An Analysis of the Effects of Risk, Materiality and Structure on Auditors' Evidential Planning Decisions

by

Lau Tze Yiu, Peter

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Ferdinand A. Gul

Professor Ferdinand A. Gul

Thesis Supervisor

UMI Number: 9913171

UMI
300 North Zeeb Road
Ann Arbor, MI 48103

ABSTRACT

This research has developed a comprehensive and integrated behavioral model that provided a more inclusive and realistic characterization of the evidential planning decisions of auditors than prior research. The model consists of five independent variables (inherent risk, control risk, desired audit risk, auditor business risk and planning materiality) and three moderating variables (audit structure, tolerance for ambiguity and auditor risk attitude). Based on this model, 15 hypotheses were developed, which were tested using a field experiment approach and a mixed design of three between-subjects variable (all moderating variables) and one-half replication of five within-subjects variables (all independent variables). Seventy-nine experienced auditors from Big Six CPA firms in Hong Kong were requested to complete a questionnaire designed to measure those variables. The data was analysed using ANOVA, omega-squared statistics and three types of judgement consistency indices, consensus, stability and self-insight.

The research findings revealed that five independent variables were important factors in explaining auditors' planning decisions, and these had the following order of magnitude (from highest to lowest): control risk, inherent risk, auditor business risk, desired audit risk and planning materiality. In sum, they explained 37 percent of the variations in auditors' planned extent of audit evidence. These results lend support to the predictive ability of the proposed evidential planning model as well as the utilization of the conventional audit risk model by auditors in Hong Kong. In addition to considering audit risk and materiality, as required by the professional standards, this research has demonstrated that auditors implicitly do consider external business risk as a significant factor determining the extent (cost) of the audit to be conducted. This finding is consistent with the widely-accepted notion that auditors are

sensitive to litigious environment. A policy implication is that explicit business risk costs, including the opportunity cost of lost revenue and personal income, should be assigned to each client in order to allow auditors to more effectively delineate the extent of planned audit costs.

In addition, the significance of the control risk variable has policy implications for CPA firms and their clients. An improved system of internal controls by a client, e.g., the formation of an audit committee within its board of directors to strengthen its corporate governance function, is likely to reduce control risk, thus decreasing auditors' planned extent of audit evidence and lowering costs to clients.

The findings of the study revealed that auditors placed significantly less emphasis on the planning materiality variable, when compared to the audit risk components (inherent risk and control risk). A policy inference from this finding is that policy makers of CPA firms and/or the Hong Kong Society of Accountants should provide more explicit guidance and/or educational training to auditors about planning materiality if they desire that it be given more emphasis in the evidential planning decision.

The results also provided empirical evidence to support the moderating roles of the audit structure, tolerance for ambiguity and auditor risk attitude variables in the evidential planning decisions of auditors. The interactive effects were found to be complex because, in some situations, considering two moderating variables together will lead to significant results, while considering the variables singly will not lead to significant results. Regarding the quality of auditor judgement, the indices for judgement consensus, stability and self-insight were found to be moderate, thus lending additional support to the proposed evidential planning model of auditors as a valid and stable model.

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CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND

An important stage of the audit process is the planning phase. The professional standards, for example, state explicitly that auditors, when performing an audit, must comply with the auditing standards issued by the Hong Kong Society of Accountants (HKSA). These standards require adequate planning of the audit work, and Paragraph 4 of the Statement of Auditing Standard (SAS) No. 3.101, "Audit Approach", states that "The auditor should adequately plan, control and record his work". SAS No. 200, "Planning", also states that "Auditors should plan the audit work so that the audit will be performed in an effective manner". Detailed planning guidelines appear throughout various other SASs. For example, SAS No. 220, "Audit Materiality", requires auditors to consider both materiality and audit risk when conducting an audit. Thus, as pointed out by Christ (1993, p.305), "planning is a crucial step in the audit process. In the initial planning phase, auditors develop expectations about the likelihood of errors in the financial statements and design an audit strategy that is appropriate for the circumstances."

Given the importance of audit planning, surprisingly little empirical evidence exists concerning the area of evidential planning. This research study therefore focuses on the evidential planning process. Based on a review of the literature and professional standards, a number of important factors that can significantly affect auditors' evidential planning decisions are identified, and on the basis of these factors a comprehensive and integrated behavioral model is developed. Several hypotheses are then developed and tested using a field experiment approach. Though empirical approaches such as archival studies will have greater external validity, a field experiment approach is adopted because (1) this study involves personality variables which cannot be easily evaluated via empirical approaches and (2) a field experiment approach will have a high degree of internal validity. In order to enhance external validity, the field experiment requires experienced auditors, who are similar to the target population of this study, to perform realistic experimental tasks. In addition, since planning decisions involve audit judgement, the study also examines the quality of auditors' judgements. The accounting and auditing literature suggest that the judgements of auditors are an important and researchable topic (Joyce 1976; Strawser 1985; Edward 1993). This is particularly true now during a period of increasing litigation costs. The following two sections provide more detail.

1.2 MOTIVATION FOR THE STUDY

Two considerations motivate this study. The first motivation relates to the importance of audit planning and the need to understand and evaluate auditors' evidential planning decisions. Arens and Loebbecke (1994) suggest three main reasons why the auditor should properly plan the audit: (1) to enable the auditor to obtain sufficient competent audit evidence for the circumstances, (2) to help keep audit costs reasonable, and (3) to avoid misunderstandings with the client. They further note the importance of these three matters (p.205):

> Obtaining sufficient competent evidence is essential if the CPA firm is to minimize legal liability and maintain a good reputation in the business community. Keeping costs reasonable helps the firm remain competitive and thereby retain or expand its client base, assuming the firm has a reputation for doing high-quality work. Avoiding misunderstandings with the client is important for good client relations and for facilitating high-quality work at reasonable cost.

Therefore, audit planning is a critical aspect of the audit quality control process and a study of this aspect has implications for issues related to auditor evidence-gathering effectiveness. Only a few studies have examined the initial evidential planning of auditors, and most of these studies and other prior studies of related areas have been conducted in the United States (US) or the United Kingdom (UK) with little or no studies in recently developed countries such as Hong Kong. Given the increasing internationalization of audit practice, it is important that studies on aspects of auditors' decision making be conducted in different economic environments. This study is conducted in Hong Kong which has a developed audit market and is subject to similar auditing standards as in the US. Thus, the evidence obtained here is a useful addition to the auditing literature, particularly in terms of the international aspects of auditing practice and the implementation of international auditing standards.

The second motivation for this study relates to the need to evaluate the quality of auditor judgements in evidential planning decisions. Individual professional judgement plays an extremely important and pervasive role in audit planning because in auditing precise guidelines for information collection and evaluation do not exist. In particular, auditors exercise a great deal of professional judgement in determining the nature, timing and extent of audit testing during the planning stage of the audit. Since the quality of these judgements greatly affects the quality of the planning decisions, assessment of the quality of audit judgement represents an important auditing issue (Edward 1993). In addition, Strawser (1985, p.19) argues that a better understanding of auditor judgements will help to improve the quality of those judgements:

> The primary justification for examining any aspect of auditor judgement is to improve the quality of these judgements. This improvement is made by making auditors more sensitive to both the judgement process and the limitations of this process.

Finally, these are particularly important issues in Hong Kong because there currently exists no rigorous and comprehensive study of the judgements of Hong Kong auditors and their judgements may be different from those of the US due to differences in culture and other factors unique to the local environment. In addition to contributing to accounting and auditing literature generally, an important purpose of this study is to contribute to an increase in the understanding of audit quality in Hong Kong.

1.3 OBJECTIVES OF THE STUDY

The first objective of this study is to examine how auditors make judgements regarding audit plans and to explain the related evidential planning processes. A review of the literature suggests that several factors such as risk, materiality, audit structure and personality could significantly affect the audit planning process. Prior studies of the audit risk model, however, mainly studied auditors' perceptions of the ultimate audit risk at the reporting stage of the audit. Little knowledge exists concerning the use of the audit risk model in the planning stage. In addition, the study of the impact of auditor business risk and planning materiality on audit planning has been relatively neglected. Further, the moderating effects of audit structure, tolerance for ambiguity and auditor risk attitude on the evidential planning decisions of auditors have also not been studied before. Therefore, this study contributes to the literature by developing a behavioral model that provides a more comprehensive and realistic characterization of auditors' evidential planning decision making.

An additional objective of this study is to evaluate the quality of auditors' judgements since this area of research is relatively unclear and no prior evidence regarding this issue exist in Hong Kong. Descriptive models which represent auditors' judgement strategies are also provided. These auditors' strategies reflect the extent to which the auditor utilizes the risk and materiality factors in his/her planning decisions. This study will therefore add to the extant knowledge of audit judgement by examining the judgements of practitioners in Hong Kong in terms of their degree of consistency.

1.3.1 Evidential Planning Variables

In order to achieve the above objectives, this study examines the following eight variables: (1) inherent risk, (2) control risk, (3) desired audit risk, (4) auditor business risk, (5) planning materiality, (6) audit structure, (7) tolerance for ambiguity, and (8) auditor risk attitude. Inherent risk, control risk, desired audit risk and planning materiality are selected because auditors appear to use them in their planning process as prescribed by the professional standards. In addition, Brumfield et al. (1983) conjectured the positive relationship between auditor business risk and the extent of audit testing. In light of an increasing litigious environment, auditor business risk is thus selected for empirical testing. Finally, the literature suggests that audit structure, tolerance for ambiguity and auditor risk attitude are three important moderating variables for a number of decision making tasks, and so these factors are included in the proposed evidential planning model. The following paragraphs describe each of these variables in more detail.

1.3.1.1 Audit Risk Model Variables

Professional standards require auditors to consider both audit risk and materiality in determining the nature, timing and extent of audit procedures as well as evaluating the results of those procedures. HKSA (1996) defines audit risk as the probability that the auditor gives an inappropriate audit opinion on financial statements that are materially misstated. The audit risk model advocated by the American Institute of Certified Public Accountants (AICPA) SAS No. 47 explicitly expresses audit risk in terms of a multiplication of inherent risk, control risk and detection risk[1].

HKSA (1996) refers inherent risk to the susceptibility of an account balance or class of transactions to a material misstatement assuming that there are no related internal controls. Prior studies (e.g., Kreutzfeldt and Wallace 1986,1995; Houghton and Fogarty 1991) have identified some factors that could affect auditors' assessment of inherent risk. Unfortunately, only a few studies (e.g., Brewer 1981; Kaplan and Reckers 1984) have examined the impact of inherent risk on the planning decisions of auditors. Another contribution of this study, therefore, is that it provides further evidence which explains the effect of inherent risk on auditors' planning decisions.

Control risk refers to the auditor's estimate of the probability that a material misstatement that could occur in an account balance or class of transactions will not be prevented or detected on a timely basis by the audit client's system of internal control (HKSA 1996). A sizable body of research

[1] Chapters Two and Three discuss this audit risk model in detail. The HKSA has also recommended a similar audit risk model for the practitioners in Hong Kong. While the AICPA model explicitly expresses audit risk in terms of a multiplication of inherent risk, control risk and detection risk, the HKSA model only considers audit risk as a function of these three risks.

exists examining auditor judgement in the context of internal control evaluations (e.g., Ashton 1974a; Hamilton and Wright 1982). These prior studies found that auditors weight separation of duties most significantly in assessing the strength of internal control systems. The literature, however, suggests a more complex relationship between the strength of internal control systems and related decisions on the planned extent of audit evidence. Mock and Turner (1981), and Mock and Wright (1993) found that a strong internal control system (i.e., low control risk) does not necessarily result in a lower planned extent of audit evidence. In contrast, other studies (e.g., Kaplan 1985; Cohen and Kida 1989) found that auditors' planned extent of audit evidence will increase as control risk increases. The research of this study will provide reasons explaining the mixed results relating to control risk.

Many auditors consider the audit risk model to be useful as a simplified tool in audit planning (Kinney 1983). Professional standards require auditors to reduce the audit risk to an acceptable low level, but no specific guidance exists on what constitutes low level. When using the risk model to plan for the extent of audit work, the auditors specify a desired level of audit risk. After auditors have assessed inherent risk and control risk and chosen the desired audit risk, they can then determine the planned level of detection risk in accordance with the audit risk model. This risk refers to the probability that auditors' substantive procedures will not detect a material misstatement that exists in an account balance or class of transactions (HKSA 1996). The audit risk model specifies that the planned detection risk should bear an inverse relationship to inherent risk and control risk. Another contribution of this study is, therefore, that it provides evidence on the extent to which the audit risk model is used by auditors in Hong Kong.

Researchers have subjected the multiplicative nature of the audit risk model to empirical testing in several research studies (e.g., Jiambalvo and Waller 1984; Strawser 1990). The findings indicate mixed results, which may be due to the incompleteness of the risk model. For example, Cushing and Loebbecke (1983) note that the risk model ignores other factors, such as, the economic effect of a potential misstatement. It is necessary, therefore, to consider other factors in addition to the risk model components when constructing the evidential planning model. One such factor that has been ignored in prior studies is auditor business risk.

1.3.1.2 Auditor Business Risk

The evidential planning model should consider a researchable economic factor, namely, auditor business risk. Brumfield et al. (1983) and Bamber et al. (1993) define auditor business risk as the probability that an auditor will suffer a loss or injury to his/her professional practice. This risk arises from decisions made by users relying on the audited financial statements and differs from audit risk. Auditor business risk includes factors such as litigation risk and cost, and also the potential loss of clients and/or reputation due to adverse publicity.

Auditor business risk constitutes an important issue for practitioners as well as accounting researchers (e.g., Pratt and Stice, 1994; Walo 1995).

Legal liability now represents a particularly overriding concern for the accounting profession. In 1994, the six largest US CPA firms' total payments for settling and defending lawsuits amounted to US$ 1 billion, which made up almost 20 percent of the auditing and accounting revenues in the US (HKSA 1995). These payments represented a significant increase from the 1991 figures of US$477 million and 9 percent (O'Malley 1993). Also, O'Malley (1993) indicated that claims against Non-Big Six CPA firms in the US rose by two-thirds between 1987 and 1991. This increasing trend of exposure to litigation is not a unique feature for the US. Auditors in other countries such as Canada, Australia, New Zealand, and the UK face similar litigious environments. Table 1.1 depicts a summary of the claims against auditors in these countries for the year 1994 and the situation in Hong Kong is similar, the HKSA (1995, p.3) stating that:

> Here in Hong Kong there have been several sizable settlements in relation to negligence claims against auditors of companies that have collapsed or been rescued. It is possible that the trend in Hong Kong will follow that elsewhere and claims will continue to escalate.

Table 1.1

A Summary of Claims Against Auditors in Different Countries (1994)

(i) Canada: approximately Can$ 600 million (Approx. HK$ 3.4 billion).

(ii) New Zealand: approximately NZ$ 300 million (Approx. HK$ 1.7 billion).

<u>Single claims</u>
- RSL (NZ$ 105 million)
- Cory-wright & Salmon (NZ$ 35 million - settled for NZ$7.6 million)
- Equiticorp (NZ$ 130 million)
- Fortex (amount unknown)

(iii) Australia: approximately A$ 6 billion (Approx. HK$ 34.2 billion).

<u>Single claims</u>
- The State Bank of Australia collapse of A$ 3 billion (HK$ 17 billion).
- Tricontinental claim A$ 1.1 billion (HK$ 6.2 billion). Settled in beginning 1994 out of court for A$ 136 million (HK$ 0.8 billion).

(iv) The United States

<u>Total Big 6 claims</u>
- Over US$ 30 billion (HK$ 240 billion).
- Paid out in 1994 - US$ 1 billion (HK$ 8 billion) (19.4% of total auditing and accounting revenue in judgement settlements and defence costs).

(v) The United Kingdom

<u>Total Big 6 claims</u> - £20 billion (HK$ 240 billion).

<u>Single claim</u> - BCCI, up to US$11 billion (almost HK$ 90 million).

Source: Hong Kong Society of Accountants 1995

The accounting profession's concern on the soaring litigation exposure is further evidenced by HKSA's efforts over the past few years in lobbying for the limitation of auditors' professional liability. The legislation enabling a CPA firm to incorporate in Hong Kong received Royal Assent on 3rd August 1995 and became effective on 2nd August 1996.[2] According to HKSA, as of July 1997, about 30 (out of a total of about 900) CPA firms had been incorporated. None of the Big Six firms in Hong Kong has been incorporated. Per discussion with several Big Six firm partners, internal factors represent the major reasons for non-incorporation, and these internal factors include:

(1) the Hong Kong partnership is constrained by the Worldwide partnership agreement

(2) the signing partner is still subject to unlimited liability and as such who is going to take up the more risky clients

(3) corporate tax rate is greater than the individual tax rate

(4) the need to maintain and protect reputation and/or brand name of the audit firm, and

(5) there may be resistance from current clients.

In fact, auditor business risk is still a major concern for the accounting profession, though the ability to incorporate a CPA firm with limited liability certainly signifies the accounting profession's, especially HKSA's, initial success in limiting the extent of auditors' legal liability. The importance of the

[2] The HKSA needed to make appropriate By-law changes and obtain the Financial Services Branch's clearance of all the Incorporation Rules (i.e., rules governing corporate practices) before the Compaines (Amendment) (No. 2) Ordinance became effective on 2nd August 1996.

issue of professional liability is evidenced by HKSA's decision to enlarge its Limitation of Professional Liability Working Group into a Limitation of Professional Liability Committee. As HKSA's 1996 annual report (p.22) indicates, "this marks the decision of the [HKSA] Council to make the right-sizing of the accountants' liability a standing issue, which will be actively and continuously pursued by the Society."

In line with developments in the UK (Accountancy 1996), HKSA is now studying the feasibility of proportionate liability. Under the concept of proportionate liability, assessed damages are apportioned between the negligent parties in proportion to their responsibility. For example, if the auditors are held responsible for 20 percent of the cause of the loss, the auditors will only be liable for 20 percent of the claim even though other negligent parties cannot pay. In contrast, under the current practice of joint and several liability, the auditors will be liable for the full damages claimed if other negligent parties cannot pay. Finally, per discussion with a partner of a Big Six firm and a technical director of another Big 6 firm, Big Six firms are now studying the feasibility of establishing a "cap" on their liability exposure through various means. For example, they consider whether it is feasible to limit their liability by contractual arrangement (e.g., through specific terms in the engagement letter) with the audit client based on a percentage of the client company's net worth or a multiple of the audit fee.

1.3.1.3 Materiality

As stated earlier, professional standards require auditors to consider materiality in their audit planning. Essentially, auditors will determine a materiality level or threshold which then represents the maximum amount by which the auditors believe the financial statements could be misstated and still not affect the economic decisions of reasonable users (HKSA 1996). Prior studies have identified some factors as potential determinants of materiality levels, and have examined the impact of these materiality factors on auditors' evaluation materiality judgements (e.g., Boatman and Robertson 1974; Friedberg et al. 1989). No study, however, have examined the impact of these factors on the planning materiality judgements of auditors.

1.3.1.4 Audit Structure

Since the auditing standards are broad principles, auditors have a great deal of flexibility to exercise professional judgement in the design of audit procedures. Within this broad span, some auditors may prefer a relatively more structured audit approach. Cushing and Loebbecke (1986, p.32) define a 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". Several studies have indicated that CPA firms' audit structure can affect the audit process and auditor behaviour (e.g., Kinney 1986; Bamber et al. 1993) and Kinney (1986) recommends that researchers studying auditors' behaviour with respect to procedures or reporting should consider the potential effects of firms' audit structures. Thus, this study provides evidence on the moderating effect of audit structure on the relationships between the risk and materiality factors and auditors' planning decisions.[3]

1.3.1.5 Individual Psychological Differences

A review of psychological literature leads one to conclude that individuals' psychological differences, such as personality, will affect decision making. Surprisingly, in prior studies such differences in auditors' evidential planning decisions have been ignored. Therefore, a need exists to explore the impact of auditors' personality on their evidential planning decisions. As explained below, this study uses tolerance for ambiguity and risk attitude as surrogates for auditors' personality.

The literature suggests that auditors' levels of tolerance for ambiguity, a personality variable, could affect the level of risk they are willing to tolerate. Budner (1962) defines tolerance for ambiguity (High on TA) as an individual's tendency to perceive ambiguous situations as desirable, and intolerance for ambiguity (Low on TA) as an individual's tendency to perceive ambiguous situations as sources of threat. Several studies in the accounting and auditing

[3] Chapter Three, Section 3.6, "Audit Structure", discusses this proposed moderating effect in detail.

literature (e.g., Gul 1984; Tsui 1993) have concluded that TA is an important moderating variable. Researchers such as Zebda (1991) and Ho and Rodgers (1993) have called for more studies to thoroughly examine the relationship of TA with various aspects of decision making. This study therefore evaluates the role of TA in the evidential planning decisions of auditors.

Also, Farmer (1993) argues that the lack of definite guidelines on the tolerable level of audit risk has the potential for auditor risk attitude, another personality variable, to have significant impacts on audit decisions. Clarke (1987) earlier found a strong association between auditor risk attitude and audit scope decisions. Another objective of this study is therefore to determine whether the risk attitudes of auditors affect the relationships between the risk and materiality factors and auditors' planning decisions.

Apart from examining the factors that affect planning decisions of auditors, this study also describes the relative importance of these factors in terms of their cue utilization or usage. However, this evaluation would be incomplete without an examination of the quality of judgement.

