auditing services. Indeed, some firms appear to be moving away from audits perceived as risky (Public Accounting Report [December 15, 1992]).

In addition to profitability, Hillison and Kenkelley [1988] have suggested another reason that public accounting firms promote non-audit services. They argue that firms are

¹Public Accounting Report regularly documents the results of litigation activity. For example, see "$400,000,000 Cash! E&Y's Global Settlement is Deal of the Year" (PAR [November 30, 1992]), "PW Socked with $335 Million Award" (PAR [May 31, 1992]).
increasing non-audit service provision as a means of risk diversification. This implies that business risk to which the firm is exposed changes as the audit/non-audit service mix changes.²

Conceptually, uncertainty and risk are distinct concepts. In a strictly statistical sense, risk implies that a probability distribution of outcomes is known and agreed upon by relevant experts. Uncertainty implies that the outcome probability distribution is unknown. As used in financial management, there is a tendency to use the terms interchangeably. Although financial decisions are made under conditions of uncertainty, decision-making techniques are based on the assumption that conditions of risk exist (Gitman et al [1985]).

Hertz and Thomas [1986] point out that while this distinction may be useful at a conceptual level, it is of limited value in assessment and analysis of risk in business operations and decision-making. This statistical distinction may be important for certain events, such as

² Business risk as used herein should not be confused with audit risk as defined by Statement on Auditing Standards Number 47. Audit risk is defined therein as the risk that the auditor may unknowingly fail to appropriately modify his opinion on financial statements that are materially misstated.
flipping of a coin, that are capable of extensive repetition. However, most events associated with conducting a business enterprise are not subject to such repetition. In other words, real events seldom have objective probability distributions associated with them. Therefore, business decision-makers are frequently confronted by the need to make subjective probability assessments in order to represent uncertainty existing in the decision context [p. 3].

Relative levels of task uncertainty associated with various CPA firm services are examined in this study. Uncertainty has been described as the fundamental problem confronting managers of organizations (Thompson [1967]), and task uncertainty is one of two major sources of uncertainty. If differing risk preferences explain the differing extent of services provided by firms, a necessary precondition is that the relative risks of audit and non-audit services are different.

The issue of whether relative levels of task uncertainty vary by office within a particular firm is also examined in this study. Such effects could relate to differences in the portfolios of clients served by different offices within the same firm. For example, clients served by one office may be
concentrated by industry or by size. Before firm differences can be explained, examination for intra-firm differences is necessary.

1.1 Statement of the Problem

Our understanding of public accounting firms as organizations is incomplete. Diversity in emphasis of service types provides an example of a situation where firms are adopting differing strategies. Little empirical evidence exists to explain different service mixes among public accounting firms. Differing levels of task uncertainty, and, therefore, differing risk levels among service types offer one possible reason for service mix differences among firms, but empirical evidence regarding relative level of task uncertainty associated with various service types is missing.

Additionally, previous auditing researchers have hypothesized firm-level differences in a variety of contexts (Cushing and Loebbecke [1986]; Kinney [1986]; Bamber, Snowball and Tubbs [1989]; Williams and Dirsmith [1988]). For example, researchers have suggested that firm-level effects exist due to differences in audit technology. Research has not considered and/or controlled for possible
intra-firm effects; that is, office-level differences within a particular Big Six firm.

1.2 Purpose of this Research

The general purpose of this study is to provide additional understanding of public accounting firms as organizations. Specifically, this research seeks to provide empirical evidence regarding relative levels of task uncertainty associated with accounting firm services. Typically, larger public accounting firms offer audit, tax, and various management advisory services. As organizations grow and expand into new service areas, their information processing needs change (Galbraith [1977]). Organizational structure changes in response to changing levels of uncertainty associated with the services provided. Certain structural changes have been noted in public accounting firms (Kinney [1986]). Changing service mix coupled with changing structure suggests possible changes in levels of task uncertainty.

Empirical tests for possible intra-firm effects are also conducted in this study. Within the context of examining task uncertainty, tests for differences between offices of a particular Big Six firm are included.
1.3 Contribution of this Research

Extending our understanding of public accounting firms as organizations operating in an uncertain environment is significant in several ways. First, provision of consulting services by the same firms that provide audit services has been controversial. For example, questions regarding the effect on audit independence of providing non-audit services to audit clients have been a long-standing concern both within the profession and to various oversight groups such as the Securities and Exchange Commission and the United States Congress.\textsuperscript{3} By adding to our understanding of motivations for and implications of providing consulting services, the profession is able to more effectively address the concerns that have been expressed.

Secondly, the unit of analysis in previous auditing research has typically been at the firm level. Before conclusions can be drawn regarding firm-level differences, it is necessary to consider whether variation occurs at a lower level of analysis. If variation occurs at the office level, examination of many auditing research questions would need

\textsuperscript{3}For a brief history of the issue and review of the research related to non-audit services and audit independence, see Pany and Reckers [1988].
to focus on that level of analysis. Significant office-
level differences in this study would suggest an explanation
for conflicting results in previous research that considered
firm-level effects. The assumption regarding level of
analysis will be tested in this study.

1.4 Research Questions

The primary research question to be addressed in this study
is stated as follows:

Do different CPA firm services involve different levels
of task uncertainty?

To address the primary research question, a preliminary
research question must be addressed. This preliminary
research question deals with the possible existence of
intra-firm effects on levels of task uncertainty related to
the office performing the service. This preliminary
research question is stated as follows:

Do offices within the same firm vary in levels of task
uncertainty associated with a particular service?

1.5 Organization of the Dissertation

This dissertation is organized as follows. This chapter has
presented the motivation for the study, the problem to be
addressed, the research contribution and questions. A review of relevant theoretical and empirical literature is contained in the second chapter. A discussion of specific research hypotheses and research methods is included in the third chapter. Discussion of the research results is contained in the fourth chapter and finally, discussion of limitations of this study and possible future research opportunities is included in the fifth chapter.
Chapter 2

Literature Review

2.0 Introduction

A review of the relevant theoretical and auditing research literature is presented in this section. First, a brief overview of the organizational research related to the construct of uncertainty is presented. A discussion of uncertainty in a CPA firm context is contained in the second section. A review of the auditing research literature is included in the third section. Lastly, a discussion of the implications for the current study is included in the final section.
2.1 Theoretical Framework

The relative level of task uncertainty associated with various CPA firm services is examined in this study. Therefore, a theoretical framework describing the types and components of uncertainty facing organizations is necessary.

The contingency approach to organizational design has had a significant impact on organizational research (Bamber and Bylinski [1982]). The contingency approach holds that optimal organization structure is dependent on situational conditions or contingencies. An appropriate organizational structure is necessary for organizational effectiveness, or attainment of organizational goals and objectives.

Burns and Stalker [1961] first presented the notion that optimal organization structure was dependent on situationally-specific conditions. Organizations were viewed as open systems. Open systems theory emphasizes the close relationship between an organization structure and its supporting environment (Katz and Kahn [1978]). Organizations depend on inputs from the environment for their continued existence and provide outputs back to the environment. Therefore, the organization is faced with uncertainty from both internal sources, such as task
characteristics, and external sources, such as environmental changes. Each of these sources of uncertainty will be considered in greater detail.

2.1.1 Uncertainty in the Organizational Setting

Organizational researchers have attempted to identify the components of task and environmental uncertainty. Information processing theory relating uncertainty to organizations was first introduced to organizational research by Galbraith [1973, 1977] and subsequently extended by Tushman and Nadler [1978]. This model places emphasis on the specification of uncertainty in the organizational setting.

2.1.2 Galbraith's Information Processing Model

Galbraith [1973, 1977] introduced the information processing model to organizational research. The premise underlying this model is that uncertainty is the core concept upon which organizational design frameworks are based [1977, p.36].

Because its exact meaning is not clear, Galbraith proposes his definition of uncertainty. Uncertainty is defined as
"the difference between the amount of information required to perform the task and the amount of information already possessed by the organization" (Galbraith [1977] p. 37). The amount of task uncertainty is the result of the characteristics of a specific task combined with the characteristics of the specific organization performing the task (Galbraith [1977] p. 37).

Galbraith's basic proposition is that the greater the uncertainty of the task, the greater the amount of information that has to be processed between decision makers during the execution of the task (Galbraith [1977] p. 36). The level of needed information is determined by three factors: diversity of goals, desired level of goal performance and division of labor.

The Galbraith [1977] model suggests that organizations structure to meet their informational needs, which result from the existence of uncertainty. The organization can choose a structure from a set of feasible alternatives, depending on the level of information processing required. All organizations employ certain structural characteristics, i.e., establishment of a hierarchy of authority and adoption of certain rules, programs and procedures.
In most organizations, managers are selected on the basis of demonstrated performance. Managers are then arranged in some hierarchical form clearly identifying the person or group to whom appeal is made to resolve conflict. Galbraith holds that the hierarchy form is chosen because it is an efficient information-processing mechanism (Galbraith [1977] p. 42).

Additionally, organizations employ rules, programs and procedures to deal with situations that occur repetitively. Existence of these rules, programs and procedures serves to reduce the information processing capacity needed by the organization through reducing the direct communication needs of co-workers as well as superiors and subordinates. Rules, programs and procedures set out specified actions or behaviors that are appropriate in a given circumstance. This represents a form of decentralization of routine decision-making (Galbraith [1977] p. 43).

As the level of task uncertainty increases, the organization must modify the hierarchy of authority to reduce the managers' span of control, so that each manager's capacity to process the increasing informational needs is not exceeded (Galbraith [1977] p.46). In this environment, greater emphasis will be placed on organizational as well as
subunit goal-setting. The previous reliance on control through supervision and surveillance will be augmented by improved personnel selection. The resultant increase in worker skills and attitude will allow for shifting of some decision making to lower levels in the organization.

The aforementioned strategies are only effective at no more than moderate levels of task uncertainty. As task uncertainty increases beyond these relatively moderate levels, the organization must modify its organizing mode further to avoid reduced organizational performance. Galbraith describes five alternative organizing strategies from which a company may choose. They are:

1. Environmental management
2. Creation of slack resources
3. Creation of self-contained tasks
4. Investment in vertical information systems
5. Creation of lateral relations (Galbraith [1977] pp. 50-53)

Actions 1 through 3 are intended to reduce the need for information processing in the organization. Actions 4 and 5 are intended to increase the information processing capacity of the organization.

The first of these possible strategies involves attempts at environmental management. Rather than modify its own structure and tasks, an organization may attempt to modify
its environment. Vertical integration is an example of the attempt to reduce uncertainty related to the flow of materials necessary for the production process. For example, a company might acquire the prior stage in the product flow (Galbraith [1977] p. 50).

The second action that might be taken by a company to deal with increased uncertainty is to reduce the level of performance by what Galbraith calls the creation of slack resources. For example, man-hours used in production could be increased. Obviously, creation of slack resources causes additional resources to be used, and, therefore, may involve significant costs to the company. The decision to use this strategy would be made only after consideration of the costs associated with the other four strategies (Galbraith [1977] p. 50).

The last of the strategies that attempt to reduce the need for information processing is the creation of self-contained tasks. This strategy involves rearrangement of the composition of the tasks so that tasks are assigned to self-contained groups that have all the resources needed to perform the task. It involves creation of work groups with multiple skills, rather than groups organized by occupational categories (Galbraith [1977] p. 51).
The remaining two strategies both represent attempts to increase the information processing capabilities of the organization. The first involves investment in vertical information systems, such as enhanced electronic data processing capacity. The final strategy involves creation of lateral relations, or movement of decision making down to the level where the appropriate information is available, rather than moving information to the point of decision. Creation of liaisons between groups, as well as direct communication between group managers is emphasized. This strategy does not involve creation of any new organizational groups (Galbraith [1977] pp. 52-53).

The goal, when instituting these actions either individually or in combination with each other, is to narrow the set of exceptional situations that might require input from a superior in the hierarchy in order to achieve appropriate resolution. Each of the alternatives involves additional costs and benefits; hence, not all of them are appropriate universally, but the organization must adopt one or more of the strategies to deal effectively with greater uncertainty.

Although the Galbraith view of organizations is essentially consistent with an open-systems perspective, which acknowledges the impact of the environment on work-related
uncertainty, his primary emphasis is on the uncertainty created by the task requirements and the resultant structural implications.