1.3.2 Judgement Quality

The determination of the quality of auditors' decision making or judgements is also an objective of this research study. To achieve this objective, the audit judgement process literature[4] suggests examining three types of judgement consistency: inter-auditor consistency (consensus), intra-auditor consistency (stability), and auditor self-insight[5] .

Consensus refers to the correlation between the judgements of two or more auditors at the same point in time. It addresses the issue of whether different auditors, given the same information at a particular time, will make the same decision. Ashton (1983, p.10) stresses the importance of consensus in audit decision making:

> Audit efficiency and effectiveness can ... vary if decisions lack consensus across different auditors within the same firm, or across different firms within the profession ... Although complete agreement among auditors does not ensure the accuracy of their decisions, lack of agreement implies that decisions of at least some auditors are not accurate.

Regarding using consensus as a surrogate for accuracy, Ashton (1985) found a strong positive association between consensus and accuracy in an auditing context for which correct decisions remain uncertain. This finding supports the use of judgement consensus as a decision-evaluation criterion in auditing contexts for which correct decisions remain uncertain (Libby 1981; Ashton 1983; Stone and Dilla 1994). No clear-cut judgements exist with which to compare individual professional judgements in most audit tasks, as Joyce (1976) earlier pointed out.

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4 Chapter Two provides a review of this literature.
5 Chapters Two and Four discuss these measures in more detail.

Other studies (e.g., Hicks 1974 and Strawser 1985) also suggest that CPA firms should consider consensus as an important criterion in evaluating the quality of audit judgements. Hicks (1974, p.40) notes that "In the best of all possible auditing worlds, every auditor, given the same set of facts, would select the same auditing procedures and apply them to the same extent". Strawser (1985, p.53) comments that "Education, training, supervision, and quality control reviews are all methods which have been adopted by the accounting profession in order to insure judgement consensus among auditors". Mautz and Sharaf (1961) and Joyce and Libby (1982) provide further indication of the importance of consensus in auditing. Mautz and Sharaf (1961, p.132) assert that "He (the prudent man) must exercise as sound judgement as would another possessed of the same extent of information available to him at the time". Joyce and Libby (1982) suggest that a successful defense in litigation often relates to establishing a consensus, via expert witnesses, that the defendant acted in a prudent manner. For the above reasons, therefore, consensus can serve as an important evaluation criterion.

Another important evaluation criterion relates to stability, which refers to the correlation between the judgements of the same auditor at two different points in time for the same situation. Stability addresses the issue of whether one auditor, given the same information at different points in time, will make the same decision. On this issue, Goldberg (1970, p.423) stresses the positive relationship between reliability (i.e., stability) and accuracy:

> He (Man) is subject to all those human frailties which lower the reliability of his judgements below unity. And, if the judge's reliability is less than unity, there must be error in his judgements – error which can serve no other purpose than to attenuate his accuracy. If we could remove some of this human unreliability by eliminating the random error in his judgements, we should thereby increase the validity of the resulting predictions.

Unstable decision making, therefore, affects the accuracy of audit decisions. Further supporting this contention, Ashton (1983) suggests that a number of practical reasons, including fluctuations in the cost and/or quality of the audit and potential exposure to legal liability and other sanctions, increase the need for maintaining stability, i.e., stable decision making. The study also adopts stability as an evaluation criterion. In addition to consensus and stability, another important type of consistency considered in this study relates to self-insight.

Auditor self-insight refers to the auditor's degree of insight into his/her own decision process as represented by a model of that process. Ashton (1983) notes that a high self-insight enables the auditor to clearly explain his/her decision process to others, e.g., in training sessions. In contrast, low self-insight indicates that an auditor's explanation of his/her decision making may not adequately describe certain aspects of the decision.

1.4 ORGANIZATION OF THE DISSERTATION

The remainder of this dissertation consists of the following six chapters numbered 2 through 7: (2) Literature Review, (3) Hypotheses Development, (4) Research Methodology, (5) Results and Discussion: Overall ANOVAs, (6) Results and Discussion: Individual ANOVAs, and (7) Conclusion.

Chapter Two reviews the auditing literature relevant to the variables studied in this research. It then presents the theoretical framework and the empirical model for auditors' evidential planning decision making. Finally, the chapter provides a brief description of the two methods used for examining the auditors' planning decisions and the quality of auditor judgements in this study: the Brunswik lens model and policy capturing.

Chapter Three begins with a discussion of the auditors' evidential planning decisions. This includes the justification for operationalising the auditors' evidential planning decisions in terms of the planned extent of audit evidence. This is followed by presenting hypotheses developed to empirically test the evidential planning model.

Chapter Four then focuses on the research methodology adopted for this study. It begins with a discussion of the measurement of the independent and moderating variables examined in this study. It continues by describing the experimental design, including a justification for the use of a field experiment approach, the experimental tasks to be performed by the auditor-subjects, the selection criteria and method for choosing the auditor-subjects of this study, and then discusses the important characteristics of the selected subjects. This is followed by a description of the procedures used to administer the field experiment and the research instrument used to elicit responses from the selected subjects. Finally, the chapter discusses the statistical procedures used to analyze the data provided by the evidential planning decisions of the auditor-subjects, and the methodological limitations.

Chapters Five and Six present and explain the results of the statistical tests of the data obtained from the field experiment. Finally, Chapter Seven of the research study summarizes the findings, presents the contributions and implications, and then makes suggestions for future research.

1.5 SUMMARY

This chapter introduced and emphasized the importance of proper audit planning. In spite of the importance of audit planning, the chapter noted that the area of evidential planning and, related to it, the quality of auditors' judgements remain unsettled and are fertile areas for research. The chapter then discussed the motivation for this study. More specifically, it elaborated on the need to develop a comprehensive and integrated descriptive model to capture the behavioral dimensions of auditors' evidential planning decisions. The chapter further noted that the relative importance of the factors affecting auditors' planning decisions and the quality of these decisions should be examined. Finally, the chapter presented the organization of the dissertation. The next chapter will review the relevant auditing literature, and it will present the theoretical framework and the empirical model for auditors' evidential planning decision making.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

Chapter One identified a number of factors that would affect the evidential planning decisions of auditors. This chapter reviews the literature on these factors which include contextual variables such as inherent risk, and individual differences variables such as tolerance for ambiguity. Based on a general model of decision making postulated by Hunt et al. (1989), a theoretical framework for auditors' evidential planning decisions is presented. This theoretical framework then forms the basis for developing an empirical model of evidential planning. Since another objective of this research study is to examine the quality of auditors' planning judgements, the pertinent literature on this subject is also reviewed. Finally, this chapter includes a discussion of the Brunswik lens model and policy capturing research because this study as well as many other prior studies have used these methods to examine the effects of a wide variety of factors on the judgements or decisions of auditors.

2.2 LITERATURE RELEVANT TO OVERALL AUDIT PLANNING

This section summarizes the archival studies regarding the overall audit planning process. The next section reviews experimental studies and some field studies on audit planning which examine the role of specific factors (e.g., risk and materiality) in the planning process.

Bedard (1989) conducted an archival investigation of audit program planning. Using a survey of workpapers of 48 audit clients in the retail, wholesale and manufacturing industries, the author studied how and why auditors altered programs for substantive tests. The findings indicated that auditors' programs for substantive tests were quite stable. The most frequent reason for decreasing substantive tests related to internal control strength and favourable past audit results. The reasons for increasing substantive tests varied, and only a few of the increases related to analytical procedures. There existed no statistically significant relationship between previous adjusting entries and revisions of substantive test programs.

Mock and Wright (1993) developed a two-period evidential planning model based on archival data to examine which factors affect audit planning. They posit that an auditor will engage in general planning by first addressing four primary areas: desired audit risk, inherent risk, control risk, and materiality. The outcomes of this general planning stage include inherent risk and control risk assessments and a preliminary judgement of materiality. The auditor will then, based upon his/her knowledge base (auditor knowledge base), select suitable decision rules, search strategies and tools to formulate an appropriate, cost-effective audit program (in terms of the nature, timing and extent of audit procedures) for the particular client. Finally, completion of the audit program will lead to certain audit results. For example, errors detected during the audit will be tabulated in terms of their frequencies and magnitude. In a multi-period setting, the prior year's audit program and the results become part of the auditor knowledge base in determining the current year's audit program.

However, the Mock and Wright (1993) study overlooks the fact that the auditor knowledge base variable itself includes several elements: auditing standards, economic incentives, prior audit program, standard audit program and prior audit results. A closer examination of these elements indicates that the auditor knowledge base variable alone constitutes an inappropriate construct for research because:

(1) Prior audit results represent a major factor affecting inherent risk (CICA 1980).

(2) A standard audit program and prior audit program constitute part of the audit structure variable.

(3) Economic incentives relate to auditor business risk, which is, as mentioned earlier, an increasing important factor.

In other words, other simpler constructs can measure the essential elements of the auditor knowledge base. Adopting Mock and Wright's operational definition of auditor knowledge base will make the evidential planning model very complex and difficult to test empirically. To overcome this problem, it would be better to decompose the auditor knowledge base into more fundamental constructs. For example, the effects of prior audit results, standard audit program, prior audit program, and economic incentives could be studied by introducing the variables mentioned above, and auditors' experience could proxy for auditors' expert skill in audit planning[1]. On this issue, Bonner and Pennington (1991, p.3) noted:

> Although experienced auditors outperform inexperienced ones in many tasks, experience per se may not be a good predictor of high-quality performance or expert skill. However, the use of experience level... to designate experts and novices is common both within auditing and across domains studied by psychologists. In many cases, the skill level indicated by experience is supported by solicitations of peer nominations and by measurements of consensus. Note that consensus is a measure that can be a good surrogate for accuracy and thus expert skill.

Nevertheless, based on their proposed model, Mock and Wright performed an archival study to examine audit planning judgements and risk. Their sample comprised 159 audits divided into two broad industry categories: manufacturing and merchandising. The findings indicated that there existed few changes (5 percent) in the types of audit procedures used by the auditors

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[1] Because experienced auditors usually perform audit planning, and inexperienced auditors seldom assist in audit planning, this study only used different levels of experienced auditors as subjects and therefore did not examine the experienced/inexperienced auditor effect on audit planning.

over the two-year period examined. Yet, it should be noted that all subjects came from a structured CPA firm and that 95 percent of them reported using standard audit programs. It is, thus, unclear whether auditors of unstructured firms would have the same or different degrees of changes in the types of audit procedures. The results also indicated that planned number of audit hours significantly correlated to a limited number of account-specific inherent risks (e.g., numbers of unusual transactions and prior errors), but not to engagement-wide risks. Overall, the study concluded that there existed no strong, consistent pattern between year-to-year changes in risk and adaptations in audit scope. The authors then suggested that, given the inherent limitations of archival research, future experimental and process tracing studies also seemed promising in providing valuable suggestions on the evidential planning process.

This dissertation study develops a comprehensive and integrated evidential planning model that improves upon the Mock and Wright model. In addition to decomposing the auditor knowledge base into more fundamental constructs which can be empirically tested, this research also examines some important factors (i.e., auditor business risk, audit structure and auditor personality) that Mock and Wright did not study. The use of a field experiment, a different approach from Mock and Wright's archival study, will also allow inferences to be made about the causal relationship between the independent variables and the dependent variable.

Maletta and Wright (1996) examined the role of industry error characteristics in audit risk assessment and the determination of appropriate audit strategies. After analysing the error characteristics of 368 actual audit adjustments across 171 engagements in six industries, they suggested that consideration of differences in industry error characteristics during the audit planning process would be valuable in terms of assessing risk and determining appropriate audit strategies. For example, since regulated companies would, generally, have stronger control procedures than non-regulated companies, it would be more appropriate to use an audit approach that focused to a greater extent on internal evidence, such as source documents with regulated companies and external evidence with non-regulated companies.

2.3 LITERATURE RELEVANT TO THE INDEPENDENT AND MODERATING VARIABLES

This section summarizes the literature relevant to the independent and moderating variables examined in this study. The review covers the following: (1) audit risk and the audit risk model; (2) inherent risk; (3) control risk; (4) detection risk; (5) auditor business risk; (6) materiality; (7) audit structure; (8) tolerance for ambiguity; and (9) auditor risk attitude.

2.3.1 Audit Risk and the Audit Risk Model

A review of the literature indicates that the research studies concerning the AICPA audit risk model can be grouped into two types: (1) analytical studies which critically reviewed characteristics of the model; and (2) empirical studies which examined the combination of component risks of the model.

Cushing and Loebbecke (1983), for example, have critically reviewed the audit risk model advocated by the AICPA. They evaluated the assumptions of the model as well as the model itself, and concluded that the model constitutes a simplified abstraction of reality and is intended to be used as a planning tool. Although they were concerned that such a simplified model might provide misleading results concerning audit risk in certain circumstances, Cushing and Loebbecke suggested that auditors could still find the model helpful when used with appropriate understanding and caution.

In another study, Kinney (1983) noted that many auditors considered the audit risk model advanced by AICPA SAS No. 39 as a useful simplified tool for audit planning[2] . He, however, showed that use of the audit risk model to conditionally revise an audit plan or to evaluate audit results could, in some circumstances, subject the auditor to greater risk than that indicated by the risk

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[2-] SAS No. 39 further decomposes detection risk into the risk of analytical procedures and tests of details risk.

model, thus resulting in audit ineffectiveness. Kinney also demonstrated that the product of the component risks exceeds the realized audit (ultimate) risk in some situations, thus resulting in higher audit cost, i.e., audit inefficiency .

With respect to the decomposition approach of the audit risk model, Jiambalvo and Waller (1984) argued that this approach complies with the decomposition principle of problem-solving strategy that is frequently followed by practitioners and is also recommended by theorists of decision analysis (e.g. Raiffa 1968; Huber 1980). Raiffa (1968, p.271) proposed that the purpose of the decomposition principle is to:

> ...... decompose a complex problem into simpler problems, get one's thinking straight on these simpler problems, paste these analyses together with logical glue, and come out with a program for action.

As a result, Jiambalvo and Waller (1984) suggested that at least three factors can contribute to the effectiveness of this decomposition strategy: (1) reducing decision makers' cognitive strain, (2) heeding relevant information and (3) combining heeded information correctly.

Further, Libby and Libby (1989) found that mechanically combining component judgements to form a global judgement rather than directly forming a global judgement would improve judgement accuracy. Specifically, two groups of experienced auditors were required to make either global control reliance decisions or component judgements of the strength of the individual controls and compliance tests. The mechanically combined component judgements were, on average, more like those of the expert panel and were more consensual than the global judgements.

The audit risk model, according to Mock & Washington (1989), is the basic model currently used to evaluate and quantify risks associated with a particular audit. They state that there are basically two ways of quantifying audit risks:

(1) The decomposition/intuitive method where the auditor makes an assessment of audit risk intuitively after assessing the component risks.

(2) The decomposition/algorithmic method where the auditor's audit risk was computed mathematically using his/her assessments of the component risks.

Jiambalvo and Waller (1984), using hypothetical case studies, investigated the effects of decomposition on auditors' assessments of tests of details risk within the framework of the AICPA SAS No.39 audit risk model. They found that assessments of tests of details risk using a decomposition/ intuitive combination approach and that assessment using a decomposition/ algorithmic combination approach differed significantly. This result suggests that the judgements of auditors were inconsistent with the multiplicative nature of the audit risk model.

The previous work of Jiambalvo and Waller (1984) was extended by Daniel (1988) who investigated the assessment of audit risk in practice. Thirty-three audit managers reviewed information from actual audit engagements, and then they evaluated component risks as well as the overall audit risk for accounts receivable. The findings indicated that the assessed value of audit risk of auditors were significantly higher than the values computed using any of the audit risk models advanced by the AICPA or the CICA (Canadian Institute of Chartered Accountants), thus implying that the auditors did not combine the component risks in the manner suggested by the audit risk models.

Contrary to the findings of the above two studies, however, the results of several other studies supported the multiplicative nature of the component risks. Libby et al. (1985) examined the multiplicative nature of inherent risk and control risk in the AICPA audit risk model. They asserted that when inherent and control risks are combined multiplicatively, the greater the level of inherent risk, the greater the magnitude of the effect of a given change in control risk. Such results indicated that the decisions of auditor-subjects were consistent with the predictions developed from the audit risk model.

Kaplan (1985) examined the effect of environmental factors (an inherent risk factor) and internal control strength (a control risk factor) on the planning decisions of auditors. Using an experimental design, 84 auditor-subjects were required to provide the planned number of audit hours for the accounts receivable subsystem of a hypothetical company. The findings indicated that (1) auditors increased their planned audit hours as the effectiveness of the internal control system deteriorated; (2) the change in the number of planned audit hours across the three levels of internal control depended on the level of the environment (a more pronounced effect was noted for the dynamic[3] environment). These results provided support for the multiplicative nature of the inherent and control risks.

To investigate whether the component risks suggested by the AICPA audit risk model and other factors discussed in the accounting and auditing literature had a significant impact on the perceptions of audit risk by auditors, Strawser (1985) performed an experimental study. Forth-eight auditors from local and regional audit firms were required to: (1) assess the perceived level of audit risk present in various hypothetical audit situations, and (2) estimate the planned audit hours that are required to satisfactorily complete the audit of the particular audit situation. Strawser found that the auditor-subjects combined the components risks in the manner suggested by the AICPA audit risk model,

[3] In the dynamic environment, the client was manipulated to have the higher than industry average growth rate, a quite erratic trend of profits, a relatively shorter company existence, a relatively shorter length of association with the current auditors, an intention to go public and a key personnel turnover, as compared to stable or slightly dynamic environment.

though some auditor-subjects felt that some components would have a greater impact on the overall audit risk model.

Strawser (1990, 1991) extended the previous works of Jiambalvo and Waller (1984), Strawser (1985) and Daniel (1988) by determining the effect of each component risk on overall audit risk for different levels of algorithmic risk (LAR) between different-sized audit firms. The author defines algorithmic risk as the level of audit risk resulting from mathematically combining the component risks according to the AICPA audit risk model. Strawser (1990) found that the judgements of the regional and local auditors exhibited more consistency with the multiplicative nature of the audit risk model than those of the Big Eight auditors. In particular, the regional and local auditors displayed higher omega-squared statistics (39.89 percent) for the "algorithmic risk" variable, and this risk also significantly affected a greater percentage of the judgements of the regional and local auditors (79 percent). He also found that auditors placed different emphases on the impacts of component risks. In particular, the Big Eight auditors associated the highest levels of audit risk with audit examinations characterized by ineffective analytical procedures. In contrast, for low levels of algorithmic risk only, the regional and local auditors associated the highest levels of audit risk with examinations characterized by ineffective tests of details procedures.

This subsection has reviewed literature on the audit risk model as a whole. The following three subsections review the literature on the component risks of the audit risk model. While the focus of this research study is on the effects of these component risks on auditors' planning decisions, studies examining factors affecting the risks are also included to provide a more complete review of the literature.

2.3.2 Inherent Risk

This subsection focuses on literature relevant to inherent risk, the first of the three components of the audit risk model. The pertinent research studies reviewed cover two major areas: (1) factors affecting inherent risk; and (2) the effect of inherent risk on auditors' planning judgements.

In one of the earliest studies, Brewer (1981) performed a study to examine the nature of audit risk indicators and their effects on audit intensity[4]. In the first phase of that study, Brewer developed a list of 60 audit risk indicators based on reviews of the accounting and auditing literature and on interviews with auditors from several CPA firms. One hundred and sixteen auditors from eight CPA firms then indicated their perceived audit risk for each of the risk indicators using a questionnaire survey. Based on the results of the

[4] The author considers audit intensity as a function of: (1) quantity of audit evidence gathered, (2) timing of audit work, (3) quality of audit work performed, and (4) quality of audit evidence gathered.

questionnaire, he generated 20 audit risk factors using factor analysis. In the second phase of the same study, Brewer found that two selected audit risk factors, i.e., a threat to client survival and incapable client management, affected auditors' perceived audit intensity. The author concluded that auditors should consider risk factors other than internal controls in determining the degree of audit intensity.

In another study, Gibbins and Wolf (1982) portrayed the decision environment of external auditors during the conduct of a normal statutory audit, and determined which environmental factors had significant influences on the audit. Eighty auditors from six large Canadian CA firms participated in a questionnaire survey. An analysis of the responses showed that the auditor-subjects considered some factors as consistently important throughout the audit. These factors included inherent risk factors, such as client's financial position and profitability, control risk factors, such as client's internal control and accounting systems, and materiality considerations.

Kreutzfeldt and Wallace (1986) then examined error characteristics and their association with environmental factors for 260 actual audit engagements. They found that: (1) small companies were more error-prone than large companies; (2) error rates differed by industry; and (3) companies with liquidity or profitability problems had more and larger errors. Based upon the same data set, Wallace and Kreutzfeldt (1995) found a statistically significant positive relationship between the incidence of aggregate error and the degree of inherent risk, which was measured in terms of management competency, management integrity and company financial condition.

Additionally, Houghton and Fogarty (1991) described the results of an auditor-detected error survey conducted by Deloitte Haskins & Sells. The survey covered 480 audit engagements with fiscal years ending during 1984 from three countries: the US, the UK, and South Africa. The survey aimed at identifying important inherent risk factors that could indicate high audit risk areas during the audit planning process. The findings indicated that the three most important factors which could identify high risk areas during the planning process relate to: (1) history of similar errors in prior years; (2) known business risk in the client's industry; and (3) known business risk of the client company.