2.1.3 Tushman and Nadler's Model Extensions

Tushman and Nadler [1978] extend the Galbraith model, particularly as it relates to environmental and task uncertainty specification. Like Galbraith, Tushman and Nadler view organizations as open social systems that must cope with uncertainty. They explicitly emphasize that this uncertainty is both environmentally and organizationally based. The level of uncertainty defines the information processing needs of the organization, which, in turn, guides the selection of an organization structure from a feasible set of alternatives. They also adopt Galbraith's definition of uncertainty. Their primary unit of analysis is the organization subunit.

Tushman and Nadler develop their model using a series of propositions. They cite a stream of research results in support of each of these propositions. The first proposition states:

Three sources of uncertainty are identified: subunit task characteristics, subunit task environment, and inter-unit task interdependencies. Each of these sources is considered in turn.

**Subunit task characteristics**—Tushman and Nadler identify three dimensions on which subunit task characteristics vary. The first is task variability. Non-variable or predictable tasks involve less uncertainty during task execution. Task difficulty is the second dimension. Tasks vary in level of difficulty from routine to complex. Complex tasks are those that are not very well understood and, therefore, involve greater amounts of uncertainty. Intra-unit task interdependence is the third dimension. Tasks that are dependent on performance of other tasks assigned to the subunit also add to the overall uncertainty. Unpredictable, complex, interdependent tasks do not lend themselves to pre-specification and are subject to greater uncertainty in their execution.

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4 The actual term used by Tushman and Nadler [1978] for task variability is task predictability. They also use task complexity for task difficulty. The terms used herein have been changed for consistency with the terms used by Van de Ven and Delbecq [1974]. The terms task predictability (Tushman and Nadler [1978]) and task variability (Van de Ven and Delbecq [1974]) describe the same constructs as used by the original authors, as do the terms task complexity (Tushman and Nadler [1978]) and task difficulty (Van de Ven and Delbecq [1974]).
Tushman and Nadler cite a substantial literature base to support this uncertainty-based approach to task characteristics (Tushman and Nadler [1978] p. 615).

**Subunit task environment**—Tushman and Nadler maintain that this is the least well-defined of the three sources of task uncertainty. They define the task environment as "those external factors which are attended to by the organization" (Tushman and Nadler [1978] p. 616). The environment gives rise to uncertainty because areas outside the organization are not under the organization's control and, therefore, potentially unstable. This environmental instability can be measured on a static/dynamic dimension. The more dynamic the environment, the less effective pre-specified rules and procedures will be because of the existence of greater uncertainty. Again, Tushman and Nadler cite substantial literature support for this dimension of task uncertainty.

**Inter-unit task interdependence**—Tushman and Nadler hold that the existence of this third source of task uncertainty has even broader structural implications for organizations. Inter-unit task interdependence exists where one subunit's task is dependent on the
work of other units, thereby increasing the need for enhanced inter-unit coordination and problem-solving. The greater the extent of inter-unit dependencies, the greater the uncertainty surrounding the execution of the task (Tushman and Nadler [1978] p. 616). Tushman and Nadler adopt Thompson's [1967] classification of interdependent task relationships: pooled, sequential, and reciprocal. Within this classification, complexity and therefore uncertainty, increases as the type of interdependence moves from pooled to sequential to reciprocal.

Tushman and Nadler's second and third propositions are entirely consistent with the Galbraith model. The second and third propositions are as follows:

P2: As work related uncertainty increases, so does the need for increased amounts of information, and thus the need for increased information capacity (Tushman and Nadler [1978] p. 616).

P3: Different organization structures have different capacities for effective information processing (Tushman and Nadler [1978] p. 617).

Tushman and Nadler discuss these propositions in terms of organismic and mechanistic structures.

Organismic organizational structures emphasize lateral, connected patterns of communication. Mechanistic
organizational structures are hierarchical in nature with emphasis on vertical information flow. Organismic structures make better use of feedback, error correction and synthesis of differing viewpoints by incorporating highly developed (connected) lateral communication networks and therefore are capable of processing more information than mechanistic structures. Organismic structures are also characterized by less formality, less attention to rules and regulations and greater peer involvement in decision-making. Each of these characteristics enhances the subunits' ability to deal with increasing amounts of uncertainty (Tushman and Nadler [1978] p. 618).

Tushman and Nadler also adopt Galbraith's five alternative organizing strategies for coping with increasing uncertainty. They refer to these strategies as "coordinating and control mechanisms" (Tushman and Nadler [1978] p. 618). These coordinating and control mechanisms become the means by which the various subunits are linked.

The fourth proposition is also drawn from the Galbraith model. It is stated in two parts:

P4: Organizations will be more effective when there is a match between information processing requirements facing the organization and information processing capacity of the

**P4A:** Due to the alternative modes of achieving integration, the choice of coordinating and control mechanisms will not be deterministic (Tushman and Nadler [1978] p. 621).

Proposition 4 is essentially a static hypothesis. Tushman and Nadler propose that the uncertainty-structure relationship is dynamic. This extension of the Galbraith model is stated by Proposition 5.

**P5:** If organizations (or subunits) face different conditions over time, more effective units will adapt their structures to meet the changed information processing requirements (Tushman and Nadler [1978] p.622).

Proposition 5 implies that changing task and environmental characteristics may render, over time, a previously effective structure inappropriate; hence, the organization or subunit must modify the structure to match the new information processing needs.

### 2.1.4 Task Uncertainty

Van de Ven and Delbecq [1974] conceptualize task uncertainty along two dimensions-task difficulty and task variability. Task difficulty refers to the extent to which there is a known procedure specifying the sequence of steps to be followed in performing the task (Van de Ven and Delbecq
[1974] p.183). Task difficulty appears to be closely related to the concept of task complexity as discussed in the information processing model. The level of task difficulty affects the level of expertise required to successfully complete the task. The greater the difficulty of the task, the greater the amount of expertise required for problem-solving and decision-making (Van de Ven and Delbecq [1974] p.184).

Following the work of Perrow [1967], Van de Ven and Delbecq [1974] state that task variability refers to "the number of exceptional cases encountered in the work requiring different methods or procedures for doing the work" (Van de Ven and Delbecq [1974] p.184). The level of task variability affects the extent to which work activities are systematized or structured.

The conceptualization of task uncertainty adopted for this study is consistent with Tushman and Nadler [1978], with slight extension of the task complexity dimension to encompass Van de Ven and Delbecq [1974]. Table 2.1 contains a summary of task uncertainty used in this study.
Table 2.1 Task Uncertainty Dimensions

<table>
<thead>
<tr>
<th>DIMENSIONS (definition)</th>
<th>DIFFICULTY (refers to the extent to which there is a known procedure specifying the sequence of steps to be followed. [Van de Ven and Delbecq, 1974])</th>
<th>VARIABILITY (refers to the number of exceptional cases. [Van de Ven and Delbecq, 1974])</th>
<th>TASK INTERDEPENDENCE (refers to the extent to which the successful completion of the task is dependent on the completion of other tasks. [Tushman and Nadler, 1978])</th>
<th>INTERUNIT INTERDEPENDENCE (refers to the extent to which the successful completion of the task is dependent on the need for information from or collaboration with other sub-units. [Tushman and Nadler, 1978])</th>
</tr>
</thead>
<tbody>
<tr>
<td>EFFECT</td>
<td>Affects the level of expertise to successfully complete the task. [Van de Ven and Delbecq, 1974])</td>
<td>Affects the extent to which activities may be systematized. [Van de Ven and Delbecq, 1974])</td>
<td>Affects the level of intertask coordination necessary to successfully complete the task. [Tushman and Nadler, 1978])</td>
<td>Affects the level of subunit coordination necessary to complete the task. [Tushman and Nadler, 1978])</td>
</tr>
</tbody>
</table>
2.1.5 Environmental Uncertainty

Despite the fact that environmental uncertainty is an important construct in organizational literature (see, for example, Duncan [1972], Lawrence and Lorsch [1967] and Milliken 1987]) operationalizing the construct has proved troublesome (Downey, Hellriegel and Slocum [1975] and Tosi, Aldag and Storey [1973]). Research has frequently resulted in inconsistent results that have been difficult to interpret (Milliken [1987]). Uncertainty about the state of the environment exists when there is a lack of understanding regarding changes in the components of the environment (Milliken [1987] p. 136).

Duncan [1972] identifies three factors in the external environment that give rise to uncertainty. These factors relate to the competition for customers and suppliers that an entity faces, the socio-political environment in which the entity operates, and the technological requirements of both the company and its industry.

More recently, Milliken [1987] has reexamined perceived environmental uncertainty as a multidimensional rather than a unidimensional construct. He hypothesizes that
environmental uncertainty can be broken down into three types: state, effect and response uncertainty.

Milliken [1987] holds that uncertainty about the state of the environment exists when one does not understand how components of the environment are changing (Milliken [1987] p. 136). Effect uncertainty is defined as "an inability to predict the nature of the impact of environmental events or changes will be on the organization" (Milliken [1987] p. 137). Lastly, response uncertainty is defined as "a lack of knowledge of response options and/or an inability to predict the likely consequences of a response choice" (Milliken [1987] p. 137).

2.1.6 Relationship Between Task and Environmental Uncertainty

Task uncertainty is measured in this study. The relationship between task and environmental uncertainty warrants consideration. In the information processing model, both environmental conditions and nature of the task performed affect the overall level of uncertainty faced by an organization. The model infers that the relationship between task and environmental uncertainty is additive.
In previous studies, in accounting and non-accounting contexts, both environmental and task uncertainty have been included as independent variables (Tushman and Nadler [1979]; Ballew [1982]), and tests of independence were conducted in each case. Pearson correlations were less than .15 and were not statistically significant.

2.2 Task Uncertainty in a CPA Firm Context

The effects of the various dimensions or factors related to task uncertainty must be translated into the context of the CPA firm. The works of Van de Ven and Delbecq [1974] and Tushman and Nadler [1978] provide the theoretical basis for the description of task uncertainty dimensions, as they are included in Table 2.1.

2.2.1 Task Difficulty

Task difficulty affects the level of expertise and/or experience required to successfully complete the task (Van de Ven and Delbecq [1974]). CPA firms serve clients in a variety of industries, many with differing situationally-specific characteristics. Theory suggest that increasing task difficulty should be associated with an increasing need for CPAs with specific expertise or experience depending
upon the specific type of situation. These more experienced professionals generally have higher charge rates for their time. The firm is typically unable to pass all such increased changes to the client. As a result, the percentage of standard charges that the firm would expect to receive, and/or actually receive from the client would be expected to decline. This decline is due to the competitive environment within which the firms operate. A highly competitive environment tends to prevent the firm from passing all increased changes on to the client through increased fees.

2.2.2 Task Variability

Increasing task variability refers to the number of exceptional cases encountered in successfully completing a task and affects the extent to which activities may be systematized (Van de Ven and Delbecq [1974]). Many CPA firm activities are systemized through the use of standardized work programs. For example, in the audit function use of work programs is extensive. Many are standardized in Big Six firms at the firm-level, with modification, where needed, left to the discretion of the individual professional as the tasks are encountered and completed.
Increasing task variability should result in the encountering of more situations where the pre-specified work program cannot be used or where significant modification is necessary. As development of situational specific programs or significant modification of existing programs is required, it is expected that the ability to meet the engagement budget will be reduced. Again in a competitive environment, when these modifications are required and unexpected, the charges that can be passed on to the client (billable charges) will be reduced and will be lower than expected.

2.2.3 Task Interdependence

Task interdependence refers to the extent to which successful completion of the task is dependent on the completion of other tasks and, therefore, affects the level of task coordination necessary to successfully complete the task [Tushman and Nadler, 1978]. When a high level of task interdependence exists, the level of coordination necessary among team members and among the various tasks will increase.

It is expected that as a result of the increased task interdependency, the need to plan a sequencing approach for
completing the tasks in an engagement will increase. While this planning process may indeed be difficult, it becomes critical to the successful completion of the tasks. This process also may be iterative, requiring additional coordination as the sequence of task completion takes place. It is expected that as the level of task interdependence increases, the number of hours devoted to engagement planning will increase.

2.2.4 Interunit Interdependence

Interunit interdependence refers to the extent to which successful completion of the task is dependent on the need for information or collaboration with other subunits. It affects the level of subunit coordination necessary to successfully complete the task (Tushman and Nadler [1978]).