The studies summarized above have identified some important inherent risk factors. Kaplan and Reckers (1984) then examined the effect of those factors on auditors' judgements. Using 60 experienced auditors as subjects, Kaplan and Reckers examined the effects of general practice priors, management integrity and control consciousness[5] on auditors' judgements at

[5] Subsection 2.3.3 of this chapter, Control Risk, provides further discussion on control consciousness.

the initial audit planning stage. General practice priors (GPP) refers to an auditor's subjective beliefs about a class or category of audit client (e.g., banking clients and manufacturing clients). These GPP beliefs are based on previous direct or indirect audit experience with other audit clients and thus reflect the auditor's prior knowledge. For example, the auditor may have a subjective belief that there exists a greater likelihood of a material error for a banking client than for a manufacturing client. The findings indicated that GPP significantly affected both the preliminary and revised evaluations of the likelihood of a material error occurring in accounts receivable. The authors concluded that GPP, an inherent risk factor, could influence the auditor's opinion formulation process in two ways: (1) act as base rates, and (2) act as a guide to the interpretation of ambiguous information. The management integrity variable was found to have a statistically insignificant effect. The following subsection reviews the literature on another component risk, control risk.

2.3.3 Control Risk

This subsection is devoted to the second component of the audit risk model, and classifies the research studies summarized under two major categories: (1) factors affecting control risk; and (2) the effect of control risk on auditors' planning decisions. The focus of this review concerns independent auditors' evaluation of the internal control systems of audit clients.

The first extensive pilot study in this area was conducted by Ashton (1974a, 1974b). In this policy capturing study using the Brunswik lens model, Ashton provided empirical evidence on the extent of judgement inconsistency in the evaluation of internal controls and on the perceived importance of the various factors in making internal control judgements. Sixty-three practicing auditors evaluated the strength of a hypothetical manufacturing company's payroll internal control system. More specifically, after reading a brief narrative of the hypothetical company and a description of six indicators of payroll internal controls, each subject then evaluated the strength of the internal controls in 32 cases which represented all combinations of "yes" and "no" answers to six internal control questions. The experimental design employed a one-half fractional replication of a 2^6 factorial design. To assess judgement consistency over time, the same experiment was repeated in the same manner six to thirteen weeks after the first administration of the experiment.

The results led Ashton to conclude that the auditors exhibited a fairly high level of judgement consensus (average $r = 0.70$) and stability (average $r = 0.81$). Despite the overwhelming importance of the two internal controls regarding separation of duties ($\omega^2 = 51.4$ percent), individual differences existed among the auditors such that at least one auditor considered each of the six internal controls as most important or least important. There existed insignificant interaction effects (total $\omega^2 = 6.4$ percent) between the internal control factors and the perceived strength of internal controls. Ashton also found that the auditors in his sample exhibited a relatively high level of self-insight, thus suggesting that the auditor-subjects were aware of the importance or weights they placed on specific factors in making their judgements.

Joyce (1976) later attempted to reconcile Ashton's (1974a) findings of high inter-auditor consensus with other researchers' reports of considerable variability of the judgements of auditors. Joyce argued that different auditors might generally agree on the strength (quality) of internal controls of a subsystem but might disagree on how much audit work should be performed for that subsystem. Using 35 practicing auditors as subjects, Joyce then studied auditor consensus, stability and self-insight. The auditor-subjects estimated the planned number of audit hours for an examination of accounts receivable in response to five independent variables: three relating to internal controls and two relating to accounting ratios. He found a mean correlation between auditors (consensus) of 0.37, which is a much lower mean correlation than Ashton's (1974) 0.70, but is consistent with Hoffman et al.'s (1968) mean correlation of 0.37[6]. Joyce also concluded that the auditors exhibited a fairly high level of stability (average $r = 0.86$). Similar to Ashton (1974a, 1974b), the five main

[6] The author of this dissertation has computed the Hoffman et al.'s mean correlation based on the data presented in their Table 1.

effects accounted for a large portion of the variance in auditors' judgements (total $\omega^2 = 74.7$ percent), while there existed insignificant interaction effects (total $\omega^2 = 3.7$ percent). As in other research, auditors weighted the separation of duties most significantly ($\omega^2 = 28.1$ percent).

Four subsequent studies then replicated and/or extended Ashton's (1974a, 1974b) internal control evaluation study. They addressed the issues of experience effects and the generality of results. Among them, Reckers and Taylor (1979) extended Ashton's study by using a longer payroll questionnaire and examined the experience effects. They found that there existed much inter-auditor disagreement, but the more experienced auditors (managers and partners) exhibited less disagreement. They also concluded that the more experienced auditors displayed significantly higher mean correlations than auditing professors, thus suggesting that experience, rather than teaching, developed or fostered auditors' professional judgement.

Ashton and Brown (1980) also extended Ashton's (1974a, 1974b) study by adding two more internal controls (cues): rotation of duties and background inquiries for new employees. In this study, 31 auditors evaluated 128 cases based on one-half replication of a 2^8 factorial design plus 32 duplicate cases. Main effects accounted for 71.9 percent of the variance explained, and the three cues related to separation of duties already accounted for 50.9 percent of the variance explained. The auditors exhibited similar degrees of consensus (average r = 0.67) and self-insight (average r = 0.86) when compared with those of Ashton (1974a, 1974b), while the degree of stability (average r = 0.91) exceeded Ashton's (1974a) 0.81. Contrary to Reckers and Taylor (1979), this study found that there existed no relationship between auditors' length of experience and any of the above judgement consistency measures.

Ashton and Kramer (1980) further replicated Ashton's (1974a, 1974b) study by using 30 auditing students as subjects. The findings indicated that students' consensus (average r = 0.66) and self-insight (average r = 0.77) exhibited lower degrees of consistency than auditors' consensus (average r = 0.70) and self-insight (average r = 0.89) in Ashton's (1974a) study. The main effects accounted for 65.6 percent of the variance in students' judgements, as compared to Ashton's 80.2 percent. The students placed significantly less emphasis on the separation of duties cues (36.9 percent in this study versus 51.4 percent in Ashton's study).

Hamilton and Wright (1982) then extended the work of Ashton (1974a, 1974b) and Ashton and Kramer (1980) by studying explicitly the relationship between years of auditing experience and consensus, stability, cue utilization, and self-insight. The research design adopted a 2^5 full factorial design, and the subjects consisted of 78 practicing auditors and a large group of auditing students. The authors classified them into three groups: auditing students, inexperienced auditors and experienced auditors. The findings indicated that no positive association existed between experience and either consensus or stability; the experienced auditors displayed a higher self-insight (average $r = 0.81$) than inexperienced auditors (average $r = 0.70$). However, the students displayed a similar level of self-insight as the pooled-sample of auditors. The subjects weighted the cues relating to separation of duties most significantly, though students' average cue weighting of 70 percent displayed a slightly lower percentage than auditors' 75 percent.

All of the above studies suggested that auditors placed a different emphasis (weight) on the various types of internal controls in assessing the strength (quality) of the internal control systems. Auditors weighted separation of duties most significantly in affecting their evaluations of internal controls. To measure judgement consistency, the researchers employed several measures, including consensus, stability and self-insight. These studies assumed that consistency could serve as a good indicator of the validity of auditors' judgements in the absence of suitable criteria by which to distinguish correct from incorrect judgements[7]. However, the relationship between particular

[7] Chapter One, Section 1.3.2, dealt with the importance of judgement consistency.

internal controls, strength of the internal control system, control risk, and subsequent decisions on the nature, timing and extent of audit testing may be more complex than was suggested in those prior studies. Furthermore, based upon the results of a series of five related field experiments and a verbal protocol analysis study, Mock and Willingham (1983) found that the auditor-subjects exhibited significant variability and lack of consensus in their evaluation of internal controls and the related planning recommendation judgements.

In a previously summarized study, Kaplan and Reckers (1984) examined the impact of inherent risk and control consciousness on auditors' initial audit planning judgements. Control consciousness is a concept which refers to the audit client's commitment to establish an environment that encourages effective internal controls. The results indicated that control consciousness interacted with auditors' job positions to affect their judgements. Specifically, control consciousness positively affected the preliminary evaluations of internal controls by the audit seniors, while no relationship existed between control consciousness and the evaluations of audit managers.

In order to compile a more comprehensive list of control risk factors, Haskins (1987) identified 48 control risk factors through interviews with audit partners and reviews of CPA firms' in-house literature. Through a questionnaire survey, auditors reported the perceived importance of these factors in evaluating the control environment of a referent audit client. The results indicated that the auditors perceived 10 of the 48 factors to have great importance in evaluating a client's control environment. The following significant factors support the findings of prior studies: the appropriateness of client's policy for the authorization of transactions (Joyce 1976), the separation of duties (Ashton 1974a, 1974b; Joyce 1976), and the controllers' knowledge of accounting guidelines (Hylas and Ashton 1982). Contrary to the findings of Hylas and Ashton (1982) and Kreutzfeldt and Wallace (1986), which indicated personnel-related problems as major causes of accounting errors, Haskins (1987) found that auditors perceived personnel-related controls, such as personnel planning, training and evaluation, to have little importance in the evaluation of a client's control environment.

Libby et al. (1985) have proposed a more comprehensive definition of control risk. They suggested that control design strength, test strength, and test results affect an auditor's final assessment of control risk. They define control design strength as the control risk factors that affect the strength of the internal control systems. Test strength refers to the strength of auditors' compliance tests, and test results refer to the results of auditors' compliance tests. In this study, Libby et al. examined the effect of process susceptibility (i.e., inherent risk at the individual process level), control design strength and test strength on internal control reliance. The study concluded that: (1) an increase in control risk resulted in a greater reduction in control reliance for a more susceptible process; (2) a decrease in control design strength resulted in a greater reduction in control reliance for a more susceptible process; and (3) a decrease in test strength resulted in a greater reduction in control reliance for a more susceptible process. The auditor-subjects exhibited a moderately high degree of consensus.

Finally, Kreutzfeldt and Wallace (1990) and Icerman and Hillison (1990) examined the relationship between control risk assessment and error characteristics. Kreutzfeldt and Wallace (1990) studied whether variations in the effectiveness of control risk factors had a relationship to the occurrence of errors. They examined the error characteristics of 260 actual audit engagements randomly selected from the client base of Arthur Andersen & Co's 13 largest US offices. Their study indicated that a significant positive relationship existed between control risk and the number of errors detected. The authors then concluded that controls did have an effect on the occurrence of errors in the financial statements and that auditors should consider control risk when setting the scope of audit work. Icerman and Hillison (1990) partitioned the perceived control environment of the client into three levels: weak, adequate and strong. After analyzing the audit workpapers of 49 manufacturing companies for a three-year period, they found that, on average, more errors were associated with weak internal control systems than with strong internal control systems. Larger companies also tended to have stronger internal control systems.

The audit risk model specifies a positive relationship between control risk and the planned extent of audit evidence. Several studies have examined this relationship and the results have been mixed. For example, Mock and Turner (1981) examined the effect of internal control evaluation on the sample size decisions of auditors. In this study, near 200 auditors were requested to evaluate internal controls over a company's revenue cycle and make four sample size decisions. The findings indicated that neither the strength of internal controls nor the guidance method presented to the auditors significantly affected the audit scope decisions.

Following the experimental task of Mock and Turner (1981), Biggs and Mock (1983) used verbal protocol analysis to investigate the decision processes of four auditors in their evaluation of internal controls and audit scope decisions. They found that auditors differed significantly in their audit plans given the same internal control information. Also, a stronger internal control system did not necessarily lead to a lower planned extent of audit work. The authors concluded that the planned extent of audit evidence might also be affected by factors other than the strength of internal controls. In summary, the findings of these two studies did not support the hypothesis that there is a positive relationship between the control risk and the planned extent of audit evidence. The following research studies, however, did find different results.

First, Gaumnitz et al. (1982) studied the relationship between effectiveness of the internal control system and the subsequent extent of substantive testing. Thirty-five auditors from four big CPA firms performed experimental tasks which were adapted from Ashton (1974a, 1974b) and Joyce (1976). The authors found that inter-auditor consensus (0.70) for the internal control evaluations displayed consistency with Ashton (1974a), and that inter-auditor consensus (0.62) for the audit hour estimates was much higher than the consensus measure in Joyce (1976). More importantly, the auditor-subjects exhibited high intra-auditor consistency (0.83) which was reflected in the fact that when an auditor rated internal control strong, he/she planned for a fewer number of audit hours and vice versa.

Then, Tabor (1983), using an experimental approach, examined the relationship between internal control evaluations and the subsequent audit program planning decisions. One hundred and nine auditors from four large CPA firms participated in the experiment. The mean inter-auditor consensus on the reliability judgements and on the substantive test sample size decisions were 0.76 and 0.69, respectively. He concluded that there is an inverse relationship between the reliability of internal controls and the extent of sample size. In particular, auditors planned for more substantive tests when their assessments of control risk increased, which was reflected by assessing a particular internal control to be less reliable.

Further, Grobstein and Craig (1984) described the Ernst and Whinney audit approach as a risk analysis methodology that effectively operationalized the concept of AICPA SAS NO. 47. The Ernst and Whinney audit approach focused on the integration of the client's operating environment, financial and operating results and the system of internal controls in a formalized risk analysis, and by so doing it emphasized the inverse relationship between control risk and detection risk. This inverse relationship implied that the higher the control risk, the greater the extent of audit evidence. Also, in a related study, Cohen and Kida (1989) examined the impact of internal control reliability on the extent of audit testing. Given an initial audit plan, 96 auditor-subjects revised the initial audit plan based on analytical review results and the reliability of the system of internal control. The study concluded that the auditor-subjects assigned more hours for a weak internal control system than for a strong system.

2.3.4 Detection Risk

The audit risk model advanced by AICPA SAS No. 47 combines the risk of analytical procedures (AR) and the tests of details risk (TD) into one component called detection risk, which is the last of the three components and is discussed in this subsection. Many studies have examined detection risk, particularly using AR. This subsection only discusses those studies relating to the audit risk model, audit planning and/or auditor judgements.

Kinney (1979) noted that TD and AR differed in focus, potential effectiveness and cost behaviour. Normally, auditors can perform analytical procedures at less cost than tests of details. The author demonstrated how auditors could integrate analytical procedures (such as regression analysis) with tests of details (such as dollar-unit sampling) to achieve the same level of audit risk at a substantially reduced audit cost. This integration involved a trade-off between the planned extents of analytical procedures and of tests of details. Specifically, an increase in the use of analytical procedures would decrease AR. In order to maintain the same level of acceptable audit risk, the auditor can then increase the planned level of TD, and this would lead to a decrease in the extent of tests of details.

Blocher et al. (1983) examined auditors' analytical procedures judgements in the payroll audit area. Using 44 experienced auditors as subjects, they examined the effect of providing (1) a checklist of suggested analytical procedures, and (2) information on prior year's extent of tests of details on current year's planning and usage of analytical procedures. Consistent with

Kinney (1979), the results indicated that the auditor-subjects perceived analytical procedures and the tests of details to be substitutes for each other. The auditor-subjects also planned to perform more analytical procedures for the current year when there existed a lower extent of tests of details in the prior year. Finally, the auditors using a checklist planned to perform more analytical procedures.

In a previously mentioned study, Cohen and Kida (1989) examined the impact of analytical procedures' results, internal control reliability and experience on the use of analytical procedures by auditors. The findings indicated that when analytical procedures signalled errors, the auditors assigned more audit hours to the audit plan. However, most auditor-subjects were unwilling to reduce testing when analytical procedures signalled no errors.

Ameen and Strawser (1994) then conducted a questionnaire survey on the use of analytical procedures. A total of 100 Big Six and 90 non-Big Six auditors participated in the survey. The results indicated that higher inherent risk, higher control risk, and the increased likelihood of error in the current period resulted in auditors emphasizing tests of details rather than analytical reviews in their substantive testing approaches. The authors concluded that the use of analytical review procedures seemed most appropriate for (1) recurring audit engagements, (2) clients with an effective internal control structure, and (3) accounts having a low risk of material misstatement.

This completes the literature review of all the component risks. A suggested extension to the audit risk model relates to considering auditor business risk. The next section discusses the relevant literature on auditor business risk.

2.3.5 Auditor Business Risk

There is a lack of auditing studies testing the relationship between auditor business risk, audit risk, and audit planning decisions, a relationship which is a central part of this dissertation. Brumfield et al. (1983) suggested that there is a relationship between auditor business risk and the audit process. They identified three major elements of auditor business risk: (1) litigation; (2) sanctions imposed by public and private regulatory bodies; and (3) impaired professional reputation. Each of these elements alone or combined might cause injury or loss to a professional auditing practice. For example, litigation could involve lawyers' fees, court awards of damages or expensive settlements, out-of-pocket expenses and foregone revenue resulting from lost chargeable hours. Brumfield et al. asserted that high perceived auditor business risk could lead an auditor to do more audit work than would normally appear necessary to satisfy auditing standards, but under no circumstances would low perceived auditor business risk lead an auditor to do less work than the minimum level suggested by the auditing standards.

In a previously summarized study, Cushing and Loebbecke critically examined the AICPA audit risk model. They noted there that AICPA SAS NO. 39 requires the auditor to exercise professional judgement in determining the tolerable audit risk for a particular audit after considering "... such factors as the risk of material misstatement in the financial statements, the cost to reduce the risk, and the effect of the potential misstatements on the use and understanding of the financial statements". Cushing and Loebbecke claimed that if economic factors such as audit cost or the effect of potential misstatement pertain to the assessment of one or more component risks, then auditors should consider these factors subjectively and incorporate them into the audit risk model.

Clarke (1987) first proposed an expanded audit risk model in which auditors explicitly consider auditor business risk in determining the level of tolerable audit risk. The author argued that auditors might implicitly, if not explicitly, incorporate business risk into the assessment of audit risk in light of the recent escalation of litigation and the related increasing costs of insurance. Clarke proposed that high auditor business risk would reduce the level of tolerable audit risk (i.e., desired audit risk), while low auditor business risk would not affect the level of tolerable audit risk. However, he did not develop an expanded behavioral model incorporating an auditor business risk variable which could be tested, as is done later in this study.

Continuing further, Palmrose (1987) studied the role of business failure and management fraud in both legal actions brought against external auditors and the settlement of such actions. Based on a sample of 472 US cases involving the 15 largest CPA firms in the US from 1960-1985, he found that:

(1) More litigation against the auditors occurred during economic downturns;

(2) About 50 percent of the lawsuits involved business failure or clients with severe financial distress;

(3) About 44 percent of the lawsuits involved management fraud;

(4) About 23 percent of the lawsuits involved both business failure and management fraud;

(5) Management fraud cases most frequently led to payment of damages by auditors; and

(6) Cases of business failure without management fraud most frequently led to dismissal of the case against the auditors.

The author concluded that auditors still faced litigation claims relating to management fraud, even though auditing standards maintain that they have no responsibility for detecting management fraud.

Stice (1991; 1993) also has noted that lawsuits are a continuing source of concern for auditors, and that litigation alleging audit failure arises in nearly all cases of client failure. The author developed a model to aid in assessing the litigation risk in an audit engagement. The sample consisted of 49 firms whose auditors faced litigation and another 49 firms served as control group. It was concluded that information relating to a client's financial condition, ratio of accounts receivable to total assets, sales growth rate and market value can improve the ability to successfully identify high-risk audit engagements. This implies that poor financial condition, a high ratio of accounts receivable to total assets, a significant decline in sales growth, and a significant decline in market value all represent good predictors of high litigation risk.

Pratt and Stice (1994) extended Stice (1991; 1993) by examining the effects of client characteristics on auditor litigation risk judgements, required audit evidence, and recommended audit fees. A total of 243 audit partners and managers of four Big Six firms participated in the field experiment. The conclusion was that a client's financial condition significantly affected auditors' assessment of litigation risk and recommendations for audit plan and fees. More specifically, poorer financial condition related to higher levels of litigation risk, higher planned extent of audit evidence, and higher audit fees.

Bamber et al. (1993) suggested that the extent of audit evidence is related to the length of the audit report lag which is defined as the number of days between the client's fiscal year-end and the audit report date. The authors assumed that the longer is the audit report lag, the greater is the extent of audit work needed to be performed. Using data from 972 firms in seven industries for each of the three years studied, Bamber et al. (1993) found that auditor business risk, proxied by the dispersion of client share ownership and the weakness of client financial condition, positively correlates with the length of audit report lag. The results suggest that the higher is the auditor business risk, the greater is the extent of the audit evidence needed to be collected or the audit testing needed to be performed, proxied by the length of audit report lag.

The justification for using the concentration (dispersion) of client share ownership to proxy for auditor business risk was as follows (Bamber et al. 1993, p.5):

> ... The more widely held the client's shares, the greater the number of individual investors that rely on the client's financial statements. Greater reliance on the client's financial statements by diverse individual investors increases the client's (and the auditor's) exposure to litigation and adverse publicity, thereby increasing auditor business risk.

As expected, the more concentrated is the client ownership, the shorter will be the audit report lag, and this implies a lower extent of audit work needed to be performed.

With respect to client financial condition, the weaker or more vulnerable the client's financial position, the higher is the chance that the client will become bankrupt, thereby increasing auditors' probability of being sued for damages. This again leads to higher auditor business risk. As expected, there existed a positive relationship between the audit report lag and the vulnerability of the client's financial condition. Specifically, the more vulnerable is the client's financial position, the longer is the audit report lag and this implies a greater extent of audit work performed.