 CPA firms are generally organized into audit, tax and various consulting subunits.5 Personnel assigned to these subunits possess specialized knowledge sometimes needed by

5 While it is commonly known that firms are, in general, organized into these three subunits, individual firms may vary somewhat. All Big Six firms prepare recruiting brochures that describe their specific organizational design. These brochures, along with discussion with numerous of the firms' professional personnel confirm the existence of these organizational subunits.
another subunit to complete tasks successfully. Individuals are frequently designated by the firm as specialists in a particular area, be it along industry or functional lines. It is expected that as interunit interdependence increases, increasing use of firm-designated specialists will be required.

A summarization of the immediately-preceding discussion is presented in Table 2.2. The table also includes a summarization of the operationalization of construct dimensions to be used.

The initial unit of analysis for this study is the individual CPA firm office providing audit, tax and consulting services. Each office has a designated partner-in-charge, as well as partners having overall responsibility for each subunit. Each office is typically considered a profit center by the firm. Each subunit is also a profit center of the office as well as a profit center of the firm-wide audit, tax or consulting practice, as applicable. The individual offices have substantial, but not complete, administrative autonomy. Variation at the office level could be associated with offices' client portfolios. The client portfolios can vary in terms of factors such as industry concentration and size of client. For example, one
<table>
<thead>
<tr>
<th>TASK UNCERTAINTY</th>
<th>DIMENSIONS</th>
<th>DIFFICULTY</th>
<th>VARIABILITY</th>
<th>TASK INTERDEPENDENCE</th>
<th>INTERUNIT INTERDEPENDENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPA FIRM</td>
<td>Affects the level of client/industry situational expertise and/or experience necessary to complete the task.</td>
<td>Affects the degree to which pre-specified standardized work programs may be used effectively.</td>
<td>Affects the level of coordination necessary among subunit team members and among the various tasks.</td>
<td>Affects the need for audit, tax or MAS involvement and/or cooperation with another subunit to complete an engagement.</td>
<td></td>
</tr>
<tr>
<td>OPERATIONAL CONTEXT</td>
<td>Increasing task difficulty is expected to be associated with: 1. Increasing need for experience and expertise. 2. Reduced billable charges as a percent of standard.</td>
<td>Increasing task variability is expected to be associated with: 1. Reduced ability to meet the engagement budget. 2. Lower billable charges than expected</td>
<td>Increasing task interdependence is expected to be associated with: 1. Planning hours as a higher percentage of total hours.</td>
<td>Increasing interunit interdependence is expected to be associated with: 1. Use of EDP specialist 2. Use of other specialist</td>
<td></td>
</tr>
</tbody>
</table>
office concentrates in provision of services (both audit and non-audit) to financial institutions, while another office concentrates in services to national and/or regional retail firms. This variation in client portfolios might cause significant office-level differences.

2.3 Overview of Relevant Auditing Research

Two areas of auditing research are relevant to this study. First, previous research has examined, in a limited way, some components of task uncertainty and the resultant structural implications. Second, researchers have investigated the existence and implications of differences between firms related to varying degrees of structure in audit methodologies. This body of research has produced conflicting results.

2.3.1 Watson [1975]

Watson [1975] reports the results of an exploratory study of the organization of a public accounting firm using a contingency framework. The next subsections contain a summarization of the hypotheses, subjects and methods, and reported results of his study.
2.3.1.1 Hypotheses

Watson develops two research hypotheses. The first hypothesis is:

That the task environment faced by management service project teams exhibits greater uncertainty than the task environment faced by audit project teams (Watson [1975] p. 263).

The second hypothesis states that:

The greater the certainty of the relevant task environment, the more formalized the structure of the project teams (Watson [1975] p. 263).

Watson supports these hypotheses with a priori reasoning within the Lawrence and Lorsch [1967] framework. That framework suggests a static model of organizations. The model elements define an operating cycle consisting of three processes: input, transformation, and output.

Watson argues that the input environment is surrounded by less uncertainty for the audit teams than for consulting service teams. He emphasizes that "all financial accounting systems have substantially the same constraints. Accounting systems are based upon the principle of double-entry bookkeeping, and each system needs to produce financial information acceptable to the investing public, the public accounting profession, and certain governmental agencies" (Watson [1975] p. 260). Watson holds that beyond
specification of the accounting system, the auditors' problem becomes routine. He also points to the repetitive nature of audit engagements as another factor reducing the attendant uncertainty. Watson goes on to state that, in the consulting area, the client problems are unique and, therefore, not well-defined. This uniqueness arises because the problem is dependent on the client's goals, economic conditions, and other unspecified factors.

2.3.1.2 Subjects and Methods

Watson used members from three, three-person audit and three, three-person management advisory service teams as subjects for this study. All subjects were employees of the same major public accounting firm. Each of the eighteen subjects completed a questionnaire. All but one subject also participated in a post-questionnaire interview.

The questionnaire included a series of questions about the input, transformation, and output processes, as well as questions relating to the organizational structure of the subunits. Questions assessing the uncertainty surrounding the input process related to how well the work programs were developed prior to the beginning of field work during the design phase of the engagement. Questions assessing the
uncertainty surrounding the transformation process related to the number of major technical changes occurring in the two areas. Questions assessing the uncertainty surrounding the output stage asked the subjects to quantify the degree of confidence they had that further information would not show their solution to a problem to be inadequate.

Questions addressing the organizational structure of the subunits related to the nature of supervision, the existence of formal rules, and methods of evaluation. To assess the nature of supervision, subjects were asked about the form and frequency of such supervision. To assess the extent of formalization of rules, the subjects were asked how they would change the program design if allowed to do so. Lastly, the subjects were asked to pick the most important evaluation criteria from a listing relevant possibilities.

2.3.1.3 Results

Watson concludes that the evidence from the study supports his first hypothesis. Regarding the development of work programs, Watson concludes that audit work programs are better developed. He states that this "indicates that input and transformation subenvironments are less certain for management services than for auditing" (Watson [1975] p. 38).
Additionally, management services personnel indicated a greater frequency of technical changes than did audit personnel. Watson concludes that this is further evidence of relatively less uncertainty in the audit services transformation process. All statistical tests for differences in the responses between the functional areas were significant for the questions related to the input and the transformation stages.

Watson reports weaker evidence for the output subenvironment. While audit team members were generally more confident in their problem solutions, some differences in question responses were not statistically significant. Additionally, when the consulting team both designed and installed a system, they became relatively more confident of their solution than were audit team members.

Support for the second hypothesis was less conclusive. There was no difference between the two areas in terms of extent or frequency of supervision. Rules were generally considered to be more restrictive in the audit area. While responses indicated that audit and consulting personnel used adaptive behavior, it was more frequently used in the management services area. Use of adaptive behavior allows a
practitioner to adapt to changing circumstances by modifying procedures.

Watson notes that different structural relations develop within consulting and audit teams. He concludes that these differences are consistent with environmental demands that are relatively more unstable for the consulting teams. In discussing the implications of this finding, Watson suggests that the mechanistic/organismic dichotomy may offer a paradigm for investigating structural variation within the public accounting firm.

2.3.2 Ballew [1982]

Ballew [1982] reported the results of research on technological routineness and its resultant structural implications for public accounting firm subunits. The concept of technological routineness is defined as "the extent to which an organization's work processes are repetitive" (Ballew [1982] p.89). Technological routineness and complexity, a component of task uncertainty, are closely related. As routineness increases, complexity and, therefore, task uncertainty decreases.
2.3.2.1 Hypotheses

Ballew uses similar reasoning to that of Watson [1975] to support his first hypothesis. This hypothesis states:

Technological routineness will rank from highest to lowest for audit teams, tax teams, and management advisory services teams, respectively (Ballew [1982] p. 93).

The second hypothesis relates to the degree of bureaucratic structuring of a firm. Bureaucratic structuring refers to the formalization of rules and procedures. The hypothesis is as follows:

Bureaucratic structuring will rank from highest to lowest for audit teams, tax teams, and management advisory service teams, respectively (Ballew [1982] p. 94).

2.3.2.2 Subjects and Methods

Audit, tax and consulting service teams from twenty national, regional and local firms completed a self-administered questionnaire. A total of 196 responses were obtained from the individual team members. All team hierarchical categories (partner, manager, senior and junior staff) were included in the sample.

Scales measuring technological routineness and bureaucratic structuring were adapted from the extant relevant research.
Ballew indicated that all scales used had been shown to exhibit high construct validity through repetition and other validation procedures. The resultant questionnaire measured three components of technological routineness (task variability, task interdependence, and task difficulty) and five components of bureaucratic structuring (hierarchy of authority, participation in decision making, rules and procedures, job specificity, and job codification).

2.3.2.3 Results

The data was analyzed using analysis of variance procedures. The results did not support either of the two hypotheses. The subunits differed significantly (alpha=.05) only for the task variability dimension of the technological routineness variable and only for the job specificity dimension for the bureaucratic structuring variable. Ballew then suggests a possible firm size effect whereby larger CPA firms perform services for more complex clients. Accordingly, the data was re-examined using size as a covariate. The results of the analysis were also non-significant. However, size did have a statistically significant relationship with most of the dimensions of technological routineness and bureaucratic structuring.
Ballew suggests several possibilities as causes of the non-significant research findings. While technological routine and bureaucratic structuring may vary significantly in CPA firms, the variation may manifest itself at some level other than the functionally designated areas of audit, tax and consulting services. He goes on to suggest that engagement size or type may be important factors. Additionally, the level of analysis was the subunit. Other possible levels of analysis exist at the organizational and individual levels. Lastly, public accounting and consulting firms might be truly anomalous organizations for which the expected relationship between technological routine and bureaucratic structuring does not hold. While suggesting this possibility, Ballew states that contingency models, while generally sound, may not be sufficiently refined to adequately describe such unusual work settings.

Observations regarding the Ballew study suggest possible reasons for the lack of significant findings. First, the Ballew study grouped offices of one firm together and tested for differences in technological routine and formalization between subunits of that firm. No test for effects between offices was conducted. Second, while no
differences were found between subunits, Ballew did not examine for differences between service types.

2.3.3 Other Research

Cushing and Loebbecke [1986] and Kinney [1986] found that degree of structure in audit methodology differs across firms. Cushing and Loebbecke [1986] define structured audit methodology as "a systematic approach to auditing characterized by a prescribed logical sequence of procedures, decisions and documentation steps, and by a comprehensive and integrated set of audit policies and tools designed to assist the auditor in conducting the audit" [p. 32].

The Cushing and Loebbecke and Kinney studies spurred further research regarding the movement of some audit firms to more structured methodologies. Differences in degree of audit structure suggest that, consistent with Tushman and Nadler's [1978] information processing theory, large CPA firms adopt different organizational structures in response to different information processing needs (levels of task uncertainty). A brief review of research regarding differing methodological structures provides evidence that these
differences are associated with changes in certain auditor judgements as well as organizational structure changes.

Results of research regarding the relationship between audit structure and audit judgment have been somewhat contradictory. Increased level of audit structure was found to be positively related to judgment consensus regarding materiality judgments (Morris and Nichols [1988]), but, unrelated to consensus regarding sample size (Bamber and Snowball [1988]). After controlling for client risk profiles, Mutchler and Williams [1989] found no apparent differences in the going-concern opinion decision across Big-Eight accounting firms, but did find a negative correlation between decision accuracy and audit structure.

Other research results indicate that audit seniors from structured firms perceived greater formalization of rules and communication adequacy and that audit seniors from unstructured firms perceived greater role stress (Bamber, Snowball and Tubbs [1989]). The effect of audit structure on audit delay has been examined with conflicting results. Ashton and Newton [1989] found no relationship between level of audit structure and audit delay, while Williams and Dirsmith [1988] found a significant increase in audit delay
for unstructured firms when earnings were more than 10% below expectations.

Kaplan, Menon and Williams [1990] found evidence that no single audit structure provides audit efficiencies across all client environments. They found increased (decreased) levels of audit structure to be associated with static (dynamic) client environments.

2.4 Implications for the Current Study

In summary, previous organizational research provides a framework to describe the components of uncertainty in organizations such as public accounting firms. However, previous research regarding uncertainty in CPA firms has not adequately considered the appropriate unit of analysis. This lack of specification regarding unit of analysis offers one possible explanation for the conflicting results. The implication for this study is that unit of analysis needs to be carefully specified. As discussed earlier in this chapter, if variation occurs at a level lower than the individual firm, auditing researchers would need to design their tests to be conducted at the office level.
The individual office will be the unit of analysis for this study. Testing for variation between service types within an office of the same firm and between offices of the same firm needs to be conducted before considering further research across firms. Grouping of offices to examine firm-level differences is only appropriate if variation between service types is the same across offices.
Chapter 3
Research Methods

3.1 Introduction

The objectives of this chapter are to describe measures and means of data collection used, state research hypotheses and describe research methods used to empirically examine hypotheses. Dependent and classification measures used in this study are described in the second section of this chapter. Data collection methods are described in the third section, while formal research hypotheses are presented in the fourth section. The fifth section contains a discussion of statistical analysis methods applied to the data to test each research hypothesis.
3.2 Research Measures

Operationalizing the theoretical constructs described in Chapter 2 required development of several dependent variables. Table 2.2 included a summarization of the operationalization of the dependent variables. This section describes how each dependent, as well as two classification variables, were measured.

3.2.1 Dependent Measures

Construct measurement for the four dimensions of task uncertainty followed the operationalization of the dimensions outlined in Chapter 2. Primary goals of the identification process were to: (1) develop measures that could be identified, located and collected from time and expense workpapers or other job administration records of a CPA firm to ensure data availability, (2) develop measures applicable to all three subunits, (3) develop measures that were scaled to meet requirements of an acceptable statistical analysis method, and (4) within constraints imposed by the first three goals, develop multiple measures for each dimension, if possible. The process of developing the measures began by using the theoretical constructs translated into a CPA firm context in Chapter 2. In

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addition to the eight measures finally adopted, two other possible measures were considered and rejected because one or more of the constraints described in the preceding paragraph were violated.

Rejected measures related to evaluation of internal control structure, and whether the engagement was recurring or nonrecurring. The measure related to internal control structure failed to meet the second criterion. Internal control structure evaluation is only applicable to the audit function. The measure related to whether the engagement was recurring or nonrecurring was rejected because it failed to meet the third criterion.

Measures were identified through a process of deductive reasoning followed by subsequent discussion with other academicians and professional personnel from several CPA firms. A description of the final eight measures developed for each dimension follows.

3.2.1.1 Task Difficulty

Increasing levels of task difficulty were expected to be associated with an increasing need for experience and expertise and with a reduction in billable charges as a
percent of the firm's standard charges. Three measures were developed for this dimension.

Percent of Standard Expected - During the engagement budgeting process, engagement personnel develop estimates of the percentage of standard charges that will ultimately be billable to and collectible from the client. This variable is measured on a ratio scale and the percentage is included on the engagement time summary. A lower percent of standard expected indicates a higher level of task difficulty.

Percent of Standard Attained - The actual percentage of standard charges billed is calculated and recorded on the engagement time summary. Again, it is measured on a ratio scale. A lower percent of standard attained indicates a higher level of task difficulty.

Weighted Average Number of Years' Experience - The engagement time records include names of individuals assigned to the engagement. By obtaining individuals' date of employment, and subsequently calculating each individual's total number of years' experience, a weighted average number of years' experience assigned to the engagement could be calculated. The variable is
measured on an continuous scale. A higher weighted average number of years' experience indicates a higher level of task difficulty.

Data related to the first two variables was collected from the firm's time and billing records. All data was rounded to one decimal place, consistent with treatment in the firm's records. Data related to the third variable was collected from the firm's personnel records. Number of years' experience was given in whole years. The resultant weighted averages were rounded to one decimal place.

3.2.1.2 Task Variability

Increasing task variability was expected to be associated with reduced ability to meet the engagement budget and lower billable charges than expected. Two measures for task variability were developed.

Percent of Standard Attained/Percent of Standard Expected -This variable is measured on a ratio scale. It represents a relative measure, across engagements, of success in achieving or surpassing original profitability expectations. Engagement profitability is primarily a function of time to complete the
engagement coupled with the experience levels assigned to the engagement. A lower percent of standard attained/percent of standard expected ratio indicates a higher level of task variability.

Budgeted Hours/Actual Hours - This variable, while similar to the first variability measure, is calculated using hours only, and is, therefore, a relative measure of success in achieving or exceeding original budget expectations. Again, this variable is measured on a ratio scale. A lower budgeted hours/actual hours ratio indicates a higher level of task variability.

Data related to both measures were collected from the firm's time and billing records. The data was rounded to one decimal place, consistent with treatment in firm records.

3.2.1.3 Task Interdependence

Despite the desire to have multiple measures for each dimension, only one feasible measure of task interdependence could be identified through the process of logical deduction. Increasing task interdependence was expected to be associated with increased need to plan an engagement
because an appropriate approach to completing one task is dependent on the performance of other tasks.

Planning/Total Hours - Engagement time records include a category for hours devoted to engagement planning. A ratio scale was developed by dividing this amount by actual hours needed to complete the engagement. A higher planning/total hours ratio indicates a higher level of task interdependence.

Data related to this measure was collected from the firm's time and billing records. The data was rounded to one decimal place, consistent with treatment in firm records.

3.2.1.4 Interunit Interdependence

Increasing interunit interdependence was expected to be associated with increasing use of firm-designated specialists. While firms typically use several types of specialist designations, only one type, EDP specialist, was uniquely identified for this study. As a result, two measures were developed.

EDP Specialist Hours/Total Hours - Individuals listed on time records as having worked on an engagement were
either designated as firm EDP specialists or not. This ratio scale was calculated by dividing total hours spent on the engagement by EDP specialists by total hours needed for the engagement. A higher EDP specialist hours/total hours ratio indicates a higher level of interunit interdependence.

Other Specialist Hours/Total Hours - All other specialist hours was divided by total hours to develop this ratio scaled measure. A higher other specialist hours/total hours ratio indicates a higher level of interunit interdependence.

Data related to these measures were collected from the firm's time and billing records. The data was rounded to one decimal place, consistent with treatment in firm records. Table 3.1 contains a summarization of dependent measures used and the primary associated dimension of task uncertainty.

3.2.2 Classification Variables

Two classification variables were examined in this study. A description of each variable follows.
Table 3.1 Task Uncertainty Measures

<table>
<thead>
<tr>
<th>Measure</th>
<th>Type of Scale</th>
<th>Primary Associated Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent of Standard Charges Expected to be Collected</td>
<td>ratio (0-100%)</td>
<td>Task Difficulty</td>
</tr>
<tr>
<td>Percent of Standard Charges Collected (Attained)</td>
<td>ratio (0-100%)</td>
<td>Task Difficulty</td>
</tr>
<tr>
<td>Weighted Average Number of Years' Experience of Personnel Actually Assigned to the Engagement</td>
<td>continuous (0-10+)</td>
<td>Task Difficulty</td>
</tr>
<tr>
<td>Percent of Standard Attained/Percent of Standard Expected</td>
<td>ratio (0-100%)</td>
<td>Task Variability</td>
</tr>
<tr>
<td>Budgeted hours/Actual Hours Needed for Engagement</td>
<td>ratio (0-100%)</td>
<td>Task Variability</td>
</tr>
<tr>
<td>Planning Hours/Actual Hours Needed for Engagement</td>
<td>ratio (0-100%)</td>
<td>Task Interdependence</td>
</tr>
<tr>
<td>EDP Specialist Hours/Actual Hours Needed for Engagement</td>
<td>ratio (0-100%)</td>
<td>Interunit Interdependence</td>
</tr>
<tr>
<td>Other Specialist Hours/Total Hours</td>
<td>ratio (0-100%)</td>
<td>Interunit Interdependence</td>
</tr>
</tbody>
</table>
3.2.2.1 Office Variable

The office performing the services for a client was employed as one classification variable. Inclusion of this variable permitted examination of preliminary research questions related to possible differences within a given CPA firm. This variable involved two levels, representing two offices (hereafter Office 1 and Office 2), that participated in the study.

The offices were part of the same Big Six professional services firm and were located in large, metropolitan areas in the eastern United States. It was considered necessary to use large offices to ensure that a reasonable number of engagements would be available. Further discussion of data collection methods will be presented in the next section.

3.2.2.2 Service Type Variable

Type of service provided was included as the second classification variable. Inclusion of this variable permitted examination of the primary research question related to the effect(s) of differing service types on levels of task uncertainty.
This variable consists of four levels, representing four service types; audits of financial statements, tax services including tax planning and compliance services, general business consulting, and consulting related to actuarial and employee benefits issues. Data collection considerations, such as availability within the participating firm and firm organization, limited the number and type of consulting services that could be used as sources for data collection. These will be discussed further in the fourth section of this chapter.

3.3 Hypotheses

As described in the fifth section of Chapter 1, there is one preliminary research question and one primary research question addressed in this study. The three research hypotheses are taken directly from these research questions. Hypotheses 1 and 2 address the preliminary research question related to intra-firm effects, while Hypothesis 3 addresses the primary research question related to differences in levels of task uncertainty associated with different types of services. The formal statement of each hypothesis, in null form, follows.
Ho1: The effects of service type on level of task uncertainty do not vary by office.

Examination of this hypothesis tests for a possible interaction between previously defined classification measures, service type and office. Figure 3.1 presents this hypothesis in notational form. If such an interaction exists, further data analysis would need to consider these interactive effects. If no interaction exists, data analysis can proceed with examination of the main effects of the two classification variables.

Ho2: For a given service type, level of task uncertainty does not vary by office.

The second hypothesis tests directly for a main effect related to the office performing the service. Chapter 2 contains a discussion of previous auditing research studies that have assumed that the individual firm is the appropriate level for examination. The results of the tests of Hypothesis 2 will suggest whether firms systematically vary at an intrafirm, or office, level. Again, rejection of Hypothesis 1 would render this hypothesis moot for analysis purposes.
$H_0: \begin{bmatrix} \mu_{1,1} \\ \mu_{2,1} \\ \vdots \\ \mu_{p,1} \end{bmatrix} = \begin{bmatrix} \mu_{1,2} \\ \mu_{2,2} \\ \vdots \\ \mu_{p,2} \end{bmatrix} = \cdots = \begin{bmatrix} \mu_{1,k} \\ \mu_{2,k} \\ \vdots \\ \mu_{p,k} \end{bmatrix}$

where:

$\mu_{p,k} =$ group centroids (mean vectors) for $p$ dependent variables (task uncertainty dimensions after data reduction) and $k$ classification groups (participating offices times identified service types)

or restated:

$H_0: \quad$ All the group centroids (mean vectors) are equal.

$H_1: \quad$ At least one group centroid (mean vector) is different.

**FIGURE 3.1-HYPOTHESIS 1**
Failure to reject Ho2, that is, finding no statistically significant differences between offices, would suggest that the assumption made by previous researchers regarding the appropriate level of analysis when investigating auditing research questions was correct. Previous research has focused on firm-level differences, but the assumption that variation does not occur at some level other than the firm has not been tested. Additionally, rejection of either Hypothesis 1 or 2 would render the analysis of hypothesis three moot.

Ho3: For a given office, level of task uncertainty does not vary by service type.

Examination of Hypothesis 3 tests the primary research question. It is expected that different CPA firm services are associated with different levels of task uncertainty. If significant differences are found between services types on the eight dependent variables for either participating office's audit, tax, general business consulting, or actuarial and employee benefits consulting services, this hypothesis will be rejected.
3.4 Data Collection

Contact with the firm that provided assistance with this study was made through an audit partner in one participating office. He became the liaison with all other units to facilitate data collection. Several meetings were held with this partner, representatives of other subunits and the researcher. These meetings were held to elicit cooperation of other subunits, explain the research being conducted, determine availability of and explain the nature of data needed. Additionally, the coordinating partner reviewed the research proposal and proposed data to be collected to enhance his understanding of the project and thereby enhance the integrity of the data ultimately collected.

The participating firm is organized along both functional and industry lines. Audit and tax units of the firm are organized to provide services over a broad range of clients and are, therefore, organized along functional lines.

Consulting services units are organized in two ways. Certain consulting services are organized to provide services of a certain type, for example consulting related to actuarial and employee benefits, to clients across industries. One such unit, Actuarial and Benefits Consulting
(hereafter "ABC"), was one unit that agreed to participate in this study. Other consulting units are organized by industry. For example, a distinct consulting unit provides general management consulting to the health care industry. Another such unit provides a range of services to the utilities industry. Services provided by this unit include consultation regarding rate negotiation with state regulatory boards, plant construction permit application, and general management consulting. The Utilities Consulting (hereafter "UC") unit also agreed to participate in this study. This unit was used to collect data related to general management consulting and business advice.