Trompeter (1994) then examined the effects of partner compensation schemes, generally accepted accounting principles (GAAP), and risk perceptions on audit partners' judgements. Fifty-four audit partners completed a series of hypothetical audit cases designed to allow varying ranges of acceptable accounting alternatives. The results suggested that auditors' perceived litigation risk made their judgements more conservative regardless of the compensation scheme or the range of acceptable accounting alternatives.

Finally, Walo (1995) examined the relationship between client characteristics and audit planning decisions. Thirty-two experienced auditors from two Big Six CPA firms participated in a field experiment. The client characteristics which were examined included a client's industry, ownership and financial condition. The results suggested that weak financial position and/or public ownership resulted in a higher planned extent of audit evidence. The auditors also perceived higher auditor business risk for a client with a weak financial position or the client was a public company. Walo concluded that auditors should consider both the client business risk and their own business risk in their evidential planning decisions. It should be noted that Walo also did not specify how the auditor business risk variable is related to the other variables in the auditors' behavioral model explaining the extent of evidential planning. Such a model is proposed later in this chapter.

Another factor that might also have a significant impact on audit scope decisions relates to materiality. The following subsection summarizes the pertinent research studies on materiality.

2.3.6 Materiality

The research studies summarized in this subsection identify materiality factors and their relationship to auditors' materiality judgements. Planning materiality and evaluation materiality represent two different concepts (AICPA

SAS NO.47). Planning materiality (see Section 1.3.1 for definition) represents a materiality level determined early in the audit for planning purposes, and this level may be modified due to circumstances arising during the audit. The revised planning materiality is then called evaluation materiality, which serves as a guide to the evaluation of audit results and the formation of an audit opinion.

Auditing standards require auditors to consider both quantitative and qualitative factors in making both types of materiality judgements. Friedberg et al. (1989) have pointed out that quantitative materiality factors relate to the absolute dollar size of a misstatement. Auditors can use these factors to determine planning materiality in the planning stages, and to evaluate misstatements discovered during the audit examination. Regarding qualitative factors, Friedberg et al. (1989, p.194) has stated that "qualitative materiality factors involve auditor consideration of nonmonetary aspects of errors, such as the nature of an item, special circumstances surrounding an item, and the uncertainty within which each item is evaluated". Although auditing standards require consideration of both quantitative and qualitative materiality factors, most prior research efforts have focused on the quantitative aspect of materiality.

Boatman and Robertson (1974) conducted a field experiment examining the evaluation materiality judgements of auditors and securities analysts. They constructed 30 hypothetical audit situations based on four quantitative and four qualitative materiality factors. Eighteen audit partners and 15 securities analysts classified those situations into three disclosure categories: no disclosure (i.e., immaterial), footnote disclosure or line-item disclosure. A discriminant analysis based on all subjects' responses correctly predicted 63 percent of the three category classifications. After reclassifying the categories into "disclosure" and "no disclosure", the predictive power went up to 84 percent. The cue of the net income effect, a quantitative materiality factor, accounted for 73 percent of the predictive power of the model. A simple "4 percent of net income" rule correctly predicted 65 percent of the classifications. There existed no statistically significant difference between the disclosure recommendations of the audit partners and the securities analysts.

Moriarity and Barron (1976) then extended Boatman and Robertson's (1974) study by using conjoint measurement techniques to assess auditors' evaluation materiality judgements. The authors constructed 18 sets of financial statements based on all possible combinations of three cues: net income, asset size and earnings trend. Fifteen auditor-subjects ranked the order of these financial statements according to the relative materiality of a $500,000 accounting error; 11 auditors' materiality judgements indicated consistency or near consistency with an additive (linear) model. A further analysis of these 11 auditors' responses showed that the net income effect constituted the most important factor in determining materiality.

In a similar study, Moriarity and Barron (1979) studied the planning materiality judgements of auditors. They required the auditor-subjects to specify planning materiality for 30 hypothetical audit situations based on variations of five financial variables: (1) net income, (2) total assets, (3) debt-equity ratios, (4) number of shares, and (5) earnings trend. The findings indicated a lack of consensus in both the materiality decisions and the relative weights assigned to the five financial variables, except that four of the five auditor-subjects weighted net income most significantly.

Subsequently, Firth (1979) conducted an experiment to study and compare the evaluation materiality/disclosure judgements of 150 subjects consisting of 90 auditors, 30 chief accountants and 30 investment analysts and bankers. The subjects recommended whether to disclose separately a gain or loss from the sale of a portion of a firm's activities. There existed large differences in disclosure recommendations across participant groups. However, the effect on income before extraordinary items represented the most important factor in determining subjects' disclosure judgements. This was followed by net assets, market capitalization and total assets.

Messier (1983) later conducted an experiment to analyze the various characteristics of evaluation materiality/disclosure judgements of audit partners. Twenty-nine audit partners made materiality and disclosure judgements on 32 hypothetical cases constructed based on five financial factors: (1) net income, (2) earnings trend, (3) total assets, (4) total inventories, and (5) current ratio. The findings indicated that 27 auditor-subjects placed significant weights on net income, while 13 auditors placed significant weights on the earnings trend. The auditors also displayed relatively high consensus, self-insight and stability.

Further, Reckers et al. (1984) conducted an experiment to study and compare the evaluation materiality judgements of 73 auditors, and 93 judges and lawyers. They examined five financial factors: (1) effect on net income, (2) effect on total assets, (3) effect on net cash flow, (4) effect on net working capital, and (5) effect on earnings trend. The subjects determined the need for a line-item disclosure of two given cases, and indicated the factor(s) they considered to reach a decision. The study concluded that participants used more than one factor to reach a judgement, but the most important factor was the percentage effect on net income.

Unlike previous studies which examined only a few qualitative materiality factors, Krogstad et al. (1984) investigated the impact of six qualitative and two quantitative materiality factors on the evaluation materiality judgements of auditors. The qualitative materiality factors investigated included: (1) industry trends, (2) primary users of financial statements, (3) management cooperativeness, (4) management's accounting policies, (5) strength of internal control, and (6) effect on earnings trend. It should be noted that the first five factors represented non-financial cues. The quantitative materiality factors included: (1) effect on net income and (2) effect on current ratio. A total of 10 audit partners, 11 audit seniors and 11 auditing students indicated the relative materiality of the proposed adjustment to the "Allowance for doubtful accounts" for 32 hypothetical cases. Consistent with earlier studies, the auditors focused primarily on the "effect on net income" in making the evaluation materiality judgements. Similarly, the "effect on earnings trend" factor remained the second important factor and explained much less of the judgement variance. The results also indicated that the auditors used nonfinancial information in making evaluation materiality judgements. However, many of these nonfinancial cues had statistically insignificant effects and there existed no consensus as to the most important nonfinancial cue. Finally, while audit seniors and partners exhibited similarity in making the evaluation materiality judgements, the accounting students could not serve as good surrogates for the professional auditors.

In another such study, Read et al. (1987) evaluated the planning materiality judgements of auditors. Ninety-seven auditor-subjects made preliminary materiality judgements for each of the four cases presented and indicated how they made those judgements. The results indicated that the auditors made significantly different planning materiality judgements, but inter-auditor consensus increased as the level of experience increased. Forty-five percent and 15 percent of the auditors used pretax operating income and total assets, respectively, as the basis for their planning materiality judgements.

The studies summarized above illustrate that the percentage effect of the misstatement on net income, a quantitative materiality factor, constitutes the most significant factor affecting the perceptions of materiality by auditors. In order to evaluate actual materiality judgements, however, Morris et al. (1984) and Chewning et al. (1989) reviewed audit reports issued during years when companies changed an accounting principle. Here they assumed that the effect of a change was immaterial if the auditor issued a clean opinion. Morris et al. (1984) examined auditors' judgements for the change of the capitalization of interest, and found statistically significant variations in the modification decisions with respect to the auditors' opinions. The effect on net income ranged from a high of 38 percent for a clean opinion to a low of one percent for a modified opinion.

Chewning et al. (1989) then examined the reporting decisions of auditors in 284 companies which implemented the following accounting changes during 1980-1983: foreign currency translation, LIFO adoption, and/or compensated absences. The results of the study suggested that auditors issued modified opinions for much smaller effects on operating income than was suggested by prior research. Specifically, auditors qualified 96 percent, 89 percent and 61 percent opinions in the 10 percent, 4-10 percent and 0-4 percent income effect category, respectively. The results also showed that auditors modified their opinions more frequently for a discretionary change (LIFO adoption) than for a non-discretionary change (i.e., compensated absences or foreign currency translation).

Rather than examining the audit reports and the corresponding financial statements, Friedberg et al. (1989), using actual audit manuals of six Big Eight CPA firms, identified 27 quantitative materiality factors which the auditors could use to establish materiality levels in the auditing process. They found that the CPA firms only consistently applied a relatively small number of quantitative materiality factors, and that the two most frequently mentioned quantitative materiality factor bases were net income before taxes and shareholders' equity. Prior research studies have shown the importance of "net income before taxes", but they seldom examined the effect of shareholders' equity on perceived materiality.

In an attempt to explain the mixed results regarding the effect of a particular balance sheet factor, Khalifa (1992) conducted a field experiment to examine the impact of a client's financial condition on auditors' evaluation materiality/disclosure judgements. Forty-two experienced auditors from five Big Six CPA firms participated in the experiment. The test results indicated that the auditor-subjects considered the income-related factors more important under strong financial conditions, but considered the balance sheet factors more important under weak financial conditions.

The two audit-structure papers published by Cushing and Loebbecke (1986) and Kinney (1986) have generated some research on the relationship between evaluation materiality judgements of auditors and audit structure (e.g., Icerman and Hillison 1991 and Hermanson 1993). The next subsection will review pertinent studies in the area of audit structure.

2.3.7 Audit Structure

In comparing audit methodologies of large CPA firms, Cushing and Loebbecke (1986) discovered that these firms had significant differences in their audit structure (see Section 1.3.1 for definition). A review of the literature identified several possible advantages and disadvantages of a structured audit methodology (Dirsmith and McAllister 1982a, 1982b; Cushing and Loebbecke

1986; Bamber et al. 1989). The first possible advantage relates to the use of a structured audit methodology in facilitating the quality control of audit work in the following manner:

(1) It facilitates compliance with auditing standards because the same general approach is followed for all audits.

(2) It facilitates compliance with all applicable accounting and auditing standards through the use of standard checklists, review procedures, etc.

(3) It can provide a standard format for documenting audit findings and conclusions that support the audit opinion issued.

The second possible advantage is that a structured audit methodology can facilitate the training of audit staff because it will be easier for trainees to learn and understand an audit methodology that is systematic, comprehensive and integrated. The third possible advantage is that a structured audit methodology can facilitate communication among audit staff because it provides a common audit terminology that can save audit staff time and reduce the possibility of misunderstandings of the requirements for each audit job. Also, another possible advantage is related to the belief that, given a very complex business and technical environment, a shift of control of audit decision making from the field auditors to the central firm can reduce the high cost of audit failure and minimize the actual audit cost.

However, shifting too much control away from the field auditors can have an adverse impact on the auditors because some field auditors may feel that this may reduce their ability to exercise discretion and judgement to an unacceptably low level. Another possible disadvantage of too much audit structure relates to the inflexibility in adapting to atypical audit environments exhibited by the uniqueness of each client. Thus, a too tightly structured audit methodology may be inefficient in low-risk audits because the auditors will be forced to perform procedures or create documentation that are not necessary in these less complex situations.

Consistent with the definition of audit structure, Cushing and Loebbecke (1986) found that firms with highly structured audit methodologies made extensive use of preprinted forms to provide explicit guidance for all stages of the audit process, utilized explicit criteria for evaluating risk and materiality to determine their overall audit approach to each engagement, and used highly publicized acronyms to describe key aspects of their audit approach. Audit firms with unstructured audit methodologies, in contrast, provided only limited guidance for almost all stages of the audit.

The study of Kinney (1986) also researched the voting patterns of the CPA firms on the AICPA Auditing Standards Board (ASB) regarding issues which occurred during the three-year period ending in 1984. A panel of experts consisting of four of the AICPA's statistical sampling subcommittee members and ASB members assessed the degree of audit structure of CPA firms. The inter-rater consensus of 0.80 suggested a high degree of consistency for the ratings. The experts rated Coopers and Lybrand, and Price Waterhouse as unstructured firms, Arthur Andersen, Arthur Young, and Ernst and Whinney as intermediate firms, and Deloitte Haskins and Sells, Peat Marwick Mitchell and Touche Ross as structured firms. Kinney concluded that these rankings were consistent with the rankings of Cushing and Loebbecke (1986). A total of 23 auditors from 22 CPA firms served on the ASB during the 1981-1984 period. The CPA firms' positions on six "controversial" issues were measured by the actual votes expressed by its members or by the firms' public position statements. The findings indicated that structured firms generally supported audit procedures and audit reporting proposals that added structured guidance, while unstructured firms generally opposed codification of such procedures and proposals.

Subsequently, Bamber and Snowball (1988) investigated the effect of audit structure on audit judgements. In particular, they examined whether task uncertainty would affect the degree of judgement consensus and the extent of use of coordination and control mechanisms. They concluded that there existed no statistically significant difference in consensus between auditors, but that auditors of structured firm tended to increase the use of certain control and coordination mechanisms (e.g., consultation with peers and audit managers) as the level of task uncertainty increased.

Bamber et al. (1989) then studied role conflict and role ambiguity as perceived by audit seniors of structured versus unstructured CPA firms.[8] Sixty-seven seniors of structured firms and 54 seniors of unstructured firms participated in their study. Auditors did not differ in the perceptions of role ambiguity and seniors of unstructured firms perceived significantly more role conflicts than those perceived by structured firm seniors. Bypassing the chain of command of their superiors represented the major source of perceived role conflict by seniors of structured firms. In addition, the lack of perceived authority to make necessary decisions, the inability to obtain accurate and timely information as needed, and the inability to adapt on a timely basis to changed circumstances constituted the major sources of perceived role conflict displayed by seniors of unstructured firms.

One other strand of audit structure research relates to the impact of audit structure on audit report lags (ARL) and earnings announcement lags (EAL). Williams and Dirsmith (1988) examined the relationship between audit

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[8] The authors define role conflict as the presence of incompatible pressures, and role ambiguity is defined as the presence of (1) nonexistent or unclear directives and policies, (2) uncertainty about authority, duties and relations with others, and (3) uncertainty as to the effect of behaviors on sanctions and rewards.

structure, the nature of information conveyed, and EAL for 679 US listed companies. They define EAL as the number of days between the client's fiscal year end and the earnings announcement date. The authors expressed the nature of the information conveyed in terms of "above expected earnings", "expected earnings" and "below expected earnings"; earning announcement dates were expressed in terms of "early" or "late". The results suggested that structured firms tend to have early releases of earnings that exceed expectations, while unstructured firms tend to delay the reporting of earnings that fall below expectations. Using EAL as a proxy for audit efficiency, Williams and Dirsmith concluded that structured firms would complete audits on a more timely basis when the clients experienced above expected earnings, while unstructured firms would complete audits more slowly when the clients had below expected earnings.

Newton and Ashton (1989) examined the relationship between audit report lag (ARL) and audit delay for over 300 Canadian listed companies from 1978 to 1982. ARL refers to the number of days between the client's fiscal year-end and the audit report date. Similar to EAL, prior research suggested that ARL has a positive relationship with the extent of audit evidence[9]. The authors classified CA firms according to Kinney's (1986) classification

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[9] Chapter Three further examines this positive relationship with the extent of audit evidence.

scheme. Contrary to Williams and Dirsmith (1988), who found a negative association, this study found a positive association between audit structure and ARL. In particular, clients of structured firms tend to experience longer ARL. In an attempt to reconcile the mixed results of the above two studies, Bamber et al. (1993) later developed a comprehensive model of the determinants of ARL. Their findings indicated that clients of structured firms experienced longer total ARLs (as in Newton and Ashton (1989)), but experienced shorter abnormal lags because structured firms could adapt more quickly to unanticipated events.

Another strand of research on audit structure concerns the impact of audit structure on materiality judgements (King 1988; Morris and Nichols 1988; English 1989; Eyler 1990; Iceman and Hillison 1991; Hermanson 1993). King (1988) conducted a field experiment to examine individual and team planning materiality judgements in structured and unstructured CPA firms. Sixty-four experienced auditors from three Big Eight[10] CPA firms (one structured, one intermediate structured, and one unstructured, following Kinney's (1986) classification) participated in the experiment. After reading three sets of financial statements representing the same hypothetical company with three different income levels, the auditors made planning materiality

[10] The Big Eight firms have become the Big Six firms. Deloitte Haskins & Sells and Touche Ross merged into Deloitte Touche Tohmatsu. Ernst and Whinney and Arthur Young merged into Ernst and Young. This study uses Big Six and Big Eight CPA firms interchangeable depending upon when the study was conducted.

judgements for each of the cases. The results suggested that changes in net income significantly affected the planning materiality judgements of auditors. While income related factors were found to be most important in the planning materiality judgements, other qualitative materiality factors such as client related and environmental factors were also considered to be important. Finally, no statistically significant difference existed in inter-auditor consensus between auditors of structured and unstructured firms or between individual judgements and group judgements.

Further, Morris and Nichols (1988) examined the relationship between the consensus of evaluation materiality judgement and audit structure in their study of interest-capitalization consistency opinions. Based on the financial information in the published annual reports of 334 US listed companies, they found a significant positive association between the judgement consensus of auditors and the degree of audit structure. More specifically, they found that "... materiality decisions of structured CPA firms are modeled more successfully, implying more consensus, fewer Type I and Type II errors in total and, thus, lower costs due to judgement error than for unstructured firms" (Morris & Nichols 1988, p.253).

To study the impact of time pressure, audit structure and client size on the evaluation materiality judgements of auditors, English (1989) conducted a laboratory experiment. Using a full factorial experimental design, 69 experienced auditors were required to formulate a materiality threshold (in dollars) for an obsolete inventory problem that arose later in the audit. He found that audit structure interacted with time pressure to affect the judgement consensus of auditors. In particular, auditors of structured firms exhibited greater judgement consensus under high time pressure than auditors of unstructured firms. English also found that audit client size, and the interaction between time pressure and client size had a statistically significant effect on the evaluation materiality judgements of auditors. Further analysis of auditor-subjects' information acquisition patterns indicated that eight items were found to be important in the materiality decisions: current assets, financial statement users, inventory balance, pretax income, profitability trend, net income, sensitive transactions and total assets.

In another study, Eyler (1990) studied the effects of task setting and audit structure on auditors' materiality judgements made during the planning stage of an audit. The study concluded that audit structure and audit client scenario (low vs. high level of uncertainty) jointly affected the materiality estimates of auditors. More specifically, the most structured firm had the lowest materiality estimates for the hypothetical audit client constructed with a low level of uncertainty, but it had the highest materiality estimates for the hypothetical audit client constructed with a high level of uncertainty.

Subsequently, Icerman and Hillison (1991) examined the impact of the relative error size and audit structure on auditors' judgements of evaluation materiality, a variable which is reflected in auditors' decisions to either book or waive the detected errors. Based upon the information of over 1,400 actual errors contained in the working papers of 49 manufacturing companies over a three-year period, evaluation materiality judgements were modeled as a function of the relative error size and audit structure. The results indicated that error disposition (book or waive) was a function of relative error size and audit structure. Structured firms, compared to less structured firms, tended to book a greater proportion of individual errors. The average booked errors were also positively related to net revenues and were generally within the 95 percent materiality confidence interval suggested by Warren and Elliott[11] (1986).

In a more recent study, Hermanson (1993) found that audit structure played an important role in auditors' error projection decisions. Here, the author required the auditor-subjects to evaluate sampling errors detected in accounts receivable confirmations and then to determine whether to project the

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[11] Warren and Elliott (1986) use the following formula for the determination of the materiality level: materiality = 0.038657 $(\text{Revenue})^{.867203}$.

errors to the population (account balance). The findings indicated that auditors of the more structured firms projected more errors than those of the less structured firms. One explanation for this is that the strict guidance in place at the structured firms does not allow auditors to "rationalize away" errors as isolated incidents. Hermanson's findings are consistent with those of Iceman and Hillison (1991).

Focusing on inherent risk, Dirsmith and Haskins (1991) considered the role of the degree of audit structure in auditors' assessments of this risk. The results of a five-phase field study revealed that auditors of unstructured firms, when compared to auditors of structured firms, perceived a wider variety of client dimensions which would influence their inherent risk assessments, and those dimensions (e.g., employee procedures and top management's characteristics) were more qualitative in nature.

In an attempt to provide evidence on the effect of audit structure on competitiveness, Kaplan et al. (1990) investigated the association between the degree of audit structure and the degree of stability in the client's environment. They argued that a relatively unstructured audit approach is likely to be cost efficient for a client in an unstable environment, while a relatively structured audit approach is likely to be more efficient for a client in a stable environment. Based upon a sample of US publicly traded firms for the fiscal years 1976 and

1986 and using Bourgeois' (1985) environmental stability measure, the authors found that clients in stable (unstable) environments displayed higher degrees of preference for structured (unstructured) auditors.