As expected, both audit and tax services are provided and coordinated through multiple offices. Most consulting units provide services on a nationwide basis from one office. ABC and UC services were provided and coordinated from one office in the participating firm. This office was also one of the offices providing data related to audit and tax services.

The issue regarding organization of the service units is significant to the research. Because consulting services are provided and coordinated through a single office, the a priori reasons to test for intrafirm effects were rendered
 moot. While the data were not affected, the analysis was affected. The statistical analysis methods are discussed in the fifth section of this chapter.

Data collection commenced at Office 1. Engagements for all four participating units were selected from a listing of activity to date for the fiscal year ended September 30, 1991. This report listed all engagements by engagement partner's unique personnel number, so that other factors such as engagement size and industry did not bias the sample. Only engagements completed prior to September 30, 1991 were included and all engagements selected were completed entirely within that fiscal year. This record was obtained from administrative accounting records of the firm. All information needed was contained on this record, other than the employment dates for accountants/consultants working on the engagement. These dates were extracted from human resources records.

Audit and tax engagements were selected randomly using a systematic sampling technique. After consultation with the coordinating partner, it was decided that only engagements in excess of 250 hours would be included, due to concerns regarding the integrity of budget expectation and planning time information for smaller engagements. Following this
procedure, ten audit and ten tax engagements were selected from Office 1.

ABC and UC engagements were also selected from Office 1. For the ABC unit, all engagements meeting the aforementioned criteria were selected. Selection of all engagements over 250 hours was necessary to produce ten engagements for analysis. Similarly, for the UC unit, a systematic sampling technique was used to select engagements. Subsequently, those engagements not representing general management consulting were eliminated, again resulting in ten selections from that unit.

Data from the selected engagements was extracted from appropriate records entirely by the researcher. An Engagement Data Sheet (see Appendix A) was developed and used to facilitate the collection process. The coordinating partner assisted by reviewing the data sheet for appropriateness, given his knowledge of the firm's billing and time-management records.

After completion of data collection, the individual Engagement Data Sheets were returned to the coordinating partner for distribution to either the primary partner or manager assigned to the engagement for his/her review. This
review process was undertaken to ensure reliability of data collected. After partner/manager review, data sheets were returned to the researcher. No changes to the data as collected were noted.

Subsequently, data was collected by the researcher from Office 2. Data selection criteria and methods were the same as those described previously. Only audit and tax engagements were selected from Office 2. A final sample of ten audit and ten tax engagements was obtained. Again, after completion of the collection process, data was reviewed for appropriateness by a partner or manager assigned to the engagement. No changes to the data were noted.

3.5 Statistical Analyses

Several statistical methods were used to analyze the data. The analysis directed toward the preliminary research question (Hypotheses 1 and 2) proceeded similarly, but separately, from analysis directed toward the primary research question (Hypothesis 3).

All statistical analyses conducted in this study were performed using PC-SAS (SAS, 1985). Specifically, PROC GLM
using the MANOVA option was used to compute all requisite statistics. The remainder of this section describes testing of each research hypothesis, including examination of relationships among dependent variables and the subsequent analysis that followed hypothesis testing.

Three separate data sets were constructed using SAS. One set included data from Office 1 and Office 2 (DS-1) audit and tax engagements. This data set was used in statistical analysis of Hypotheses 1 and 2 as described later. The second data set (DS-2) included Office 1 audit and tax data and data related to the two consulting service types. The last data set (DS-3) included Office 2 audit and tax data and data related to the two consulting service types. Data sets DS-2 and DS-3 were used in analysis of the third (primary) research hypothesis.

3.5.1 Hypothesis 1

A 2X2 multiple analysis of variance (MANOVA) was conducted on the DS-1 data using Office 1 and Office 2 as the two levels of one classification variable. Audit and tax services were the two levels of the second classification variable. The first hypothesis was tested by examining the data for a statistically significant (alpha=.05) interaction
between classification variables. If no significant interaction exists, the null hypothesis cannot be rejected.

3.5.2 Hypothesis 2

Hypothesis 2 tests for significant main effects of the 'office' classification variable. The significance of main effects can be assessed using the same MANOVA conducted on DS-1. Subsequent interpretation of the results were contingent on testing Hypothesis 1.

3.5.3 Hypothesis 3

Two 1X4 MANOVA's (one for Office 1 and one for Office 2) were conducted using data in DS-2 and DS-3. Four levels of the 'service type' classification variable represent audit, tax, ABC, and UC services.

3.5.4 Dependent Variable Relationships

Tests were conducted to determine relationships existing among the eight dependent variables. Task uncertainty was described in Chapter 2 along four dimensions. By examining partial correlations from the sum-of-squares cross products
(SSCP) matrices for significance, relationships can be described and validity of the measures assessed.

3.5.5 Subsequent Analysis

Analysis of significant MANOVAs focuses on determining the relative effect of the eight dependent variables in contributing to the significant results. Step-down analysis was used. Step-down analysis is a form of analysis of covariance in which classification variables are entered in a specific order, thereby testing the relative contribution of each (Bray and Maxwell [1985]).

The step-down procedures were conducted using the REGWF option in SAS. REGWF controls for Type I error rate and is preferable to multiple univariate tests. The initial step-down F and a univariate F are identical. Subsequent steps with the step-down procedure are carried out with the first or preceding classification variable removed (covaried) (Bray and Maxwell [1985]).

3.6 Summary

Methods used to examine research questions presented in Chapter 1 have been outlined in this chapter. Data were
collected related to eight dependent variables for four types of CPA firm services: audit, tax, actuarial and benefits consulting, and general management consulting. Dependent measures were defined and the data collection process outlined. Specific research hypotheses were defined. The chapter concluded with a description of statistical analysis techniques and methods used including multiple analysis of variance and subsequent step-down procedures. Research results are presented in the next chapter.
Chapter 4
Research Results

4.1 Introduction

In previous chapters, a discussion of the theoretical dimensions of task uncertainty and a description of the research hypotheses, along with data collection and statistical analysis methods used to test hypotheses, are presented. The results of empirical tests of hypotheses are contained in this chapter.

This chapter is organized as follows. In the next section, descriptive statistics about the data are presented. The third section includes an analysis of the relationships among the dependent variables. Results of specific tests of research hypotheses are presented in the fourth section, and
subsequent analyses applied to the data are discussed in the fifth section. Finally, the last section of the chapter includes a summary of research results.

4.2 Descriptive Statistics

Table 4.1 shows the mean size and standard deviation of engagements sampled. Mean size, in terms of hours, of engagements ranged from a high of 1,486.6 hours for audit engagements at Office 1 to a low of 447.7 hours for Office 2 tax engagements. Overall, tax and consulting engagements were smaller than audit engagements selected. Audit and utilities consulting engagements exhibited greater relative variability, as measured by the standard deviation, than did tax or actuarial and benefits consulting engagements. Discussions with the coordinating partner and a partner or manager from each subunit indicated that engagement sizes and variation therein are representative of the individual subunit's client portfolio.

Tables 4.2, 4.3 and 4.4 list cell means and standard deviations on the eight dependent variables for each level of the classification variables. Reference to cell means and standard deviations will facilitate discussion of post-hoc tests later in this chapter.
<table>
<thead>
<tr>
<th></th>
<th>Off 1 Audit n=10</th>
<th>Off 1 Tax n=10</th>
<th>Off 2 Audit n=10</th>
<th>Off 2 Tax n=10</th>
<th>ABC n=10</th>
<th>UC n=10</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mean</strong></td>
<td>1309.6 hours</td>
<td>600.9 hours</td>
<td>1014.9 hours</td>
<td>447.7 hours</td>
<td>458.9 hours</td>
<td>650.6 hours</td>
</tr>
<tr>
<td><strong>Standard Deviation</strong></td>
<td>1486.6 hours</td>
<td>499.2 hours</td>
<td>742.2 hours</td>
<td>254.8 hours</td>
<td>169.5 hours</td>
<td>419.6 hours</td>
</tr>
<tr>
<td><strong>High</strong></td>
<td>5063.3 hours</td>
<td>1787.5 hours</td>
<td>2868.7 hours</td>
<td>1039.1 hours</td>
<td>835.7 hours</td>
<td>1770.0 hours</td>
</tr>
<tr>
<td><strong>Low</strong></td>
<td>394.3 hours</td>
<td>250.0 hours</td>
<td>322.4 hours</td>
<td>250.0 hours</td>
<td>278.9 hours</td>
<td>275.0 hours</td>
</tr>
</tbody>
</table>
Table 4.2
Cell Means/Standard Deviations for Office 1 Audit and Tax

<table>
<thead>
<tr>
<th>Dep Var</th>
<th>Description</th>
<th>Office 1 Audit</th>
<th>Office 1 Tax</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Percent of Standard Charges</td>
<td>69.1%/10.9</td>
<td>69.0%/14.9</td>
</tr>
<tr>
<td></td>
<td>Expected to be Collected</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Percent of Standard Charges</td>
<td>59.5%/20.1</td>
<td>59.4%/18.2</td>
</tr>
<tr>
<td></td>
<td>Collected (Attained)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Weighted Average Number of Years' Experience Assigned to the Engagement</td>
<td>4.4%/1.3</td>
<td>2.9%/1.3</td>
</tr>
<tr>
<td></td>
<td>(years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Percent of Standard Charges Attained/Percent of Standard Charges Expected</td>
<td>84.5%/21.7</td>
<td>85.8%/19.2</td>
</tr>
<tr>
<td></td>
<td>(years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Budgeted Hours/Actual Hours Complete Engagement</td>
<td>72.9%/16.3</td>
<td>77.2%/14.3</td>
</tr>
<tr>
<td>6</td>
<td>Planning Hours/Actual Hours Needed to Complete Engagement</td>
<td>9.0%/3.9</td>
<td>5.2%/3.4</td>
</tr>
<tr>
<td>7</td>
<td>EDP Specialist Hours/Actual Hours Needed to Complete Engagement</td>
<td>2.7%/8.0</td>
<td>0.0%/0.0</td>
</tr>
<tr>
<td>8</td>
<td>Other Specialist Hours/Actual Hours Needed to Complete Engagement</td>
<td>4.6%/6.8</td>
<td>1.3%/4.0</td>
</tr>
</tbody>
</table>
Table 4.3
Cell Means/Standard Deviations for Office 2 Audit and Tax

<table>
<thead>
<tr>
<th>Dep Var</th>
<th>Description</th>
<th>Office 2 Audit</th>
<th>Office 2 Tax</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Percent of Standard Charges Expected to be Collected</td>
<td>56.5%/22.4</td>
<td>72.5%/18.9</td>
</tr>
<tr>
<td>2</td>
<td>Percent of Standard Charges Collected (Attained)</td>
<td>52.9%/23.1</td>
<td>62.7%/26.6</td>
</tr>
<tr>
<td>3</td>
<td>Weighted Average Number of Years' Experience Assigned to the Engagement</td>
<td>5.1/1.1 (years)</td>
<td>5.4/2.7 (years)</td>
</tr>
<tr>
<td>4</td>
<td>Percent of Standard Charges Attained/Percent of Standard Charges Expected</td>
<td>94.9%/18.4</td>
<td>83.5%/37.9</td>
</tr>
<tr>
<td>5</td>
<td>Budgeted Hours/Actual Hours Needed to Complete Engagement</td>
<td>84.8%/16.0</td>
<td>75.7%/22.1</td>
</tr>
<tr>
<td>6</td>
<td>Planning Hours/Actual Hours Needed to Complete Engagement</td>
<td>10.7%/4.6</td>
<td>8.2%/5.5</td>
</tr>
<tr>
<td>7</td>
<td>EDP Specialist Hours/Actual Hours Needed to Complete Engagement</td>
<td>5.6%/11.2</td>
<td>0.0%/0.0</td>
</tr>
<tr>
<td>8</td>
<td>Other Specialist Hours/Actual Hours Needed to Complete Engagement</td>
<td>14.5%/28.8</td>
<td>21.5%/34.0</td>
</tr>
</tbody>
</table>
Table 4.4
Cell Means/Standard Deviations for ABC and UC Services

<table>
<thead>
<tr>
<th>Dep Var</th>
<th>Description</th>
<th>ABC</th>
<th>UC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Percent of Standard Charges Expected to be Collected</td>
<td>68.0%/6.3</td>
<td>80.0%/7.5</td>
</tr>
<tr>
<td>2</td>
<td>Percent of Standard Charges Collected (Attained)</td>
<td>56.7%/13.9</td>
<td>77.1%/12.5</td>
</tr>
<tr>
<td>3</td>
<td>Weighted Average Number of Years' Experience</td>
<td>6.0%/1.2</td>
<td>6.2%/3.0</td>
</tr>
<tr>
<td></td>
<td>Assigned to the Engagement (years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Percent of Standard Charges Attained/Percent of Standard Charges Expected</td>
<td>83.5%/18.7</td>
<td>97.0%/17.1</td>
</tr>
<tr>
<td>5</td>
<td>Budgeted Hours/Actual Hours Complete Engagement</td>
<td>59.0%/17.6</td>
<td>91.9%/16.1</td>
</tr>
<tr>
<td>6</td>
<td>Planning Hours/Actual Hours Needed to Complete Engagement</td>
<td>4.1%/1.5</td>
<td>1.8%/3.0</td>
</tr>
<tr>
<td>7</td>
<td>EDP Specialist Hours/Actual Hours Needed to Complete Engagement</td>
<td>3.0%/6.5</td>
<td>0.0%/0.0</td>
</tr>
<tr>
<td>8</td>
<td>Other Specialist Hours/Actual Hours Needed to Complete Engagement</td>
<td>0.0%/0.0</td>
<td>0.0%/0.0</td>
</tr>
</tbody>
</table>
4.3 Dependent Variables

The discussion in Chapter 2 relating to the theoretical consideration of task uncertainty suggested that this construct could be described along the four dimensions of difficulty, variability, task interdependence, and interunit interdependence. Measures of these four dimensions were developed. An examination of the partial correlation coefficients from the sum-of-squares cross-products (SSCP) matrix provides insight into the validity of the measures developed.

4.3.1 Dependent Variable Relationships

Tables 4.5, 4.6, and 4.7 list the partial correlation coefficients and related p-values for the three data sets (DS-1, DS-2, and DS-3). Analysis of these correlations begins with a discussion of the expected relationships. Actual findings that were consistent across data sets are described, followed by discussion of differences among the three data sets. Because this is an exploratory study, an alpha = .05 level of significance will be used in all data analysis. Use of alpha = .05 is both customary and conservative.
Table 4.5

Partial Correlations from Sum of Squares Cross Products Matrix/prob > r:
Data Set 1-Office 1 Audit v. Office 1 Tax v. Office 2 Audit v. Office 2 Tax

<table>
<thead>
<tr>
<th>Dep Var</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
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<td></td>
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<tr>
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<td>.74/</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>.0001</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>.05/</td>
<td>.28/</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>.79</td>
<td>.09</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>.05/</td>
<td>.67/</td>
<td>.38/</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>.77</td>
<td>.001</td>
<td>.02</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>.43/</td>
<td>.61/</td>
<td>.19/</td>
<td>.47/</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>.07</td>
<td>.001</td>
<td>.25</td>
<td>.0004</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>.13/</td>
<td>-.11/</td>
<td>.29/</td>
<td>-.35/</td>
<td>.04/</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>.45</td>
<td>.53</td>
<td>.08</td>
<td>.03</td>
<td>.84</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>.24/</td>
<td>.10/</td>
<td>-.08/</td>
<td>-.09/</td>
<td>.06/</td>
<td>.10/</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>.15</td>
<td>.54</td>
<td>.62</td>
<td>.60</td>
<td>.73</td>
<td>.55</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>-.29/</td>
<td>-.13/</td>
<td>-.12/</td>
<td>.22/</td>
<td>-.01/</td>
<td>-.01/</td>
<td>.07/</td>
<td></td>
</tr>
<tr>
<td></td>
<td>.08</td>
<td>.47</td>
<td>.50</td>
<td>.95</td>
<td>.95</td>
<td>.66</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Key:
1= Percent of Standard Charges Expected to be Collected
2= Percent of Standard Charges Collected (Attained)
3= Weighted Average Number of Years' Experience Assigned to the Engagement
4= Percent of Standard Charges Attained/Percent of Standard Charges Expected
5= Budgeted Hours/Actual Hours Needed to Complete Engagement
6= Planning Hours/Actual Hours Needed to Complete Engagement
7= EDP Specialist Hours/Actual Hours Needed to Complete Engagement
8= Other Specialist Hours/Actual Hours Needed to Complete Engagement
Table 4.6

Partial Correlations from Sum of Squares Cross Products Matrix/prob > r:
Data Set 2-Office 1 Audit v. Office 1 Tax v. ABC v. UC

<table>
<thead>
<tr>
<th>Dep Var</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>2</td>
<td>.59/ .0001</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>3</td>
<td>-.16/ .36</td>
<td>-.05/ .75</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>4</td>
<td>.11/ .52</td>
<td>.86/ .0001</td>
<td>.034/ .84</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>5</td>
<td>.24/ .16</td>
<td>.548/ .0004</td>
<td>.11/ .50</td>
<td>.50/ .002</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>6</td>
<td>-.21/ .21</td>
<td>-.25/ .15</td>
<td>.17/ .31</td>
<td>-.23/ .18</td>
<td>.08/ .65</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>7</td>
<td>.04/ .79</td>
<td>-.06/ .74</td>
<td>-.08/ .64</td>
<td>-.09/ .67</td>
<td>-.17/ .30</td>
<td>.10/ .57</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>8</td>
<td>-.10/ .57</td>
<td>-.05/ .75</td>
<td>.05/ .76</td>
<td>-.02/ .93</td>
<td>.08/ .65</td>
<td>.47/ .003</td>
<td>.07/ .70</td>
<td>—</td>
</tr>
</tbody>
</table>

Key:
1= Percent of Standard Charges Expected to be Collected
2= Percent of Standard Charges Collected (Attained)
3= Weighted Average Number of Years’ Experience Assigned to the Engagement
4= Percent of Standard Charges Attained/Percent of Standard Charges Expected
5= Budgeted Hours/Actual Hours Needed to Complete Engagement
6= Planning Hours/Actual Hours Needed to Complete Engagement
7= EDP Specialist Hours/Actual Hours Needed to Complete Engagement
8= Other Specialist Hours/Actual Hours Needed to Complete Engagement
Table 4.7

Partial Correlations from Sum of Squares Cross Products Matrix/\text{prob > r}: Data Set 3-Office 2 Audit v. Office 2 Tax v. ABC v. UC

<table>
<thead>
<tr>
<th>Dep Var</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>_</td>
<td>_</td>
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<td>.28/ .09</td>
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<td>.66/ .001</td>
<td>.30/ .07</td>
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<td>.25/ .14</td>
<td>.53/ .008</td>
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<td>.13/ .46</td>
<td>.24/ .16</td>
<td>-.22/ .19</td>
<td>.07/ .67</td>
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<td>.12/ .47</td>
<td>-.07/ .69</td>
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<td>.13/ .45</td>
<td>.15/ .38</td>
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<tr>
<td>8</td>
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<td>-.13/ .44</td>
<td>.08/ .62</td>
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<td>-.02/ .89</td>
<td>-.07/ .67</td>
<td>-.09/ .60</td>
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</tr>
</tbody>
</table>

Key:
1= Percent of Standard Charges Expected to be Collected
2= Percent of Standard Charges Collected (Attained)
3= Weighted Average Number of Years’ Experience Assigned to the Engagement
4= Percent of Standard Charges Attained/Percent of Standard Charges Expected
5= Budgeted Hours/Actual Hours Needed to Complete Engagement
6= Planning Hours/Actual Hours Needed to Complete Engagement
7= EDP Specialist Hours/Actual Hours Needed to Complete Engagement
8= Other Specialist Hours/Actual Hours Needed to Complete Engagement
Statistically significant correlations were expected among the first three dependent variables, those being the variables to measure task difficulty, and between the two variables (4 and 5) measuring task variability, and between the two variables (7 and 8) measuring interunit interdependence. As expected, the correlation between variables 1 and 2 (percent of standard expected and percent of standard attained) was highly significant, as was the correlation between variables 4 and 5 (standard attained/standard expected and budget/actual hours). Variable 3 (experience) did not correlate with either of the other difficulty measures, nor did variables 7 and 8 (EDP specialist hours/total hours and other specialist hours/total hours). These findings are consistent across the three data sets.

It should be noted that the results related to variables 7 and 8 are driven largely by the limited, and in some cases, absence of specialist usage by non-audit subunits. A review of Tables 4.2, 4.3 and 4.4 shows that no EDP specialists were used on any tax engagements nor on any UC engagements. Additionally, neither ABC nor UC made use of any other type of specialist.
The correlations between variable 2 and variables 4 and 5 were significant. This suggests that the difficulty and variability dimensions of task uncertainty, as described by Van de Ven and Delbecq [1974] are not independent. Indeed, Van de Ven and Delbecq [1974] suggest that these dimensions may be related in that exceptional cases encountered in the performance of a task (variability) may also require additional expertise to successfully complete the task. The information processing model of Galbraith [1973, 1977] and Tushman and Nadler [1978] also suggests interrelationships between the dimensions.

The foregoing results suggest that the dependent variables developed to measure task difficulty and task variability (1 through 5 on Table 3.1) are not independent of one another and therefore, further analysis of the data should be conducted in terms of one dimension (difficulty/variability). Additionally, significance of variable 3 (experience) is unclear. Experience was correlated with another difficulty/variability measure 4 only in DS-2 (Office 1 audit and tax, ABC, and UC).

No other statistically significant correlations exist that are consistent across the three data sets. Only three additional significant correlations were found. Each was
found in only one of the three data sets and no data set contained more than one of these significant correlations. Variables 6 and 8 were significantly correlated in DS-2. Variables 1 and 6 were correlated in DS-3 and variables 4 and 6 were correlated only in DS-1. Variables 6 and 8 both relate to interdependence dimensions.

Correlation data support use of the newly-developed measures for task uncertainty in testing and analyzing the research hypotheses along three dimensions rather than four-difficulty/variability, task interdependence, and interunit interdependence. Accordingly, the following analysis will be conducted in those terms.

4.3.2 Validity and Reliability of the Dependent Measures

Whenever attempting to associate theoretical concepts with empirical data, validity and reliability of the measure(s) are of significance. A measurement devise is valid if it does what it is intended to do. Reliability relates to the extent to which a measurement procedure yields consistent results on repeated trials (Carmines and Zeller [1979]). Three types of validity are frequently discussed in extant literature: criterion-related, content, and construct validity (Kerlinger [1973] p. 457).
Criterion-related validity (also referred to as predictive ability) relates to the comparison of test scores with one or more external variables (Kerlinger [1973] p.459). Content validity is described by the question: Is the substance or content of this measure representative of the content of the property being measured? (Kerlinger [1973] p.458). Content validity is essentially judgmental. Measures must be judged for their presumed relevance to the construct being measured, usually by competent judges other than the researcher (Kerlinger [1973] p. 459).

Carmines and Zeller [1979] define construct validity as "the extent to which a particular measure relates to other measures consistent with theoretically derived hypotheses concerning the concepts (or constructs) that are being measured" (p.23). One distinguishing characteristic of construct validity is its emphasis on the necessity for a theoretical basis for the measures (Kerlinger [1979], p. 461). Therefore, measures based on a logical progression from theory possess higher construct validity.

4.3.2.1 Validity Assessment

Validity of the dependent measures developed and used in this study can be assessed using concepts of content and
construct validity. As previously stated, content validity is essentially judgmental. In this research, content validity of the dependent measures was assessed by review of persons having relevant experience/expertise. Specifically, the research proposal, including a description of measures and information processing theory upon which they are based, was provided to the coordinating partner from the participating firm prior to commencement of data collection for the express purpose of obtaining his and others' opinion regarding validity of the dependent measures. In subsequent discussion with the coordinating partner, it was ascertained that the coordinating partner, as well as others with whom he spoke, considered the measures to be valid.

Evidence is also available regarding construct validity of the dependent measures used in this study. First, the method by which the measures were developed enhances their construct validity. Dependent measures were developed by a logical progression from existing theory, as described in Chapters 2 and 3. As cited earlier, Kerlinger [1973] suggests that measures drawn in such a manner from theory have higher construct validity.