Subsequently, Tuntiwongpiboon and Dugan (1994) investigated the relationship between the degree of audit structure and client attributes. They contended that one type of audit structure would be more suitable and efficient for a certain type of client than other types of audit structure. The client attributes examined included risk, environmental uncertainty, size, financial leverage and managers' ownership. Based upon an ordinal logit analysis of a sample of US publicly held companies for the fiscal year 1988, the authors did not find a statistically significant relationship between those client attributes and the degree of audit structure.

Finally, Gist (1994) examined the effect of audit structure on audit pricing. Based on a questionnaire survey of 108 US listed companies, Gist found that audit pricing by structured firms is lower, on average, than audit pricing by unstructured or intermediate-structured firms. Using audit fee as a surrogate for audit cost, Gist suggests that audit production costs are lower, on average, when a structured audit approach is employed compared to other approaches, i.e., a structured approach improves audit efficiency.

This subsection has reviewed literature relating to audit structure. In addition to previously discussed variables, auditor personality can also affect audit planning decisions. The next two subsections will, therefore, review accounting studies concerning two surrogates of personality, namely, tolerance for ambiguity and risk attitude.

2.3.8 Tolerance For Ambiguity

This subsection summarizes the pertinent research studies relating to the impact of tolerance for ambiguity (TA) on accounting and auditing decision making (see Section 1.3.1 for definition of TA). First, Dermer (1973) studied the relationship between TA and the perceived importance of information. He asserted that individuals low on TA perceive ambiguous situations as a source of threat and behave in a manner that is perceived to reduce this threat. Such individuals will reduce the threat by collecting more information or by manifesting a preference for readily interpretable stimuli. In this study, 44 sales supervisors and managers indicated how many of 72 given job aspects they considered to be unimportant in performing the work of a manager. As hypothesized, the findings showed that individuals low on TA perceived more information to be important and used them more readily than individuals who were high on TA.

Oliver and Flamholtz (1978) then conducted a laboratory experiment examining the perceived information content of data on the replacement costs of human resources. Seventy-three students participated in the experiment. Consistent with the theory, the findings concluded that individuals low on TA accepted accounting information more readily than individuals high on TA.

McGhee et al. (1978) further examined the effects of TA on the information processing of an individual. Twenty-four MBA students participated in a laboratory experiment, and the results suggested that there existed no relationship between TA and individual judgements, judgement confidence, and the desired amount of evaluative information. The authors noted that the results should be interpreted with caution because the study used a laboratory experiment with student subjects. Faircloth and Ricchiute (1981) examined the relationship between TA levels of accountants and their desires for financial reporting alternatives. The results from a questionnaire survey indicated that there existed no relationship between TA and the desire for financial reporting alternatives.

The statistically insignificant results of the above studies led some accounting researchers to conclude that there might be little point in studying the effects of personality on accounting decision making (Ashton 1982).

However, a seminal study that first demonstrated the importance of TA was conducted by Gul (1984).

Gul (1984) examined both the joint and moderating role of TA and field dependence on decision making. Forty-six managers of electronic companies in Malaysia participated in a laboratory experiment in which they made a decision regarding personnel layoff and answered a question regarding their confidence in having made an optimal decision. Unlike prior studies which used the Budner Scale to measure TA, Gul used MacDonald's (1970) Scale[12]. The findings indicated that there existed no significant effects for TA alone, but when field dependence was taken into account, the interacting effects on decision confidence were statistically significant. This suggested that in subsequent research TA should be viewed as a moderating variable.

A later study by Gul (1986) extended Gul (1984) by examining the interacting effects of auditors' opinions and TA on the decision making of bankers. Gul (1986, p. 104) argued that "... a qualified report, because of the ambiguity or uncertainty it creates, causes individuals to react differently in terms of their confidence depending on whether they are high or low on TA". The findings suggested that individuals low on TA felt less confident than

[12] Chapter Four, Section 4.7, "Research Instrument", discusses the MacDonald Scale in detail.

individuals high on TA as a result of a qualified audit report. There existed no differences in bankers' confidence in their decisions in cases of an unqualified report.

Following the research of Gul, Pincus (1991) then examined the relationship between three auditor individual differences (tolerance for ambiguity, field dependence or independence, and category width) and fairness of presentation judgements. In this study, 114 auditor-subjects evaluated the fairness of presentation of an inventory account for a hypothetical case based on a real client situation. Unknown to the auditor-subjects, the inventory account contained material misstatements due to management manipulation. The author classified the subjects into high or low TA based upon their test scores for the MacDonald Scale. The findings indicated that auditors low on TA made more judgements consistent with the misstated nature of the inventory account than auditors high on TA.

More recently, Gul (1993) examined the interactive effect of TA and evaluation materiality on auditors' audit opinion preferences; Tsui (1993) examined the moderating effect of TA on bankers' perceptions of loan risk; Gul and Tsui (1994) examined the moderating effect of TA on bankers' perceptions of auditor independence; and Majid and Pragasam (1997) examined the moderating effect of TA on auditors' litigation avoidance behaviour[13]. Both studies' results showed TA to be a statistically significant variable. This completes the literature review on TA. The following subsection discusses the literature relevant to the auditor risk attitude variable.

2.3.9 Auditor Risk Attitude

Only a few studies have examined the role of auditor risk attitude in the audit process. Clarke (1987) conducted an experiment to examine the impact of risk attitudes and perceptions of auditors on their audit risk assessments (in terms of audit scope)[14]. To ensure that the subjects were familiar with the experimental audit task, only auditors with experience in a supervisory role on the audit of a manufacturing firm were selected as subjects. As a result, 44 experienced auditors from a big CPA firm participated in the experiment. Their average audit experience and supervisory experience amounted to 31 months and 19 months, respectively. In order to reduce the risk of cognitive strain and the related response biases, the experimental task was administered in two sessions: (1) risk attitude and perception measurements, and (2) the audit case scenario. The sequencing of the two sessions was randomized to avoid possible

[13] Chapter Three further describes these studies.
[14] Chapter Three discusses this study in detail.

biases due to ordering. The findings indicated that auditors' degrees of risk aversion affected their planning decisions.[15]

Farmer (1993) then conducted an experiment to examine the effect of risk attitude on auditor judgements using multiattribute utility theory. The author classified 15 auditors as risk-preferring or risk-averse based upon their multiattribute utility functions. After reading through the background information of a hypothetical case, the auditor-subjects assessed the reliability of the internal control systems in 42 cases with different results of compliance tests. The findings indicated an average auditor consensus of 0.80, and there existed no statistically significant difference in consensus between the risk-averse and risk-preferring auditors. Farmer concluded that future studies could examine whether different levels of risk posed by the various internal control systems would affect the planning decisions of auditors differently, depending on their risk attitudes.

[15] Clarke classified auditors into "risk-seeking" and "risk-averse". However, "risk-seeking" represents an unusual classification of auditor risk attitude because auditors rarely possess a risk-seeking attitude. A more appropriate term for "risk-seeking" would be "low degree of risk-aversion".

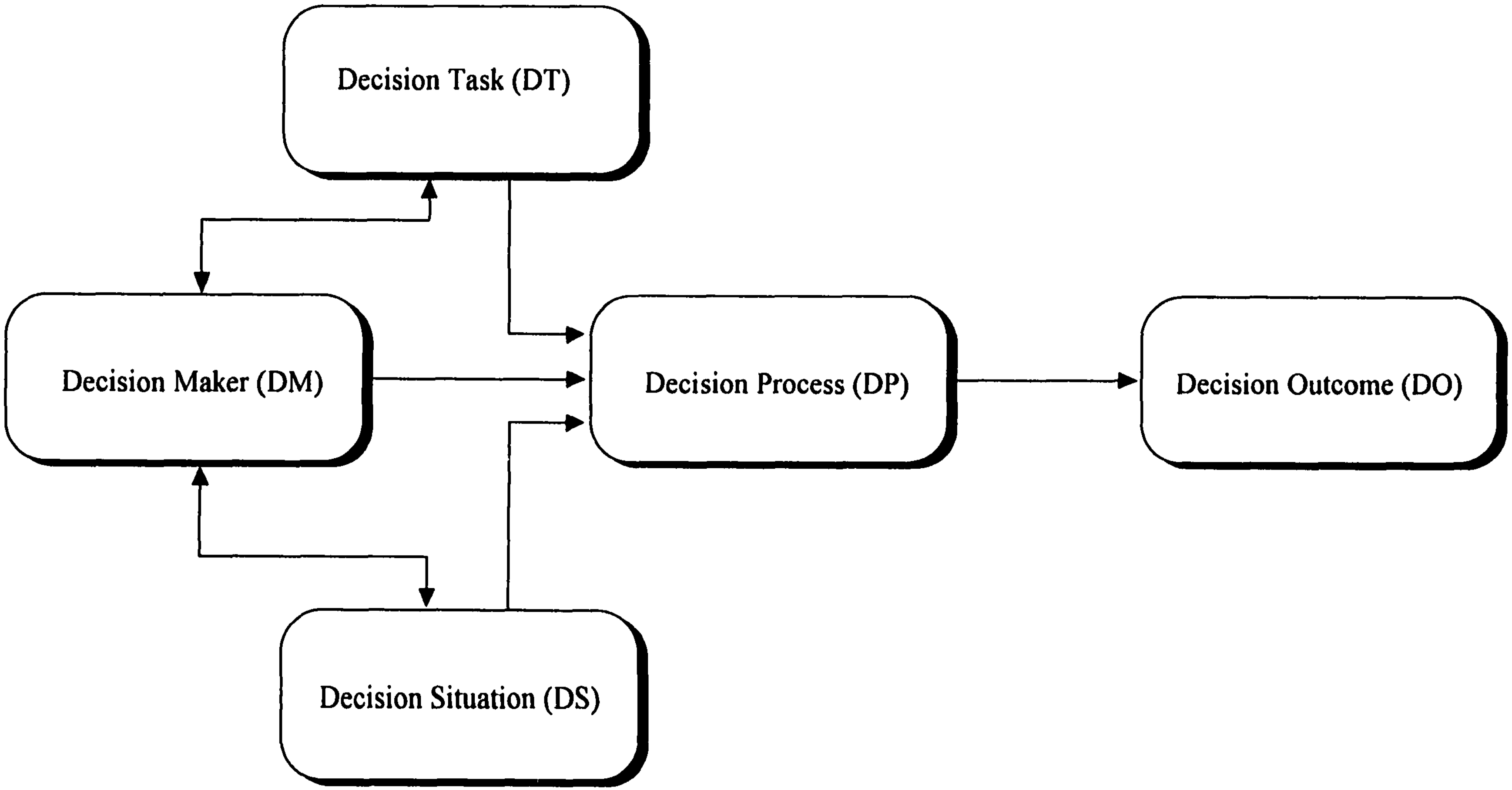
2.4 THEORETICAL FRAMEWORK FOR AUDITORS' EVIDENTIAL PLANNING DECISION MAKING

This section first describes a general decision making model postulated by Hunt et al. (1989). The model advocates an interactionist perspective to decision making and provides the basis for a theoretical framework which may be used to empirically examine the determinants of auditors' evidential planning decisions using an interactionist approach.

As shown in Figure 2.1, the general decision making model of Hunt et al. (1989) takes into consideration the interaction effects of the decision maker, decision task and decision situation on both the decision process and ultimate decision outcome. They explained each component of the model as follows:

> (1) The decision maker may be viewed as a stable personality bringing to a task certain beliefs, predispositions, skills, experience, and a distinctive cognitive style.
>
> (2) The decision task depicts a "demand" property of an actor's environment that serves to focus attention. The task can be described in terms of its structure and content.
>
> (3) The decision situation refers to the ecological or contextual conditions, both conceptual and circumstantial, in which both the decision maker and task are embedded.
>
> (4) The decision process is a complex variable which signifies an array of implicit "strategies" and explicit behavioral "events" distributed over several "stages" preliminary to and resulting in response selection.
>
> (5) The decision outcome comprises postdecision performance output.

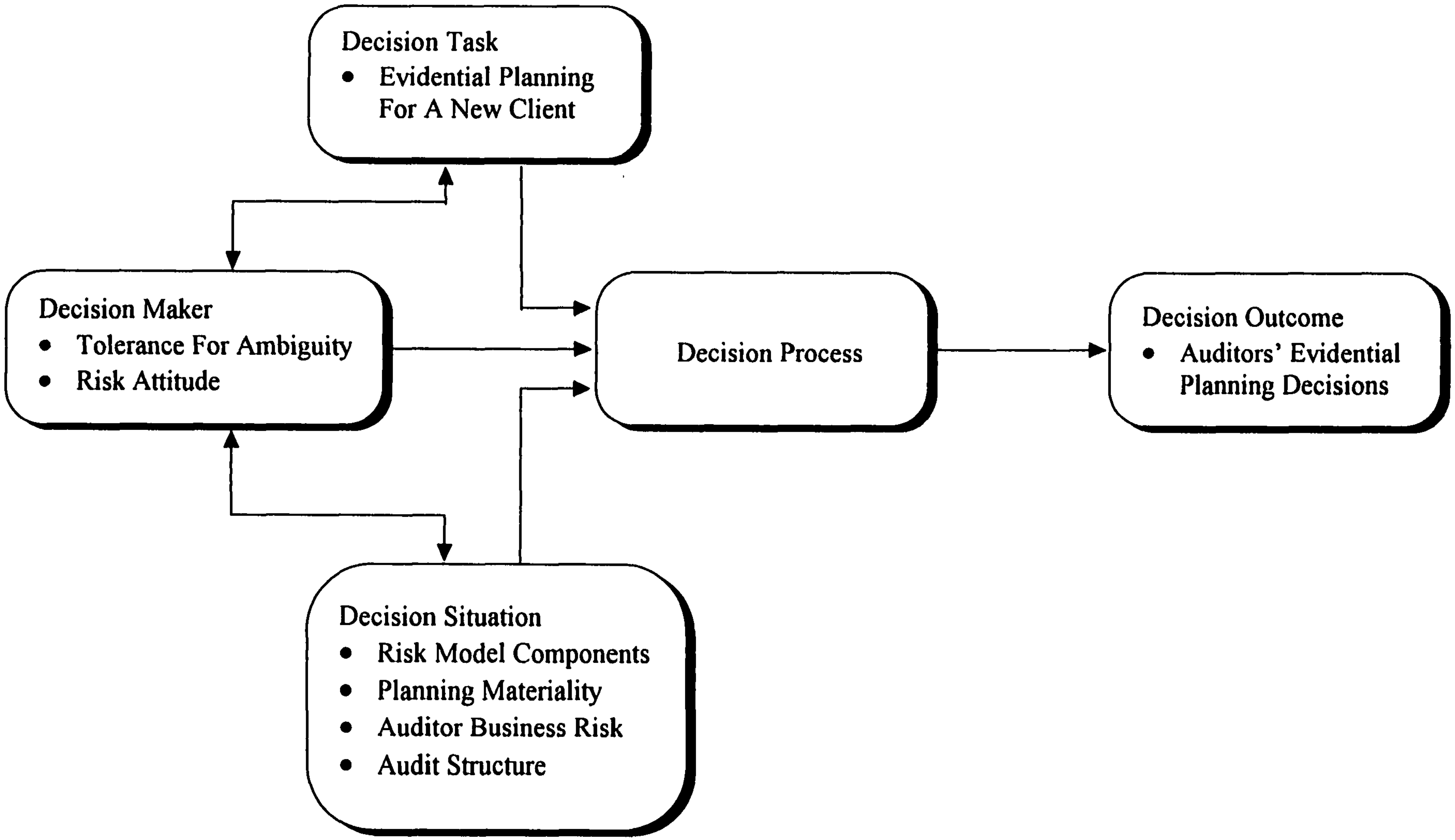
Figure 2.1 A Model of Decision Making



Source: Hunt et al. (1989, p.440)

Based on Hunt et al.'s model, a theoretical framework for auditors' evidential planning decision making is developed which is shown in figure 2.2. As illustrated, this study focuses specifically on relationships between decision makers' personality (tolerance for ambiguity and risk attitude), the decision situation (audit risk model, planning materiality, auditor business risk and audit structure), and the decision outcome (auditors' evidential planning decisions) given a specific decision task (evidential planning for a new audit client).

Figure 2.2 Theoretical Framework For Auditors' Evidential Planning Decision Making



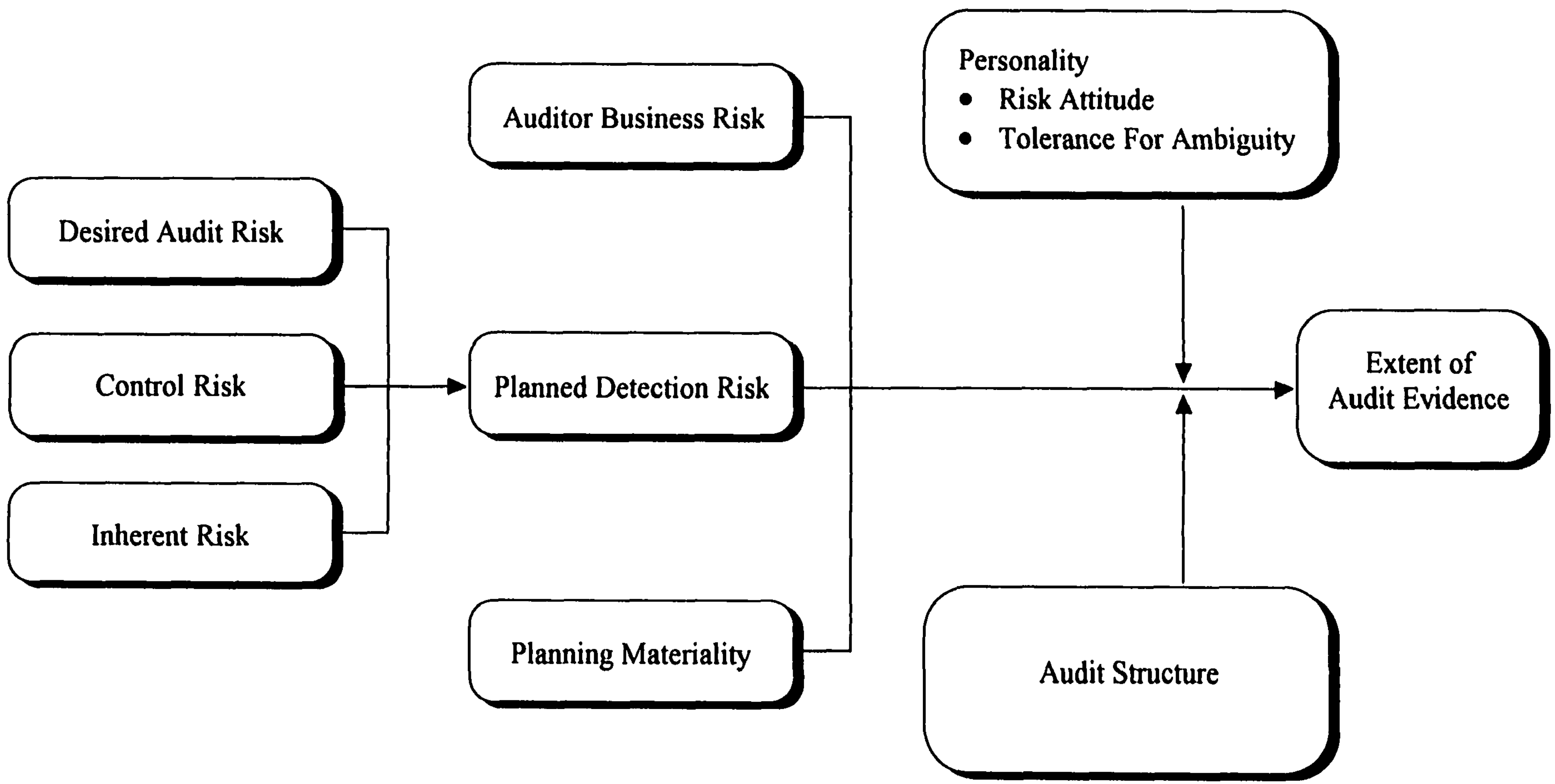
2.5 EMPIRICAL MODEL FOR AUDITORS' EVIDENTIAL PLANNING DECISION MAKING

A synthesis of the professional standards and auditing literature reviewed in previous sections suggests that the following variables exert a significant influence on the evidential planning decisions of auditors:

1. Inherent risk
2. Control risk
3. Desired audit risk
4. Auditor business risk
5. Planning materiality
6. Audit structure
7. Tolerance for ambiguity
8. Auditor risk attitude

Figure 2.3 portrays an empirical evidential planning model which integrates the above variables and therefore provides a comprehensive and realistic characterization of the evidential planning process of auditors and helps to explain the extent of judgement consistency. This empirical model is based on the general decision making model of Hunt et al. (1989) and the theoretical framework described in the preceding section. While following paragraphs present an overview of this behavioral model, Chapters Three and Four will discuss each element of the model in detail.

Figure 2.3 Empirical Model For Auditors' Evidential Planning Decision Making



The model suggests that the first five variables mentioned above represent independent variables, and thus have direct influences on auditors' evidential planning decisions which is then operationalized in terms of the planned extent of audit evidence[16]. The first three variables, namely, inherent risk, control risk and desired audit risk relate to the audit risk model. In addition to the risk model components, auditors also consider auditor business risk, the fourth variable, which takes into account the possible economic effects of a potential misstatement. With regard to planning materiality, the fifth variable, professional standards and prior research findings on evaluation materiality suggest that auditors consider planning materiality in determining their evidential planning decisions.