Second, multiple measures were developed for the difficulty/variability dimension and for the interunit
interdependence dimension. As indicated in the preceding section, the multiple measures for difficulty/variability are significantly correlated. These significant correlations suggest that the measures possess construct validity. As Carmines and Zeller [1979] suggest, the existence of significant relationships between multiple measures drawn from the same theory is evidence of the construct validity of the measures.

Validity is an abstract rather than an absolute concept. It is a matter of degree. The perfectly valid indicator is unachievable (Carmines and Zeller [1979]). Brewer and Hunter [1989] state that it is by comparing imperfect but real measures to one another rather than to some fictional "true" measure that validity can be assessed (p.130). Evidence suggests that the dependent measures related to the difficulty/variability dimension are both content and construct valid. The task interdependence and interunit interdependence measures were judged to be content valid. Only one measure could be developed for task interdependence; therefore, assessing its construct validity is problematic. The two interunit interdependence measures were not significantly correlated, as one would expect for measures with high construct validity.
4.3.2.2 Reliability Assessment

Reliability is the second necessary characteristic of a measurement procedure. Validity of measures is a necessary precondition before reliability of measures is a concern.

Kerlinger [1973] describes the total variance of a test as made up of two variance components, a "true" component and an "error" component. The "true" component represents the actual difference between treatment groups, while the "error" variance should be washed out by the averaging process (Kerlinger [1973] p.444). Kerlinger [1973] states that "reliability is defined, so to speak, through error; the more error, the greater the unreliability; the less error, the greater the reliability" (p. 446). In analysis of variance, the F-test statistic is essentially the ratio of "true" variance to "error" variance. When a measure is unreliable, measurement distortion prevents the "error" variance from being averaged out and, therefore, the ratio of "true" variance to "error" variance is reduced, resulting in a lower F-value. Unreliability, then, reduces the likelihood of identifying significant differences between classification groups, where such differences actually exist.
With regard to this study, evidence suggests that the dependent measures developed and used possess sufficient reliability. Tests of research hypotheses also serve as indication of the reliability of measures employed. The following section contains a discussion of results of hypothesis tests. The existence of $F$-values sufficiently large to achieve statistical significance is also evidence of the reliability of dependent measures. It should be noted, however, that reliability, like validity, is a matter of degree. To the extent that significant differences are not found, unreliability of the measures cannot be excluded from a consideration of the possible causes.

4.4 Tests of Hypotheses

The overall or omnibus MANOVA test will be used for each of the three research hypotheses. Again, an alpha = .05 level of significance is used throughout the analysis of the hypotheses. Use of this level of significance is both customary and conservative.

4.4.1 Hypotheses 1 and 2

Table 4.8 includes results of the MANOVA conducted on DS-1. Hypothesis 1 tests for inter-office differences in audit and
Table 4.8

MANOVA Results: Office 1 Audit and Tax v. Office 2 Audit and Tax
F Value/Prob > F

<table>
<thead>
<tr>
<th></th>
<th>Overall</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
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<td>.06/</td>
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<td>.46/</td>
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<tr>
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<td>.82</td>
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<td>.62</td>
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<td>.11</td>
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<td>.04</td>
</tr>
<tr>
<td>Service Type</td>
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<td>.48/</td>
<td>1.18/</td>
<td>.39/</td>
<td>.18/</td>
<td>4.99/</td>
<td>3.63/</td>
<td>.07/</td>
</tr>
<tr>
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<td>.15</td>
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<td>.29</td>
<td>.53</td>
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<td>.06</td>
<td>.80</td>
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<td>.50/</td>
<td>2.50/</td>
<td>.63/</td>
<td>1.48/</td>
<td>.21/</td>
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</tbody>
</table>

Key:
1= Percent of Standard Charges Expected to be Collected  
2= Percent of Standard Charges Collected (Attained)  
3= Weighted Average Number of Years' Experience Assigned to the Engagement  
4= Percent of Standard Charges Attained/Percent of Standard Charges Expected  
5= Budgeted Hours/Actual Hours Needed to Complete Engagement  
6= Planning Hours/Actual Hours Needed to Complete Engagement  
7= EDP Specialist Hours/Actual Hours Needed to Complete Engagement  
8= Other Specialist Hours/Actual Hours Needed to Complete Engagement
tax engagements for Office 1 and Office 2. The interactive term (office*service type) was not significant. Accordingly, results do not support rejection of the null hypothesis, Ho1. The MANOVA also tests for main effects due to 'office' and 'service type' variables. Neither of the main effects were statistically significant. Significance or non-significance of the main effect for the 'office' variable is the test of the second research hypothesis. Again, results do not support rejection of the null hypothesis, Ho2.

Results of the tests of Hypotheses 1 and 2 are important in two respects. First, consideration of these results suggests that offices within a single Big Six firm are more similar than different. The implication is that the assumption made by previous researchers regarding the nature of Big Six firms' organizational structure is supported. While testing of this assumption is still appropriate in future studies, these findings lend additional credibility to previous research findings.

Second, in the current study, testing and analysis of Hypothesis 3 is now appropriate. Data from each of the participating offices' audit and tax subunits can now be analyzed with data from ABC and UC subunits.
The PROC MANOVA procedure produces univariate tests on the eight dependent variables. These results are presented in Table 4.8. Only variable 3 (experience) and variable 8 (use of other specialist) differed between the two offices. The 'service type' variable was significantly different for variable 6 (planning). Effects of service type differences are examined by evaluation of the primary research hypothesis.

4.4.2 Hypothesis 3

Tables 4.9 and 4.10 include the results of the MANOVA conducted on DS-2 and DS-3, respectively. Results of these analyses provide tests of the primary research hypothesis, Ho3. Table 4.9 includes results of the MANOVA on data from Office 1 audit and tax, ABC, and UC engagements. The overall MANOVA test was significant. Table 4.10 includes results of the MANOVA conducted on data from Office 2 audit and tax, ABC, and UC engagements. Again, the overall MANOVA test was significant. The significant overall MANOVA tests support rejection of the primary research hypothesis.

Results of the univariate tests performed on the eight dependent variables are included in Tables 4.9 and 4.10.
Table 4.9

MANOVA Results: Office 1 Audit v. Office 1 Tax v. ABC v. UC
F Value/Prob > F

<table>
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<tr>
<th></th>
<th>Overall</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
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<td>3.24/</td>
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<td>1.07/</td>
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<td>9.43/</td>
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<td>.001</td>
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<td>.04</td>
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Key:
1= Percent of Standard Charges Expected to be Collected
2= Percent of Standard Charges Collected (Attained)
3= Weighted Average Number of Years' Experience Assigned to the Engagement
4= Percent of Standard Charges Attained/Percent of Standard Charges Expected
5= Budgeted Hours/Actual Hours Needed to Complete Engagement
6= Planning Hours/Actual Hours Needed to Complete Engagement
7= EDP Specialist Hours/Actual Hours Needed to Complete Engagement
8= Other Specialist Hours/Actual Hours Needed to Complete Engagement
Table 4.10

MANOVA Results: Office 2 Audit v. Office 2 Tax v. ABC v. UC
F Value/Prob > F

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<th>8</th>
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</thead>
<tbody>
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<td>4.06/</td>
<td>2.84/</td>
<td>.57/</td>
<td>.88/</td>
<td>6.12/</td>
<td>10.11/</td>
<td>1.76/</td>
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</tr>
<tr>
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<td>.0001</td>
<td>.17</td>
<td>.09</td>
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Key:
1= Percent of Standard Charges Expected to be Collected
2= Percent of Standard Charges Collected (Attained)
3= Weighted Average Number of Years' Experience Assigned to the Engagement
4= Percent of Standard Charges Attained/Percent of Standard Charges Expected
5= Budgeted Hours/Actual Hours Needed to Complete Engagement
6= Planning Hours/Actual Hours Needed to Complete Engagement
7= EDP Specialist Hours/Actual Hours Needed to Complete Engagement
8= Other Specialist Hours/Actual Hours Needed to Complete Engagement
The results for both sets of data were largely consistent. For both sets of data, variables 1, 2, 5, and 6 were significant and variables 4 and 7 were not significant. Variable 8 was significant at alpha = .05 for the DS-2 data (Office 1), but was only significant at alpha = .10 for DS-3 (Office 2). Variable 3 was significant for DS-2, but not for DS-3.

4.5 Analysis of Results

The previous section contained results of tests of the preliminary and primary research hypotheses. Analysis of those results is presented in this section. The preliminary hypotheses will be discussed first, followed by discussion of the primary hypothesis.

4.5.1 Hypotheses 1 and 2

Results of statistical analysis of the data did not support rejection of either research hypothesis 1 or 2. The primary implication for this study of these findings is that levels of task uncertainty of various services do not vary by office and that further investigation can proceed at the firm level of analysis; however, there are more general implications that warrant further consideration.
Results support previous auditing research reviewed in Chapter 2 that examined a variety of auditing-related questions using the individual firm as the level of analysis. One deficiency cited in previous research was the failure to test the assumption that the firm was the appropriate level for analysis and that offices within firms did not vary systematically. While these results do not allow one to conclusively state intra-firm, or office-level, effects do not exist, they provide strong evidence that offices of Big Six firms are more similar than different.

Two of the dependent variables were significant in the individual ANOVAs. Office 2 audit and tax engagements were staffed with professionals with more experience than those staffing audit and tax engagements in Office 1. Also, non-EDP specialists were used more extensively on Office 2 engagements than they were on Office 1 engagements. These two areas represented the only office-level differences noted. A possible explanation relating these two variables can be offered.

According to the coordinating partner, to be designated as a specialist by a firm one generally has been with the firm sufficiently long to have advanced to the manager or partner level. Individuals are usually not promoted to manager
until he or she has at least five or six years of experience. If engagements use specialists significantly more than others, this would likely raise the weighted average experience level on those engagements. It is likely that the difference between offices in experience level assigned to the engagement is driven to a substantial degree by the greater use of specialists. Review of data collected suggests that the majority of specialists used did have in excess of six years experience, thereby increasing the weighted average experience level on those engagements and supporting the explanation offered.

In conclusion, offices only differed on only two of eight variables, and the difference on the experience variable may be related to the difference on the use of specialists variable. While increased use of specialists indicates greater interunit interdependence for Office 2, overall the conclusion to be drawn from results indicate that offices within the selected firm appear to be more similar than different. This supports previous assumptions made regarding the organizational structure of CPA firms, and supports examination of the third hypothesis regarding differences between service types in levels of task uncertainty using the firm as the appropriate level for analysis.
4.5.2 Hypothesis 3

The MANOVA test strongly supported rejection of the null hypothesis stating that levels of task uncertainty do not vary by service type. Further analysis was necessary to determine the significance of each service type on the dependent variables. Multiple tests are available with PC-SAS and were used in this study to conduct such analysis. Specifically, the Scheffe and Bonferroni Protected F methods and the Ryan Einot Gabriel Welsch Multiple Range test (REGWQ) and the Ryan Einot Gabriel Welsch Multiple F test (REGWF) methods were used. Results were generally consistent across methods. Tables 4.11 and 4.12 present results of the REGWF tests. REGWF was chosen for presentation herein over the other methods, because it not only controls Type I experimentwise error, but also has a lower Type II error rate (SAS [1985]).

It should also be noted that variable 4 (standard attained/standard expected) and variable 7 (use of EDP specialist) were not significant in any of the analyses performed. No service type differed significantly from another with regard to these two variables. A discussion of the task interdependence and the interunit interdependence dimensions
Table 4.11

REGWF Results: Data Set 2  Office 1 Audit v. Office 1 Tax v. ABC v. UC

Note: Units with the same letters do not differ significantly. For example, UC differs significantly on Dependent Variable 1 from the other subunits. This is indicated by the "A" next to UC, while all other subunits have a "B" next to them.