The proposed behavioral model focuses on the interactive effect of audit structure (the sixth variable). A review of the literature has suggested that audit structure could affect the audit planning process. The model, therefore, posits that audit structure will moderate the relationship between the five independent variables and auditors' planned extent of audit evidence.

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[16] Chapter Three, Section 3.2, "Auditors' Evidential Planning Decisions", discusses this operationalization in detail.

As a previous review of the psychological and auditing literature[17] also has suggested, the personality of the auditor affects his/her decision making. The model, therefore, posits that risk attitude and tolerance for ambiguity, two personality variables, moderate the effects of the five independent variables on the planned extent of evidence of auditors.

In summary, the above proposed behavioral model represents a comprehensive and integrated evidential planning model that can be empirically tested. The model makes the following unique contributions to the literature. First, it has expanded the current audit risk model by explicitly considering the effects of auditor business risk. Second, the model considers the interactive effect of both risks and planning materiality in determining the planning decisions of auditors. Third, the model takes into account the moderating effect of audit structure of a CPA firm on the relationship between risks, materiality and planned extent of audit evidence. Finally, the model explicitly considers the moderating effect of auditor personality on the planning judgements of auditors.

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[17] These have been reviewed in Subsection 1.3.1.5, Subsection 2.3.8 and Subsection 2.3.9.

2.6 THE BRUNSWIK LENS MODEL

The Brunswik lens model provides a useful approach for studying and evaluating audit judgement under uncertainty. Strawser (1985, p.42) noted:

> The Brunswick lens model, initially developed by Egon Brunswick (1952) has been used as a primary method of providing the conceptual framework by which the judgement process of an individual may be analyzed. This model not only provides a method for the conceptual analysis of the judgement process, but also enables researchers to analyze quantitatively the judgement process using regression and analysis of variance (ANOVA) techniques.

Libby (1981) and Ashton (1982) provided in-depth reviews of the Brunswik lens model. This section provides a brief summary of that model.

The lens model portrays the individual (e.g., an auditor) judging a criterion variable (e.g., satisfactory completion of the audit) that cannot be directly observed through a "lens" of cues (e.g., inherent and control risks). The relationship between these cues and both the criterion variable and the judge remains uncertain. Here, the lens model assumes that the world consists of two parts: (1) the environment, represented by the left side of the lens, and (2) the individual's judgement system, represented by the right side of the lens. The lens model examines the relationship between the environment and the judge's representation of that environment. The model focuses on judgement accuracy, which measures the extent to which the judge's responses agree with the environmental event. Regression and analysis of variance (ANOVA) constitute two widely used statistical approaches for lens model studies.

2.6.1. Regression Approach

Figure 2.4 presents the regression formulation of the lens model. The model includes three elements: (1) the task environment; (2) the criterion event (Y_e); and (3) the judge's estimate of the event (Y_s). The task environment refers to the cue set (X_1, X_2, ..., X_k) and the matrix of intercorrelations between cues (r_{ij}). A series of correlation coefficients represent the relationships among the three elements.

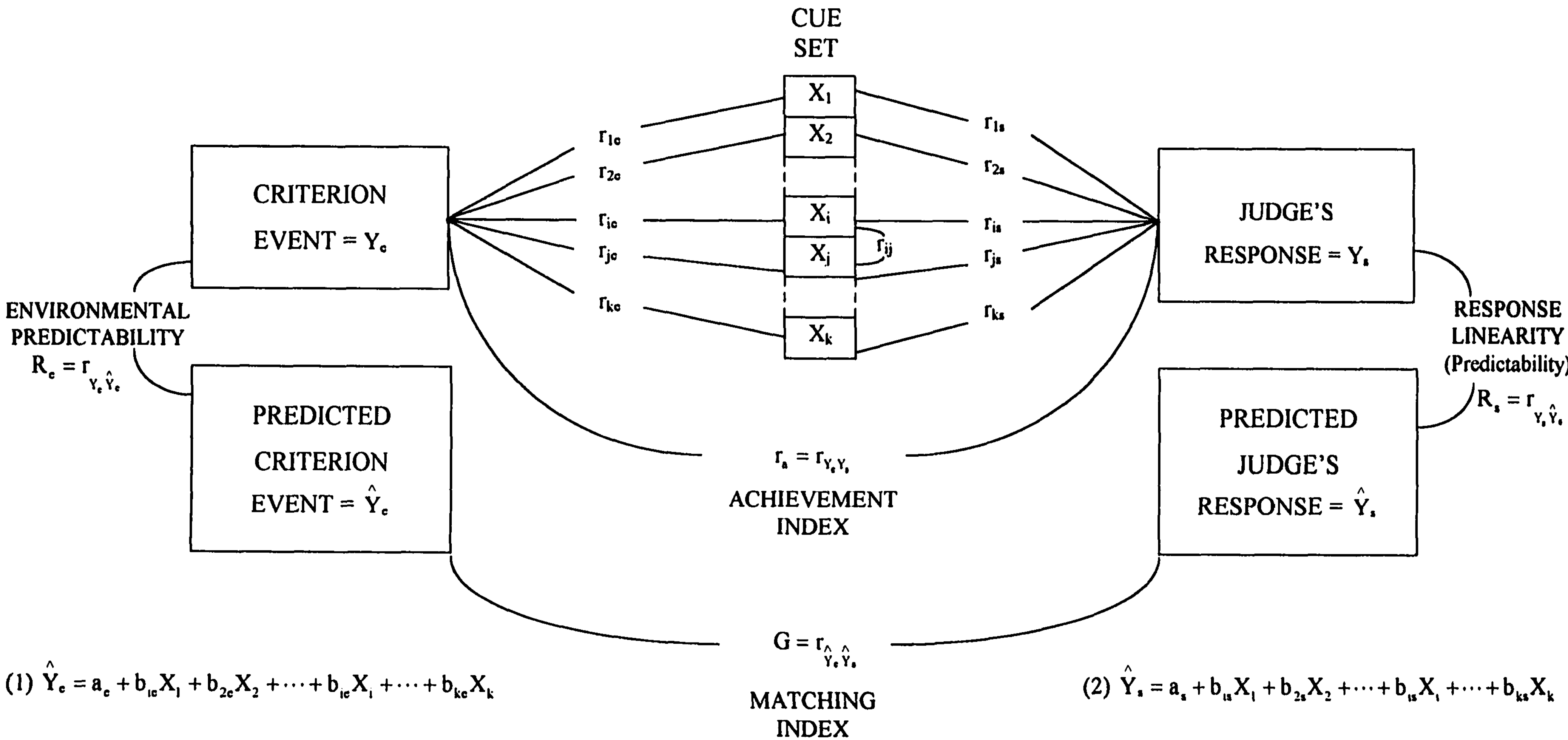
On the environmental (left) side of the model, ecological validity of a cue (r_{ie}) refers to the correlation between the cue (X_i) and the criterion event (Y_e), and thus measures the relevance of the cue to predicting the criterion event. The following linear regression model represents the multivariate relationship between all of the cues and the criterion event:

$$\hat{Y}_e = a_e + b_{1e}X_1 + b_{2e}X_2 + \ldots + b_{ke}X_k, \qquad Y_e = \hat{Y}_e + u_e$$

The environmental predictability ($R_e = r_{Y_e \hat{Y}_e}$), which indicates the relevance of the complete cue set to predicting the events, refers to the correlation between the criterion event (Y_e) and the model's prediction of the criterion event ($\hat{Y}_e$).

Figure 2.4

Regression formulation of the lens model
Source: Libby (1981, Figure 2.1)



(1) $\hat{Y}_e = a_e + b_{1e}X_1 + b_{2e}X_2 + \cdots + b_{ie}X_i + \cdots + b_{ke}X_k$

(2) $\hat{Y}_s = a_s + b_{1s}X_1 + b_{2s}X_2 + \cdots + b_{is}X_i + \cdots + b_{ks}X_k$

On the decision maker's side of the model, the utilization coefficient of the cue (r_{is}) measures the decision maker's reliance on that cue to formulate his/her response (judgement), and constitutes the univariate correlation between the cue (X_i) and the response (Y_s). The following linear regression model represents the multivariate relationship between all of the cues and the decision maker's responses:

$$\hat{Y}_s = a_s + b_{1s} X_1 + b_{2s} X_2 + \ \dots\ + b_{ks} X_k, \qquad Y_s = \hat{Y}_s + u_s$$

The response linearity ($R_s = r_{Y_s \hat{Y}_s}$), which indicates the predictability or consistency of the judgement, refers to the correlation between the actual judgement (Y_s) and the model's prediction of the judgement ($\hat{Y}_s$). The correlation of the predictions of the two linear regressions constitutes the matching index ($G = r_{\hat{Y}_e \hat{Y}_s}$), which measures the accuracy of the weighting of the cues relative to their weighting in the environment. Finally, the achievement index ($r_a = r_{Y_e Y_s}$), which provides a direct ex-post measure of judgement accuracy, refers to the correlation between the judge's response and the environmental event. The achievement index also equates with the multiplication of the matching index (G), environmental predictability (R_e), and response linearity (R_s).

Many researchers consider the regression form of the lens model as a useful representation of human judgement policies. On this matter, Libby (1981) concluded that linear models can account for most of the variance in human judgement, in spite of the fact that people's judgement rules are not always linear, and that people appear to rely on a relatively small subset of available data. Libby (1981), Joyce and Libby(1982), Ashton (1982), and Solomon and Shields (1995) provided reviews of accounting and auditing studies using the regression approach of the lens model.

2.6.2 ANOVA Approach

Hoffman et al. (1968) used the ANOVA approach to conduct a pilot study in which nine radiologists participated in an experiment to evaluate their judgements of the malignancy of gastric ulcers. Major issues of concern included consensus, stability and self-insight. Since then, a variety of judgement studies in auditing, including this research study, have adopted the ANOVA approach.

In a typical ANOVA study, the researcher utilizes a set of cues and partitions each cue into a few discrete levels. The researcher then requires the participant to make judgements based on a series of hypothetical cases. These hypothetical cases consist of all possible combinations of cue levels in a full factorial design or include a special sampling of these combinations in a fractional replication study[18]. By analyzing changes in judgement (dependent variable) for the various combinations of cue levels, the researcher quantifies both the main and interaction effects of the independent variables in terms of significance statistics (e.g., F ratios) and related strength-of-association statistics (e.g., omega squared (ω^2)). The resulting ω^2 statistics measure the percentage of the variance in the dependent variable accounted for by the individual cues (the main effects) and the interactions of the cues. A cue's ω^2 indicates the squared utilization coefficient of the cue (r^2_{is}), and the sum of all ω^2 statistics represents the squared response linearity (R^2_s).

Earlier sections of this chapter provide a review of those ANOVA studies that are pertinent to the research interest of this study.[19] Many of these accounting studies also employ the policy capturing method discussed in the following section.

2.7 POLICY CAPTURING

Solomon and Shields (1995) noted that audit judgement and decision making research in auditing widely use policy capturing to model judgement policies of auditors, and have identified 28 experimental studies which

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[18] Chapter Four discusses fractional replication in detail.

[19] Libby (1981), Joyce and Libby (1982), Ashton (1982), and Solomon and Shields (1995) provided reviews of other accounting studies not summarised in this research study.

empirically modeled the judgements of auditors[20]. Table 2.1 shows that these studies are mainly concerned with cue usage and judgement consensus, and that relatively few studies have examined judgement stability, self-insight and accuracy[21]. The following paragraphs further discuss these points.

Twenty-one of the 28 studies examined cue usages, which aimed at capturing the policies underlying the particular judgement examined. Typically, there existed only four to six significant cues, and auditor-judges had statistically significant different patterns in cue usage. The relative importance of cues conformed to auditing standards. Nineteen of the 21 studies found that configural cue usage (i.e., interaction effect) seldom existed.

Further, 22 of those studies examined consensus. The findings indicated an unweighted average consensus of 0.59 (ranged from a high of 0.93 to a low of 0.28), where 1.0 indicates complete agreement. Solomon and Shields (1995) noted that the same studies showed higher levels of consensus than those reported in nonaudit judgement studies. Stability was examined in 9 studies and

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[20] Solomon and Shield (1995) restricted their review to studies employing practicing auditors as subjects and to papers published in the following five journals before 1992: Accounting, Organizations and Society; Auditing: A Journal of Practice and Theory; Contemporary Accounting Research; Journal of Accounting Research; and The Accounting Review.

[21] Chapter One, Section 1.3.2, "Judgement Quality", defined judgement consensus, stability and self-insight and justified their use as appropriate evaluation criteria of judgement quality.

they showed an unweighted average stability of 0.86 (ranged from 0.73 to 0.98). Seven of the 28 studies examined auditors' self-insight. The average auditors' self-insight of those studies ranged from 0.53 to 0.89. Only four of the studies examined accuracy with an unweighted average of 0.73.

Twenty-five of the 28 studies generated cues using factorial designs (mostly fractional replications), and modeled auditor-subjects' judgement policies using ANOVA, conjoint measurement or the analytical hierarchy method[22]. Earlier sections of this chapter have reviewed those policy capturing studies that are pertinent to the research interest of this study.[23]

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[22] This dissertation study employs a factorial design with fractional replication using ANOVA which appears in Chapter Four.

[23] Libby (1981), Joyce and Libby (1982), Ashton (1982) and Solomon and Shields (1995) provided reviews of those policy capturing studies that are not summarized in this research study.

Table 2.1

Policy Capturing Studies

	Judgement/decision evaluation criteria					
Audit process activities	Consensus	Cue usage	Stability	Consistency	Self-insight	Accuracy
1. Orientation	Colbert (1988)	Colbert (1988)	Colbert (1988)		Colbert (1988)	
2. Evaluate accounting information-system architecture	Ashton (1974a) Ashton & Brown (1980) Gaumnitz et al. (1982) Hamilton & Wright (1982) Mayper (1982) Abdel-Khalik et al. (1983) Brown (1983) Tabor (1983) Schneider (1984, 1985) Kaplan (1985) Meixner & Welker (1988) Brown & Solomon (1990)	Ashton (1974a) Ashton & Brown (1980) Hamilton & Wright (1982) Brown (1983) Schneider (1984, 1985) Kaplan (1985) Mayper et al. (1989) Brown & Solomon (1990)	Ashton (1974a) Ashton & Brown (1980) Abdel-Khalik et al. (1983) Brown (1983) Meixner & Welker (1988)	Gaumnitz et al. (1982) Schneider (1985)	Ashton & Brown (1980) Hamilton & Wright (1982) Brown (1983)	
3. Tactical Planning	Brown & Solomon (1991)	Brown & Solomon (1991)				

(to be continued)

Table 2.1 (continued)

	Judgement/decision evaluation criteria					
Audit process activities	Consensus	Cue usage	Stability	Consistency	Self-insight	Accuracy
4. Plan indirect tests and evaluate results		Libby & Libby (1989)				Libby & Libby (1989)
5. Plan direct tests and evaluate results	Joyce (1976) Gaumnitz et al. (1982) Tabor (1983) Kaplan (1985) Schneider (1985) Srindhi & Vasarhelyi (1986) Bamber & Snowball (1988) Brown & Solomon (1991)	Joyce (1976) Kaplan (1985) Schneider (1985) Brown & Solomon (1991)	Joyce (1976) Srindhi & Vasarhelyi (1986)	Gaumnitz et al. (1982) Schneider (1985)	Joyce (1976)	
6. Evaluate aggregate results						
7. Report decision	Moriarity & Barron (1979) Kida (1980) Messier (1983) Ashton (1985)	Boatsman & Robertson (1974) Moriarity & Barron (1976, 1979) Firth (1979) Kida (1980) Messier (1983)	Messier (1983)		Messier (1983)	Kida (1980) Ashton (1985) Simnett & Trotman (1989)

Source: Solomon and Shields (1995, Table 1)

2.8 SUMMARY

This chapter first reviewed the relevant literature relating to audit planning and the independent and moderating variables (i.e., risk, materiality, audit structure, and personality) examined in this research study. A review of the literature suggested the need to develop a comprehensive and integrated evidential planning model to capture the audit planning processes of auditors. Such a behavioral model, based on the literature and the theoretical framework postulated in Section Four, was presented in Section Five. The chapter then discussed the Brunswik lens model and policy capturing research, both of which provide a useful method for studying the audit planning judgements of auditors in this research study. The next chapter will provide a discussion of the operationalization of the dependent variable, namely, the planning decisions of auditors, and will present hypotheses developed to empirically test the evidential planning model.

CHAPTER THREE

HYPOTHESES DEVELOPMENT

3.1 INTRODUCTION

Chapter Two, Figure 2.3 presented an integrated model that would provide insights into the evidential planning decisions of auditors. This chapter develops hypotheses to empirically test the predictability of the model. The remainder of this chapter consists of six sections: auditors' evidential planning decisions, risk model components, auditor business risk, materiality, audit structure, and individual psychological differences.

3.2 AUDITORS' EVIDENTIAL PLANNING DECISIONS

The professional auditing standards require auditors to obtain sufficient competent audit evidence to support their audit opinions and permit them to exercise a great deal of professional judgements in determining what constitutes "sufficient competent audit evidence". In the planning stage, auditors should consider a range of issues which include auditor assignment, auditor scheduling, sampling method selection and sample size determination. In this study, the evidential planning for obtaining sufficient competent audit evidence to satisfactorily complete an audit is operationalised in terms of the planned extent of audit evidence that is to be collected in order to satisfactorily complete the audit of a hypothetical new audit client using a unit independent scale[1].

In order to avoid the potential confounding effects of an intervening variable such as sample size, this study requires auditors to make decisions about the planned extent of audit evidence on a scale that is unit independent. The scale for this measure ranges from a low value of 1 (much lower than the normal extent) to a high value of 10 (much higher than the normal extent). A limitation of the use of this unit independent planned extent of audit evidence scale is that it is not as easily operationalized as sample size or planned audit hours. Specifically, in order to use this scale, specific types of planning task, e.g., planned audit hours or sample size, were not mentioned in the questionnaire. Consequently, when the auditor-subjects indicated an increase in the extent of audit evidence to be collected, they could mean collecting more quality evidence or increasing the sample size depending on the circumstances. For example, in a high control risk situation, auditors would normally increase the sample size of substantive testing, whereas in a high inherent risk situation, more experienced auditors would normally be assigned to perform the audit. Nevertheless, the planning task still represents a realistic task that is understood

[1] Chapter Four, Section 4.7, "Research Instrument", describes the hypothetical audit client in detail. Since this study focuses on the planning aspect, the planned, rather than the actual, extent is measured.

by the subjects[2]. Similar planning task and measurement scale have also been used by Pratt and Stice (1994)[3]. More importantly, the unit independent scale avoids the use of a proxy measure which may inflate or deflate the impact of the various independent and moderating variables on auditors' extent of audit testing decisions. This line of reasoning is consistent with Emby's (1994) argument for using an unit independent scale in his study. The potential confounding effects of using intervening variables such as sample size and audit hours are discussed below.

Sample size can have much variation across the evidential sources. On this issue, Mock and Wright (1993, p.44) noted that:

> For some types of evidence (such as client inquiry or analytical procedures using ratios) samples are not drawn. Also, equal samples of different types of procedures (say, confirmations versus cut-off tests) are likely to differ in terms of audit effort and cost.

---

[2] Recall that the planning task requires the subjects to determine a planned level of audit evidence which constitutes the sufficient competent audit evidence for the audit of the hypothetical audit client, and the professional auditing standards permit auditors to exercise their professional judgements in determining what constitutes "sufficient competent audit evidence".

[3] Pratt and Stice (1994) measured the recommended amount of required audit evidence by asking the respondents to indicate "how much audit evidence must be collected to ensure that the risk of a material misstatement in the financial statements of Manufacture is reduced to an acceptable level" on a scale which ranges from (1) "much lower than normal" to (10) "much higher than normal".

Similarly, an equal number of audit hours can differ in terms of audit effort and cost. Different staff mixes of the audit team will result in different audit costs. Audit staffs at different levels of audit experience will also be more effective and/or efficient in performing certain kinds of audit tasks.

3.3 RISK MODEL COMPONENTS

The AICPA provides guidance for the quantitative assessment of audit risk in the audit risk model described in Chapter One. While Cushing and Loebbecke (1983) and Kinney (1983) critically reviewed the characteristics of the AICPA audit risk model, other researchers have subjected the multiplicative nature of the model to empirical testing. The findings indicate mixed results. The results of Jiambalvo and Waller (1984) and Daniel (1988), for example, suggested that auditors do not combine the component risks in a multiplicative manner. On the other hand, the results of Libby et al. (1985), Kaplan (1985) and Strawser (1990) suggested that auditors' decisions do conform with the multiplicative nature of the audit risk model. Though the multiplicative nature of the audit risk model remains an unsettled issue, the research findings of these studies clearly indicate that auditors do consider the component risks (i.e., inherent risk, control risk, and detection risk) in their evidential planning decisions. The following paragraphs discuss the hypothesized effect of each of the component risks.

Brewer (1981) found that the presence of two manipulated inherent risk factors (i.e., a threat to client survival and incapable client management) directly affected auditors' perceived audit intensity. More specifically, as risk increases there is a change in audit intensity, regardless of whether internal controls can detect a material error that has occurred. This finding suggests that auditors do consider factors other than internal controls (i.e., inherent risk) in planning for the quantity, timing and quality of audit evidence that are necessary to complete a particular audit. Gibbins and Wolf (1982) also found that inherent risk factors, such as client's financial position and profitability, had significant influences on the audit. In summary, though there have been few studies investigating the impact of inherent risk on the audit planning decisions of auditors, the studies summarized above support the predicted effect of inherent risk (i.e., the higher the inherent risk, the higher the planned extent of audit evidence). To test this relationship, the following hypothesis is postulated for testing:

H_1: There is a positive relationship between inherent risk and auditors' planned extent of audit evidence.

Figure 3.1 portrays Hypothesis One which posits a positive relationship between inherent risk and the planned extent of audit evidence of auditors.

Figure 3.1

$\underline{H_1}$

Inherent Risk $\longrightarrow$ Auditors' Planned Extent of Audit Evidence

The audit risk model also specifies a positive relationship between control risk and the planned extent of audit evidence. When auditors determine control risk to be high, they will increase the planned extent of audit evidence. This relationship was examined in several previously discussed studies in Chapter Two and the conclusions were mixed. Both Mock and Turner (1981) and Mock and Wright (1993) found that strong internal controls (i.e., low control risk) did not necessarily lead to a lower planned extent of audit evidence. On the other hand, Gaumnitz et al. (1982), Tabor (1983), Grobstein and Craig (1984), Libby (1985), Kaplan (1985) and Cohen and Kida (1989) suggested that auditors' planned extent of audit evidence would increase as control risk increased. This then leads to the following hypothesis:

H_2: There is a positive relationship between control risk and auditors' planned extent of audit evidence.

Figure 3.2 portrays Hypothesis Two which posits a positive relationship between control risk and the planned extent of audit evidence of auditors.

Figure 3.2

$\underline{H_2}$

Control Risk $\longrightarrow$ Auditors' Planned Extent of Audit Evidence

When the audit risk model is used for planning purposes, the auditors will determine a desired level of audit risk. The risk model suggests that the desired level of audit risk has an inverse relationship with the planned extent of audit evidence. In particular, the planned extent of audit evidence of an auditor will be higher (lower) when his/her desired level of audit risk is lower (higher). The effect of desired audit risk on the planned extent of audit evidence constitutes an interesting issue because the auditor's desired audit risk indicates his/her preference for the tolerable level of audit risk when issuing an opinion[4]. In order to investigate the effect of desired audit risk on the planned extent of audit evidence, the following hypothesis is then tested:

H_3: There is a negative relationship between desired audit risk and auditors' planned extent of audit evidence.

[4] Chapter Four, Section 4.2 further discusses this point.

Figure 3.3 portrays Hypothesis Three which posits a negative relationship between auditors' desired audit risk and their planned extent of audit evidence.

Figure 3.3

$\underline{H_3}$

Desired Audit Risk ——————→ Auditors' Planned Extent of Audit Evidence

Another component of the AICPA audit risk model is detection risk, and that model suggests that the detection risk and the extent of audit evidence to be accumulated are inversely related. When the audit risk model is used during the audit planning stage to determine how much evidence to accumulate in each of the accounting cycles[5], then the audit risk formula is equivalent to the one shown in Figure 3.4.

[5] The cycle approach divides an audit into various cycles (components) of closely related types of transactions and account balances: Sales and Collection Cycle, Acquisition and Payment Cycle, Payroll and Personnel Cycle, Inventory and Warehousing Cycle, and Capital Acquisition and Repayment Cycle.

Figure 3.4

<u>Audit Risk Model for Audit Planning</u>

$$PDR = \frac{DAR}{IR \times CR}$$

where

PDR = Planned Detection Risk
DAR = Desired Audit Risk
IR = Inherent Risk
CR = Control Risk

After assessing inherent risk and control risk and choosing a desired level of audit risk, an appropriate level of planned detection risk can then be determined (Libby et al. 1985). AICPA SAS NO. 47 points out that "... as the auditor's assessment of inherent risk and control risk decrease, the detection risk that [the auditor] can accept increases" (AICPA 1995). The planned level of detection risk determines the extent of audit evidence to be accumulated. In particular, the extent of audit evidence varies inversely with the size of PDR. The lower the PDR, the more evidence that needs to be accumulated. Houghton and Fogarty (1991) shared a similar view regarding this planning process. They argued that auditors first assess inherent and control risks in order to determine audit scope, and then design their auditing procedures to limit the planned detection risk to an acceptable low level. Therefore, based on the above discussion, the following hypothesis is suggested:

H_4: There is a negative relationship between planned detection risk and auditors' planned extent of audit evidence.

Figure 3.5 portrays Hypothesis Four which posits a negative relationship between planned detection risk and the planned extent of audit evidence of auditors.

Figure 3.5

$\underline{H_4}$

Planned Detection Risk ——————→ Auditors' Planned Extent of Audit Evidence

In a previously discussed study, Strawser (1990) found that the judgements of Big Eight auditors, compared with regional and local auditors, exhibited less compatibility with the multiplicative nature of the audit risk model. One possible explanation for such incompatibility relates to the notion that the auditors might have incorporated factors other than the component risks into their judgements. It has been suggested that one such important factor is auditor business risk (Brumfield et al. 1983; Akresh et al. 1988).

3.4 AUDITOR BUSINESS RISK

Auditor business risk (see Section 1.3.1 for definition) arises from decisions made by users relying upon audited financial statements and so differs from the audit risk (Brumfield et al. 1983; Clarke 1987; Bamber et al. 1993). Although auditor business risk and audit risk are two distinct variables, it has been argued that auditor business risk has a significant impact on the desired level of audit risk chosen by the auditor. In response to a higher auditor business risk, Brumfield et al. (1983) and Clarke (1987) proposed that an auditor may set a lower acceptable audit risk (i.e., desired audit risk). The lower level of acceptable audit risk will eventually lead to a lower level of planned detection risk, i.e., more audit work is required.

The research findings of three previously summarized studies, namely, Bamber et al. (1993), Pratt and Stice (1994) and Walo (1995) further supported the extent of a positive association between auditor business risk and the planned extent of audit evidence. Bamber et al. (1993) found that there existed a positive relationship between auditor business risk and the length of audit report lag (a proxy for the extent of audit evidence). Pratt and Stice (1994) found that poorer client financial conditions correlated with higher levels of litigation risk, higher planned extents of audit evidence and higher amounts of audit fees. Finally, Walo (1995) concluded that a weak financial condition or the presence of public ownership, both indicating higher auditor business risk, resulted in a statistically significantly greater planned number of audit hours.

Based on the above discussion, it is expected that auditor business risk has a positive relationship with the planned extent of audit evidence. Specifically, the planned extent of audit evidence of auditors will be higher (lower) when auditor business risk is higher (lower). The following hypothesis tests this relationship:

> H_5: There is a positive relationship between auditor business risk and auditors' planned extent of audit evidence.

Figure 3.6 portrays Hypothesis Five which posits a positive relationship between auditor business risk and the planned extent of audit evidence of auditors.

Figure 3.6

$\underline{H_5}$

Auditor Business Risk $\longrightarrow$ Auditors' Planned Extent of Audit Evidence

3.5 MATERIALITY

Another variable which needs to be considered together with risk is materiality. Standards require the auditor to consider both audit risk and materiality in determining the nature, timing, and extent of auditing procedures and in evaluating the results of those procedures. As summarized in Chapter 2, using an experimental design approach, several prior research studies (Boatsman and Robertson 1974; Moriarity and Barron 1976, 1979; Firth 1979; Messier 1983; Reckers et al. 1984; Krogstad 1984; Read et al. 1987) investigated the effect of various quantitative materiality factors on the materiality judgements of auditors. All of these studies reached the conclusion that the most significant factor in determining the perceived materiality of a misstatement is the percentage effect of the misstatement on net income. By analyzing the audit manuals of six Big Eight CPA firms, Friedberg et al. (1989) found that the relationship of a misstatement to net income constitutes the most frequently mentioned quantitative materiality factor which the auditor should consider in his/her materiality judgements. In two previously summarized studies on actual materiality, Chewning et at. (1989) concluded that a smaller effect on net income (as compared with that suggested by the experimental research) would lead to a modified opinion, while Morris et al. (1984) found that there existed significant variations in auditors' consistency modification decisions based on the net income effect.

Other studies such as Boatsman and Robertson (1974), Moriarity and Barron (1976, 1979), Messier (1983), Krogstad et al. (1984) and Reckers et al. (1984) investigated the effect of qualitative materiality factors on the perceived materiality of an item. They discovered that although auditors consider qualitative materiality factors in their materiality judgements, auditors perceive these qualitative factors as secondary to the quantitative factors. This research finding conforms with AICPA SAS NO. 47, which states that "although the auditor should be alert for errors that could be qualitatively material, it ordinarily is not practical to design procedures to detect them" (AICPA 1995).

In conclusion, while a sizable portion of prior studies have examined the determinants of evaluation materiality and their effects on the disclosure judgements, only a few studies have examined factors affecting planning materiality. Moreover, no study has examined the impact of planning materiality on the extent of audit testing. Arens and Loebbecke (1994) state that planning materiality helps auditors to plan the appropriate amount of audit evidence to be collected. When the auditor chooses a higher (lower) planning materiality level, he/she can tolerate a higher (lower) amount of monetary error and so will perform less (more) audit work.[6]

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[6] If the auditor sets a higher dollar amount, less audit evidence is required than for a lower amount because there will be less chance that a particular amount will become a material misstatement. For example, if the planning materiality level is $200,000 and the auditor is concerned with a possible error of $150,000, the auditor need not perform further audit work because $150,000 still represents an immaterial error. However, if the planning

Based on the above discussion, it is expected that the level of planning materiality will have a negative relationship with the planned extent of audit evidence. In particular, the planned extent of audit evidence of auditors will be higher (lower) when the level of planning materiality is lower (higher). The hypothesis which tests that assertion is:

H_6: There is a negative relationship between planning materiality and auditors' planned extent of audit evidence.

Figure 3.7 portrays Hypothesis Six which posits a negative relationship between planning materiality and the planned extent of audit evidence of auditors.

Figure 3.7

$\underline{H_6}$

Planning materiality $\longrightarrow$ Auditors' Planned Extent of Audit Evidence

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materiality level were $100,000, the auditor would have to perform additional audit work to ensure that appropriate actions would be taken to reduce any uncorrected error below the $100,000 materiality level.

3.6 AUDIT STRUCTURE

There currently are only several empirical studies on audit structure. In the studies summarized in Chapter Two, Kinney (1986) found that there was a statistically significant relationship between voting patterns of CPA firms and their audit structures. Specifically, firms that used a structured approach tended to support audit procedures and audit reporting proposals that added structured guidance, while those firms which used the unstructured approach generally opposed the codification of such guidance. In another empirical study, Bamber and Snowball (1988) found that the auditors of structured firms tended to employ more control and coordination mechanisms as task uncertainty increased. Bamber et al. (1989) then found that unstructured firm auditors perceived significantly more role conflicts, and these were associated with a lack of authority adequacy, communication adequacy and adaptability.

Further, Williams and Dirsmith (1988), Newton and Ashton (1989), and Bamber et al. (1993) have also studied the impact of audit structure on audit report lag (ARL) and earnings announcement lag (EAL). The tests demonstrated that there exists a statistically significant relationship between audit structure and both ARL and EALs. In particular, clients of structured audit firms experience longer total ARLs and EALs. However, when an unanticipated event occurs, structured audit firms can adapt more quickly, and so their clients experience shorter abnormal ARLs and EALs, on average, than do the clients of unstructured audit firms.

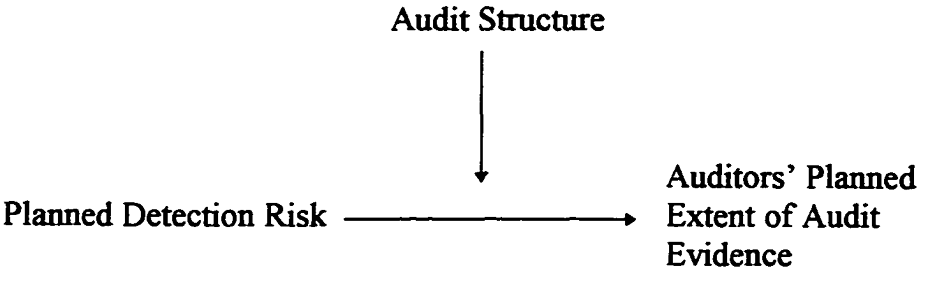
Bamber et al.'s (1993) conclusion has significant implications on the relationship between risk, audit structure and planned extent of audit evidence. One reason why the structured audit firms could adapt more quickly to unanticipated events (representing higher risk) is that they have already performed relatively more audit work to anticipate or plan for the "unanticipated" events. In contrast, the unstructured audit firms would have performed less audit work to anticipate or plan for the "unanticipated" events and so would need more time to detect them and/or would take longer time to perform additional audit work to handle the "unanticipated" events. Since the planned detection risk is a function of the inherent risk, control risk and desired audit risk variables, it is also expected that audit structure will affect the relationship between the planned extent of audit evidence for clients and the level of planned detection risk adopted by the auditor. The following hypotheses test the above relationships regarding planned detection risk, inherent risk, control risk, audit structure and the evidential planning decisions of auditors:

H_7: The negative relationship between planned detection risk and auditors' planned extent of audit evidence is dependent upon audit structure (structured vs. unstructured).

Figure 3.8 portrays Hypothesis Seven which posits a moderating effect of audit structure on the negative relationship between planned detection risk and the planned extent of audit evidence of auditors.

Figure 3.8

$\underline{H}_7$

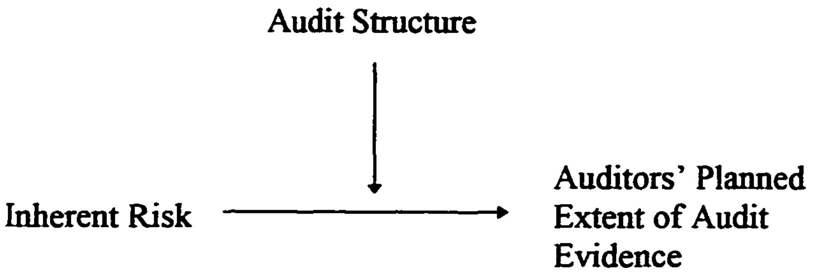


$H_{7(1)}$: The positive relationship between inherent risk and auditors' planned extent of audit evidence is dependent upon audit structure (structured vs. unstructured).

Figure 3.9 portrays Hypothesis 7(1) which posits a moderating effect of audit structure on the positive relationship between inherent risk and the planned extent of audit evidence of auditors.

Figure 3.9

$\underline{H}_{7(1)}$

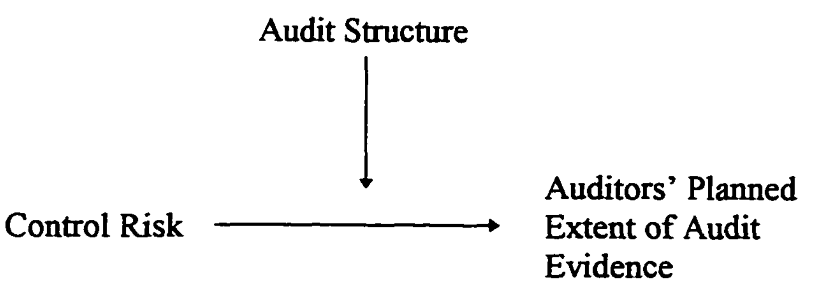


$H_{7(2)}$: The positive relationship between control risk and auditors' planned extent of audit evidence is dependent upon audit structure (structured vs. unstructured).

Figure 3.10 portrays Hypothesis 7(2) which posits a moderating effect of audit structure on the positive relationship between control risk and the planned extent of audit evidence of auditors.

Figure 3.10

$\underline{H}_{7(2)}$



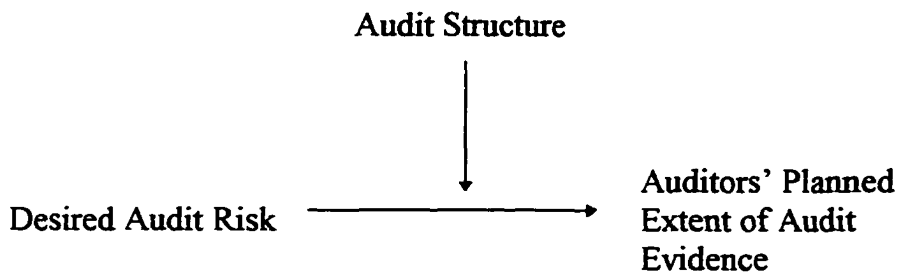
Regarding the desired audit risk variable, the third element of the planned detection risk variable, structured audit firms are more likely to give more specific guidance to their audit staff about the level of desired audit risk. On the other hand, auditors of unstructured firms have more discretion or judgement in determining the desired or tolerable level of audit risk. This suggests that the degree of audit structure can influence auditors' judgements or decisions on the level of desired audit risk. Similarly, it can also be argued that CPA firms may provide different degrees of guidance (from no guidance to very specific guidance) to their staff in relation to transcribing a desired level of audit risk into a planned extent of audit evidence, thus resulting in different planned extents of evidence. Therefore, the degree of audit structure will affect the relationship between the desired audit risk variable and auditors' planned extent of audit evidence. To test this moderating effect, the following hypothesis is postulated for testing:

$H_{7(3)}$: The negative relationship between desired audit risk and auditors' planned extent of audit evidence is dependent upon audit structure (structured vs. unstructured).

Figure 3.11 portrays Hypothesis 7(3) which posits a moderating effect of audit structure on the negative relationship between desired audit risk and the planned extent of audit evidence of auditors.

Figure 3.11

$\underline{H}_{7(3)}$



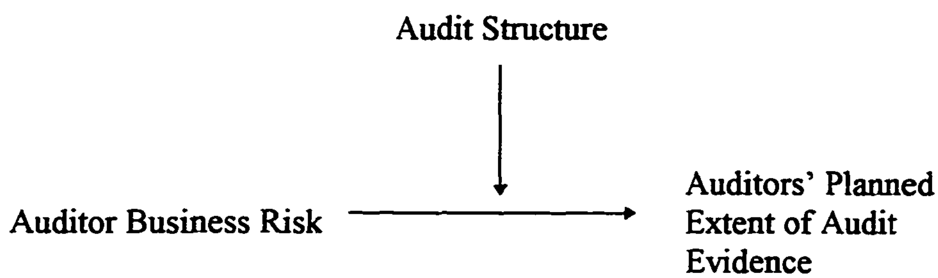
In addition, there exists no empirical evidence on how audit structure interact with auditor business risk to affect the planning decisions of auditors. In a previously summarized research study, using an audit report lag (ARL) as a proxy for audit inputs, Bamber et al. (1993) found that there existed statistically significant relationships between auditor business risk and ARLs, and between audit structure and ARLs. Unfortunately, the authors did not study the interactive effect between auditor business risk and audit structure. However, based on an earlier discussion about the relationship between risk assessments, the degree of audit structure and the planned extent of audit evidence, it can also be argued that auditors of structured firms, in general, have performed some structured or standard procedures in order to attain a better understanding of the degree of auditor business risk for a particular audit such that they will plan for a greater extent of audit evidence if auditor business risk is assessed to be high. To test this moderating effect, the following hypothesis is postulated for testing:

H_8: The positive relationship between auditor business risk and auditors' planned extent of audit evidence is dependent upon audit structure (structured vs. unstructured).

Figure 3.12 portrays Hypothesis Eight which posits a moderating effect of audit structure on the positive relationship between auditor business risk and the planned extent of audit evidence of auditors.

Figure 3.12

$\underline{H_8}$



Furthermore, there is relatively little empirical evidence on how audit structure is related to the effect of planning materiality on the planned extent of audit evidence. However, prior accounting research studies have found that there is a relationship between audit structure and the materiality judgements of auditors. In those studies summarized in Chapter Two, a few have examined the relationship between audit structure and the materiality judgements of auditors, and they found mixed results. While King (1988) did find that auditors of structured firms do not display significantly higher judgement consensus in their planning materiality decisions, Morris and Nichols (1988) found a statistically significant positive association between judgement consensus and the degree of audit structure in their study of interest-capitalization consistency opinion decisions. English(1989) also found that auditors of structured firms exhibited greater judgement consensus in their materiality evaluations under high time pressure. Eyler (1990) determined that audit structure and audit client scenario jointly affected the planning materiality estimates of auditors. Finally, Icerman and Hillison (1991) and Hermanson (1993) concluded that structured firms tended to book a greater proportion of individual errors than did less structured firms, and the former study stated that research on audit policy and auditor decision making should take into account the effect of audit structure. It is thus expected that auditors of CPA firms with different degrees of audit structure would interpret the same planning materiality limit differently in determining the planned extent of audit evidence. This then leads to the following hypothesis:

H_9: The negative relationship between planning materiality and auditors' planned extent of audit evidence is dependent upon audit structure (structured vs. unstructured).

Figure 3.13 portrays Hypothesis Nine which posits a moderating effect of audit structure on the negative relationship between planning materiality and the planned extent of audit evidence of auditors.

Figure 3.13

H$_9$

Audit Structure

↓

Planning Materiality ⟶ Auditors' Planned Extent of Audit Evidence

3.7 INDIVIDUAL PSYCHOLOGICAL DIFFERENCES

The preceding sections have proposed that audit risks correlates with the evidential planning decisions of auditors. A similar related issue concerns whether risk attitudes and other individual psychological differences of auditors have any impact on their evidential planning decisions. As discussed earlier, several prior accounting research studies (Ashton 1974a, 1974b; Joyce 1976; Ashton and Brown 1980; Hamilton and Wright 1982; Gaumnitz et al. 1982; Biggs and Mock 1983) did find individual differences across auditors regarding their assessments of internal control systems. These individual differences may have been caused in part by differences in the personality structures of auditors. Personality refers to differences in the attitudes or beliefs of individuals (Pratt 1980). In this research study, personality is measured by two variables, namely, tolerance for ambiguity and risk attitude.