Means are presented in each cell.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
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<th>5</th>
<th>6</th>
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<tr>
<td></td>
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<td>B</td>
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<td>B</td>
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<tr>
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<td>59.0%</td>
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<td>B</td>
<td>—</td>
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<td>6.2%</td>
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<td>91.9%</td>
<td>1.8%</td>
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</tr>
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</table>

Key:
1 = Percent of Standard Charges Expected to be Collected
2 = Percent of Standard Charges Collected (Attained)
3 = Weighted Average Number of Years' Experience Assigned to the Engagement
4 = Percent of Standard Charges Attained/Percent of Standard Charges Expected
5 = Budgeted Hours/Actual Hours Needed to Complete Engagement
6 = Planning Hours/Actual Hours Needed to Complete Engagement
7 = EDP Specialist Hours/Actual Hours Needed to Complete Engagement
8 = Other Specialist Hours/Actual Hours Needed to Complete Engagement
Table 4.12

REGWFF Results: Data Set 3 Office 2 Audit v. Office 2 Tax v. ABC v. UC

Note: Units with the same letter do not differ significantly. For example, UC differs significantly on Dependent Variable 1 from the other subunits. This is indicated by the "A" next to UC, while all other subunits have a "B" next to them.

Means are given in each cell.

<table>
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<td>—</td>
<td>—</td>
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<td>A</td>
<td>—</td>
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<td>UC</td>
<td>A</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>A</td>
<td>C</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>80.0%</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>91.9%</td>
<td>1.8%</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

Key:
1= Percent of Standard Charges Expected to be Collected
2= Percent of Standard Charges Collected (Attained)
3= Weighted Average Number of Years' Experience Assigned to the Engagement
4= Percent of Standard Charges Attained/Percent of Standard Charges Expected
5= Budgeted Hours/Actual Hours Needed to Complete Engagement
6= Planning Hours/Actual Hours Needed to Complete Engagement
7= EDP Specialist Hours/Actual Hours Needed to Complete Engagement
8= Other Specialist Hours/Actual Hours Needed to Complete Engagement
is presented next, followed by discussion of the
difficulty/variability dimension.

4.5.2.1 Task Interdependence

Variable 6 measured the ratio of planning hours to total
hours required to complete the engagement and was included
in this study as a measure of task interdependence. A
review of cell means in Tables 4.2, 4.3 and 4.4 shows that
audit services required the greatest amount of planning,
followed by tax services, ABC, and UC, respectively.
Results in Tables 4.11 for DS-1 show that UC was
significantly different from all other service types. For
DS-2 (Table 4.10,) UC was significantly lower than auditing,
but not significantly different from tax and ABC. Audit,
tax, and ABC were not significantly different for DS-2.

These findings suggest that levels of task interdependence
are greatest in the audit function, followed by tax
services, ABC, and UC, based on ordering of the means.
Differences between tax and consulting services are not
statistically significant in DS-1 but are for DS-2.
Auditing services appear to involve significantly higher
levels of task interdependence.
4.5.2.2 Interunit Interdependence

Results related to Variable 8 (use of non-EDP specialists) suggest that audit and tax services require more extensive use of specialists from other areas than do either type of consulting service. In fact, this sample of ABC and UC service engagements did not reveal any instances where non-EDP related specialists were used. It should also be noted that use of EDP-related specialists (Variable 7) was rare in all service types. Again, audit services appear to make use of specialists most frequently, followed by tax.

Results related to interunit interdependence are largely consistent with those for task interdependence. Auditing services appear to involve higher levels of interunit interdependence; however, it should be noted that the difference was only significant for Office 2. Differences for Office 1, while in the expected direction, did not achieve statistical significance. One of the few differences between offices was related to Variable 8 as discussed in a previous section of this chapter.

In summary, these results suggest that audit services involve significantly higher levels of interdependence among tasks performed and between subunits of the firm.
Consulting services appear to involve less task and interunit interdependence. Tax services generally involve less interdependencies than audit, but more than the consulting services, but these differences are not consistently significant.

4.5.2.3 Task Difficulty/Variability

Results of the MANOVA related to the dimension of task difficulty/variability are more problematic to interpret. While the MANOVA test was significant for variable 1 (percent of standard expected), variable 2 (percent of standard attained), variable 3 (experience) and variable 5 (budget/actual hours), examination of cell means in Tables 4.2, 4.3, and 4.4 shows some of these differences to be inconsistent with one another. These inconsistencies relate to consulting service types, especially UC services.

Results from three of the four variables (1, 2, and 5) indicated that UC service tasks involve less difficulty/variability than do the other three service type tasks, while variable 3 (experience) indicates higher levels of difficulty/variability for UC and ABC service tasks. These findings, together with previous results from this study, raise the issue of validity of the experience
variable. Experience did not correlate with any other of the task difficulty/variability measures and also was one of only two measures that differed between the two offices.

Whether this possible lack of validity is related to theoretical deficiency or to specification problems is unclear and remains an open question. One possible explanation relates to the relationship between experience and expertise. Expertise is also mentioned in the theoretical literature, but is difficult to measure. It is not clear that experts are always the most experienced.

Results of the tests related to the other variables (1, 2, and 5) suggest that UC services involve less task difficulty/variability than do audit, tax, or ABC services. The apparent difference between ABC and UC services, especially apparent with DS-1 (Table 4.11) suggests that the assumption made in this study, that all consulting services should not necessarily be grouped together for analysis, is reasonable. Much of the previous literature cited in Chapter 2 considered consulting services as a single service type. These results suggest that such a treatment is inappropriate and that consulting service types should be, at least initially, considered separately. These results indicate that ABC services appear to be more similar to
audit and tax service than to UC services with regard to task variability/difficulty.

4.6 Summary of Research Results

The results of tests of research hypotheses indicate that levels of task uncertainty do differ among various types of CPA firm services. In general, consulting services appear to involve lower levels of task uncertainty than do audit and tax services, although results also suggest that not all consulting services involve the same level of task uncertainty. In this study, the functional consulting service type (ABC) was generally more similar to audit and tax service types, while UC services tended to differ from the others.

Experience levels used as a measure of task difficulty/variability proved to be problematic, providing inconsistent results difficult to interpret. Possible explanations related to theoretical and measurement issues were offered. Lastly, tests for intra-firm effects represented by differences between offices offered little to suggest that systematic variation occurs at other than the firm level, at least in the context of the study of task uncertainty. This supports assumptions made in previous auditing research.
literature that the individual firm is the appropriate level for analysis of various research questions related to the practice of public accountancy.
Chapter 5

Limitations, Contributions and Extensions

5.1 Introduction

This chapter contains three additional sections intended to discuss limitations, contributions and possible extensions of this dissertation research. The next section contains a discussion of the limitations of this study and its conclusions. Section 3 includes a discussion of the contributions this research makes to our understanding of public accounting firms and the practice of public accountancy. In the final section, possibilities for future work in this area, including possible extensions of this specific study are discussed.
5.2 Limitations of the Research

All research is subject to limitations resulting from circumstance and scarcity or availability of resources. This section includes a discussion of the more significant limitations of this particular research project.

First, generalizability of the results of this study can be questioned for two reasons. The study examines only one firm. No examination involving only one firm can be viewed as more than exploratory. The firm involved in this study was one of the so-called Big Six. Composition of the public accountancy profession is more diverse. Firms range in size from sole practitioners to large, multinational firms. While this study gives certain insights into the practice of such accounting firms, any generalizations must be viewed carefully and probably in any case do not extend beyond the Big Six and other large multiple office, multiple service firms.

Second, the types of services provided by public accounting firms is considerably more extensive than examined in this study. Not only do firms provide an array of non-audit services, even the attest function has expanded in recent years to include attestations regarding assertions made in
contexts other than financial statements. Data availability restricted the number of services that could be examined in this study.

Data availability restrictions also created the third limitation. Sample sizes obtained for this research were small. In some instances, most notably where the issue of inter-office differences was examined, the lack of significance needed to reject the null hypotheses cannot be construed as establishing that such differences do not occur. Rather, these results simply provide evidence that such differences are limited.

Lastly, validity concerns related to use of experience as one of the eight dependent measures represent another limitation. As discussed in Chapter 4, results related to this variable were not consistent with other measures of the same dimension of task uncertainty. Causes for these findings are unclear, although possible explanations were discussed in the preceding chapter.

5.3 Contributions of the Research

Despite the aforementioned limitations, this research does make contributions to the extant accounting research
literature. The more significant contributions are discussed herein.

First, this research adds significantly to our knowledge regarding the nature of services provided by CPA firms. Specifically, previous research questioned whether services differed in the level of task uncertainty involved (Bamber and Bylinski [1978]). The major finding of this study gives substantial evidence related to that question, strongly suggesting that provision of different types of services does involve different task characteristics and interdependencies.

Second, results of this study provide evidence that large multi-unit CPA firms still remain similar at the level of the individual office. This finding tends to confirm previous assumptions regarding the nature of firms, and adds credibility to other studies that examined only for firm-level effects.

Third, results of this study provide evidence that consulting services provided by accounting firms do vary in their task characteristics, and, therefore, future research should consider consulting not as one type of service, but rather differentiate each type of consulting service.
Numerous types of consulting services are performed by large accounting and consulting firms.

Fourth, measures developed and used for task uncertainty were non-perceptual in nature. Rather, they measure the construct in terms of how it is manifested during engagements. As such, measures are more objective and verifiable than perceptual measures.

Lastly, results of this research provides additional support for the existing theoretical description of task uncertainty. The construct of task uncertainty has been used previously in accounting and auditing research as an independent variable. Rarely has it been studied as a dependent variable. These results suggest that task uncertainty as described in the extant theoretical literature provides a reasonable basis for further research.

5.4 Extensions of the Research

Extensions to this research may be proposed. Proposed extensions could respond to the limitations of this study. This study could be replicated using non-Big Six accounting firms. Such research could deal with the so-called 'Second Tier' firms as well as smaller firms. This research also
could be extended by examining other types of consulting and attestation services. Additionally, generalizability of this research would be significantly enhanced by examining other than Big Six accounting firms. Examination of other service types also would extend generalizability.
BIBLIOGRAPHY


Cushing, B.E. and J.K. Loebbecke, Comparison of Audit Methodologies of Large Accounting Firms (American Accounting Association, 1986).


APPENDIX A

ENGAGEMENT CHECKLIST—Please answer the following questions and/or provide the following information for each engagement.

1. Indicate the type of service performed:
   ________Audit
   ________Tax planning
   ________Tax compliance
   ________Accounting and financial systems implementation
   ________Accounting and financial systems design
   ________Merger and acquisition services

2. Indicate the total number of hours needed to complete this engagement.
   ________hours

3. Indicate the percentage of standard charges attained on this engagement.
   ________%

4. Indicate the percentage of standard charges expected or bid for this engagement.
   ________%

5. Indicate the total hours charged for engagement planning, administration and control.
   ________hours

6. How many individuals charged time to this engagement?
   ________
7. Were any of these individuals a firm-designated specialist?

_______yes  ________no

If yes, to which subunit was/were the individual(s) assigned?

_______Audit  ________Tax  ________Consulting

How many hours were charged to this engagement by this/these individual(s)?

Specialist 1  Specialist 2  
Specialist 3  Specialist 4

_______hours  ________hours
_______hours  ________hours

8. For each individual assigned to the engagement, please indicate that individual's number of years experience with the firm and number of hours on this engagement (round to the nearest year and use the back of the sheet if additional space is needed).

Person  1  2  3  4

_______yrs  _______yrs  _______yrs  _______yrs
_______hrs  _______hrs  _______hrs  _______hrs

Person  5  6  7  8

_______yrs  _______yrs  _______yrs  _______yrs
_______hrs  _______hrs  _______hrs  _______hrs
VITA

Gary Burkette was born in Winston-Salem, North Carolina on October 28, 1952. He graduated from Lyman High School in Longwood, Florida in June, 1971 and subsequently attended Rollins College in Winter Park Florida for one year.

After completing three years' active duty with the United States Army, Gary entered Wake Forest University in Winston-Salem, where he earned a Bachelor of Science degree in accounting in May, 1978. Also in May, 1978, he sat for and passed the North Carolina Uniform Certified Public Accountant's Examination.


In September, 1984, Gary entered the Master of Accountancy program at Virginia Polytechnic Institute and State University in Blacksburg, Virginia. He completed the degree in March, 1986. He assumed the duties of Director of Accounting for the Virginia Tech Foundation, Inc. in 1986, and held that position until September, 1989.

Gary continued his graduate study at Virginia Tech by enrolling in the doctoral program in accounting. Following coursework and comprehensive examinations, Gary taught for two years at James Madison University in Harrisonburg, Virginia while he worked on his dissertation. In 1992, he joined the faculty at East Tennessee State University in Johnson City, Tennessee.


Gary Burkette