3.7.1 Tolerance For Ambiguity

Ambiguity exists in many accounting and auditing situations and "neglect of the ambiguity involved in audit risk analysis may represent a primary reason why the traditional audit risk model was found to be inconsistent with auditors' behaviour (Zebda 1991, p.137). In evaluating the role of TA, Gul (1993, p.5) points out that "it is important to recognize that the dimension is expected to interact with a task/situational variable to affect decision making". In other words, TA should be viewed as a moderating variable (Pratt 1980; Gul 1984,1986).

In addition, Dermer (1973) found a negative correlation between TA and the amount of information perceived to be important. He argued that in an ambiguous situation individuals high on TA exhibited more confidence in making judgements than individuals low on TA. Gul (1986) and Pincus (1991) tested this notion in accounting contexts and found that individuals high on TA felt more confident in decision making than individuals low on TA as a result of ambiguous accounting information. Therefore, it is likely that individuals with different levels of TA will perceive ambiguous or uncertain information differently.

Continuing this line of research and using 41 New Zealand bank officers as subjects, Gul and Tsui (1994) found that TA moderated the effects of management advisory services and audit firm size on third party perceptions of auditor independence. In particular, regarding the effect of management advisory services, bankers low on TA expressed a statistically significant change in perceptions of auditor independence, while there existed little difference in perceptions for bankers high on TA. With respect to the effect of audit firm size, bankers low on TA registered a more statistically significant change in perception than bankers high on TA.

The link between TA and risk was also studied by Tsui (1993). Using 24 New Zealand bankers as subjects, Tsui (1993) investigated the moderating effects of TA on the perceptions of loan risk by bankers. Based on identical financial information about a company, including a footnote disclosure on an uncertainty regarding pending litigation and a "Subject to" audit qualification, the bankers in her study estimated the interest rate premiums they would recommend for the loan application of the company. The results suggest that bankers low on TA required a higher interest rate premium than bankers high on TA. One possible explanation relates to the argument that individuals low on TA perceived a higher loan risk than individuals high on TA since they believed the qualified audit opinion to be more uncertain and a "source of threat". Consequently, individuals low on TA required a higher interest premium to compensate for the perceived greater uncertainty and risk attached to the qualified audit opinion.

Additionally, TA can be linked to audit risk. McGhee, Shields and Birnberg (1978) noted that individuals low on TA perceived ambiguous situations as sources of threat and sought more information to reduce the ambiguity. Based on this line of reasoning, auditors low on TA are likely to be more responsive to a lower level of planned detection risk and, therefore, to require more audit evidence to support the same level of assurance than that which is required by auditors high on TA. In other words, given the same levels of inherent risk and control risk and the same desired level of audit risk, it is likely that auditors low on TA will require more audit evidence at a lower level of PDR than auditors high on TA.

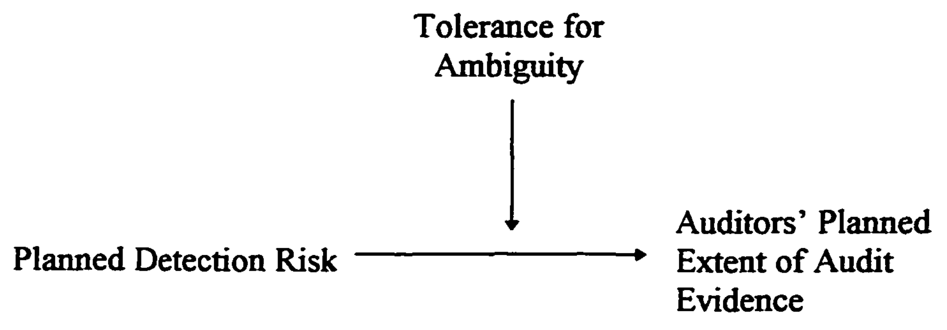
Based on the above discussion, it is expected that, at a lower level of planned detection risk, auditors low (high) on TA will have a higher (lower) planned extent of audit evidence. This relationship is tested by the following hypothesis:

> H_{10}: The negative relationship between planned detection risk and auditors' planned extent of audit evidence is dependent upon tolerance for ambiguity (high vs. low).

Figure 3.14 portrays Hypothesis Ten which posits a moderating effect of TA on the negative relationship between planned detection risk and the planned extent of audit evidence of auditors.

Figure 3.14

$\underline{H}_{10}$



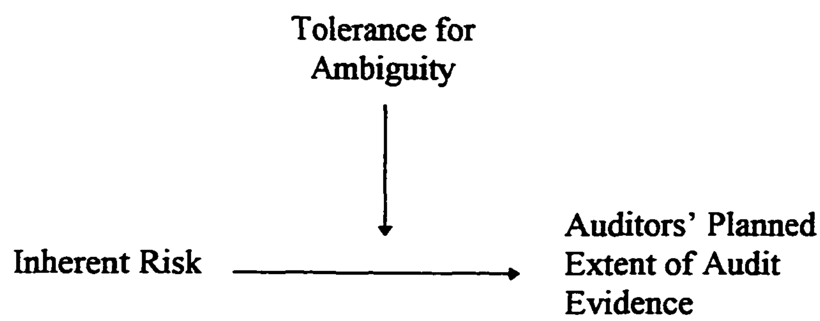
Since the planned detection risk variable is a function of inherent risk, control risk and desired audit risk, the moderating effects of TA on the relationships between those variables and auditors' planned extent of audit evidence are tested by the following three hypotheses:

$H_{10(1)}$: The positive relationship between inherent risk and auditors' planned extent of audit evidence is dependent upon tolerance for ambiguity (high vs. low).

Figure 3.15 portrays Hypothesis 10(1) which posits a moderating effect of TA on the positive relationship between inherent risk and the planned extent of audit evidence of auditors.

Figure 3.15

$\underline{H}_{10(1)}$

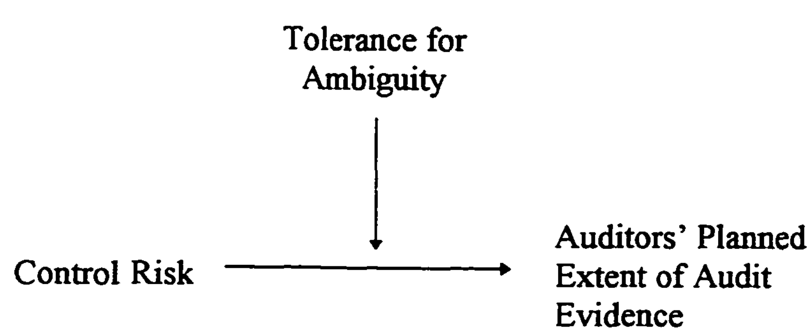


$H_{10(2)}$: The positive relationship between control risk and auditors' planned extent of audit evidence is dependent upon tolerance for ambiguity (high vs. low).

Figure 3.16 portrays Hypothesis 10(2) which posits a moderating effect of TA on the positive relationship between control risk and the planned extent of audit evidence of auditors.

Figure 3.16

$\underline{H}_{10(2)}$

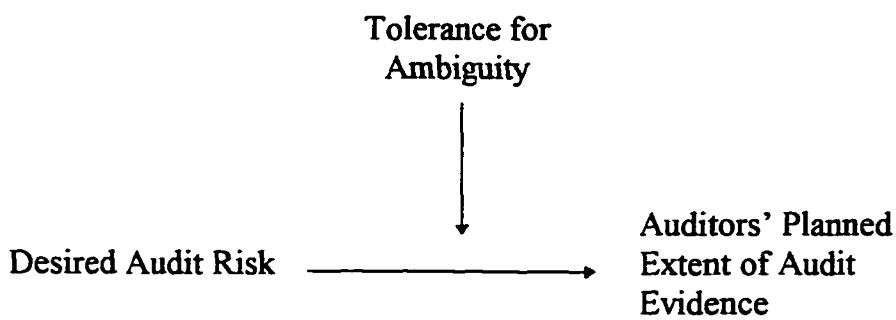


$H_{10(3)}$: The negative relationship between desired audit risk and auditors' planned extent of audit evidence is dependent upon tolerance for ambiguity (high vs. low).

Figure 3.17 portrays Hypothesis 10(3) which posits a moderating effect of TA on the negative relationship between desired audit risk and the planned extent of audit evidence of auditors.

Figure 3.17

$\underline{H}_{10(3)}$



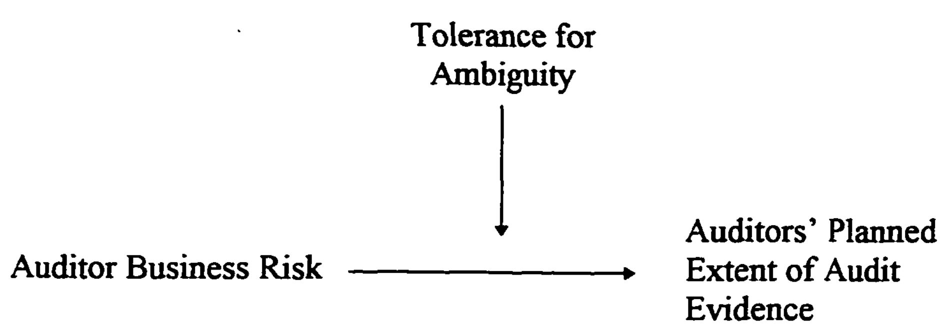
In relation to auditor business risk, Majid and Pragasam (1997) examined the interactive effects of TA and contingent liabilities on auditors' litigation avoidance behaviour which was operationalized in terms of their preferences for an unqualified opinion. Using 65 auditors as subjects, they found that auditors low on TA showed a statistically significant less extent of preference for an unqualified opinion at the highest level of uncertainty, as indicated by the amount of contingent liability, and therefore demonstrated higher degrees of litigation avoidance behaviour when compared to auditors high on TA. Since this auditor litigation risk is part of the more inclusive auditor business risk, it is reasonable to expect that auditors low on TA would plan for more audit work at higher levels of auditor business risk than auditors high on TA. This moderating effect is tested by the following hypothesis:

> H_{11}: The positive relationship between auditor business risk and auditors' planned extent of audit evidence is dependent upon tolerance for ambiguity (high vs. low).

Figure 3.18 portrays Hypothesis Eleven which posits a moderating effect of TA on the positive relationship between auditor business risk and the planned extent of audit evidence of auditors.

Figure 3.18

$\underline{H}_{11}$



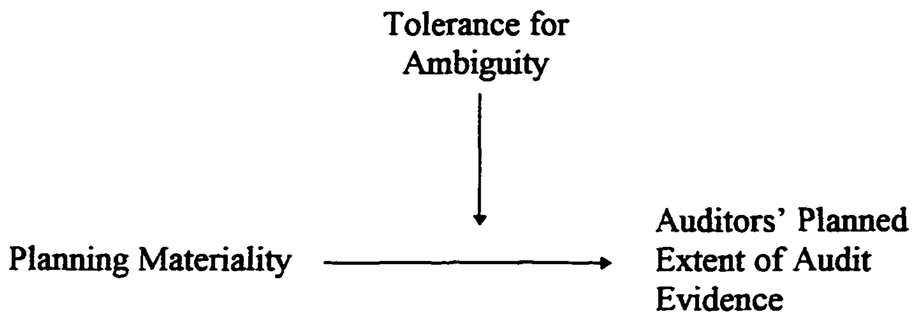
Regarding the planning materiality variable, there exists a lack of empirical evidence on the interactive effect of this variable and the TA variable on the planning decisions of auditors. However, Gul (1993), which examined the interactive effects of TA and evaluation materiality on auditors' audit opinion preferences, provided some insights into that issue. Given identical sets of financial statements except for the information on contingent liabilities over three levels ($50,000, $500,000, & 1 million), the auditor-subjects were requested to indicate their preferences for a "subject-to" qualified opinion. The author found that auditors low on TA showed higher levels of preference for the qualified opinion than auditors high on TA. An explanation for this finding is that auditors with different levels of TA perceived different amounts of evaluation materiality such that auditors low on TA, as compared to auditors high on TA, perceived lower levels of evaluation materiality and so were more likely to prefer an qualified opinion. This suggests that, given the same level of planning materiality, auditors low on TA are likely to transcribe it into higher planned extents of audit evidence when compared to auditors high on TA. This moderating effect is tested by the following hypothesis:

> H_{12}: The negative relationship between planning materiality and auditors' planned extent of audit evidence is dependent upon tolerance for ambiguity (high vs. low).

Figure 3.19 portrays Hypothesis Twelve which posits a moderating effect of tolerance for ambiguity on the negative relationship between planning materiality and the planned extent of audit evidence of auditors.

Figure 3.19

$\underline{H}_{12}$



3.7.2 Auditor Risk Attitude

In differentiating risk attitude and audit risk, Clarke (1987) argues that the audit process requires the auditor to perform adequate audit procedures to ensure an appropriately low level of audit risk while, at the same time, avoiding excessive audit procedures which would increase costs and reduce profits (Clarke 1987, p.3):

> Audit risk encompasses the uncertainty related to the accuracy of the financial statements being reported upon. Risk attitude concerns an individual decision maker's relative preferences for increase in uncertainty regarding the possibility of unfavourable outcomes in exchange for increased value.

Clarke (1987) found that differences in relative risk attitudes and perception biases (or risk perceptions) explained a significant portion of the variations in the audit scope decisions of auditors. In particular, high risk-averse auditors consistently recommended higher levels of audit procedures compared to low risk-averse auditors. Moreover, high risk-averse auditors perceiving a larger number of errors (or a higher level of risk) recommended the most extensive levels of audit procedures in 24 of the 30 hypothetical cases, as compared to only 6 out of 30 for high risk-averse auditors perceiving a fewer number of errors (or a lower level of risk).

The above results clearly indicate that the risk attitude of an auditor could interact with the assessment of risk (or probability of error) to affect the audit scope decisions of auditors. In this research study, the risks examined include inherent risk, control risk, desired audit risk and auditor business risk. AICPA SAS NO.39 provides no normative statement about the tolerable level of audit risk and leaves that assessment to professional judgement. Farmer (1993, pp.91-92) contends that "this lack of definitive guidelines on the tolerable level of audit risk leaves the potential for a significant impact of auditor risk attitude and risk perception on audit decisions". Because a higher level of audit risk implies a higher level of uncertainty, an auditor with a high (low) degree of risk-aversion tends to tolerate a low (high) level of audit risk. This leads to choosing a lower (higher) level of desired audit risk, which in turn leads to a lower (higher) level of planned detection risk. Because there exists an inverse relationship between the planned level of detection risk and the planned extent of audit work, high risk-averse auditors will plan to collect more audit evidence than low risk-averse auditors at higher risk situations. In other words, high risk-averse auditors are likely to act more prudently (conservatively) than low risk-averse auditors at high risk situations.

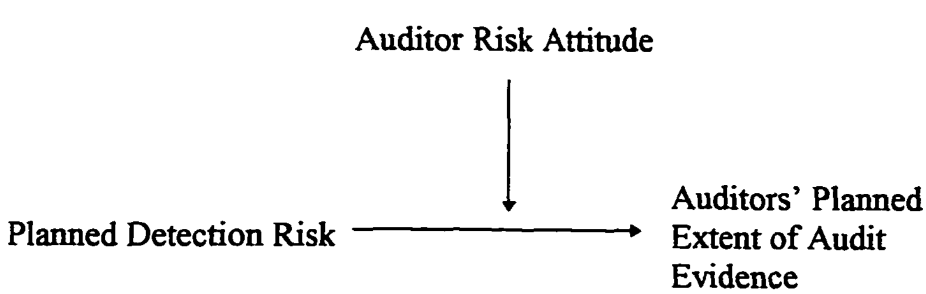
Based on the above discussion, the planned detection risk variable and each of its component risk variables, i.e. the inherent risk, control risk and desired audit risk variables, are expected to interact with the auditor risk attitude variable to affect auditors' planned extent of audit evidence. The following hypotheses are therefore proposed:

> H_{13}: The negative relationship between planned detection risk and auditors' planned extent of audit evidence is dependent upon auditor risk attitude.

Figure 3.20 portrays Hypothesis Thirteen which posits a moderating effect of risk attitude on the negative relationship between planned detection risk and the planned extent of audit evidence of auditors.

Figure 3.20

$\underline{H}_{13}$

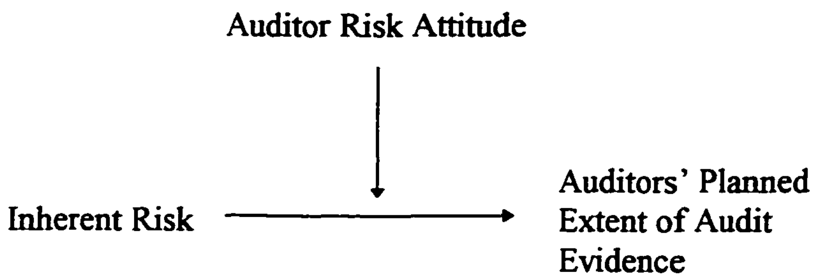


$H_{13(1)}$: The positive relationship between inherent risk and auditors' planned extent of audit evidence is dependent upon auditor risk attitude.

Figure 3.21 portrays Hypothesis 13(1) which posits a moderating effect of risk attitude on the positive relationship between inherent risk and the planned extent of audit evidence of auditors.

Figure 3.21

$\underline{H}_{13(1)}$

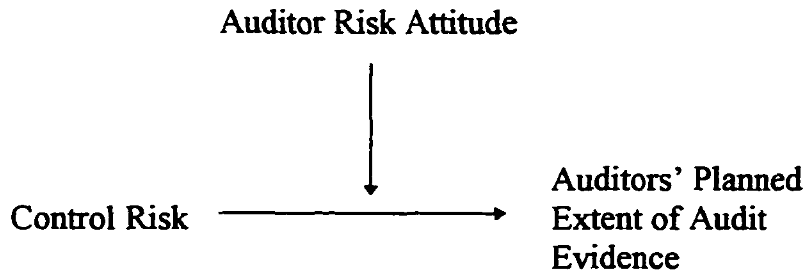


$H_{13(2)}$: The positive relationship between control risk and auditors' planned extent of audit evidence is dependent upon auditor risk attitude.

Figure 3.22 portrays Hypothesis 13(2) which posits a moderating effect of risk attitude on the positive relationship between control risk and the planned extent of audit evidence of auditors.

Figure 3.22

$\underline{H}_{13(2)}$

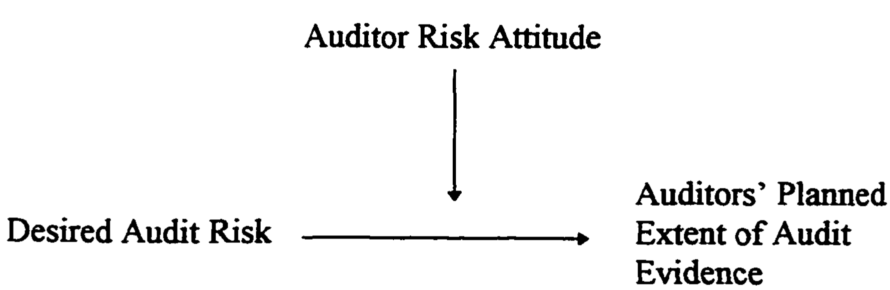


$H_{13(3)}$: **The negative relationship between desired audit risk and auditors' planned extent of audit evidence is dependent upon auditor risk attitude.**

Figure 3.23 portrays Hypothesis 13(3) which posits a moderating effect of risk attitude on the negative relationship between desired audit risk and the planned extent of audit evidence of auditors.

Figure 3.23

$\underline{H}_{13(3)}$



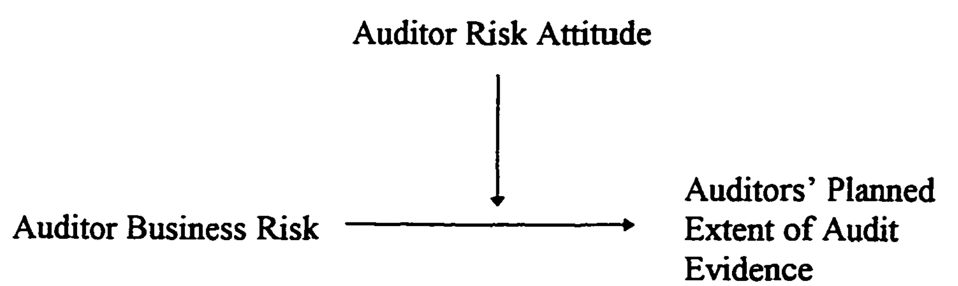
Similarly, it can also be argued that high risk-averse auditors are likely to act more prudently (conservatively) by planning to perform more audit work at high levels of auditor business risk. On the other hand, low risk-averse auditors would behave more optimistically at low levels of auditor business risk by planning to perform less audit work. To test whether the auditor business risk variable is moderated by the risk attitudes of auditors, the following hypothesis is proposed:

H_{14}: The positive relationship between auditor business risk and auditors' planned extent of audit evidence is dependent upon auditor risk attitude.

Figure 3.24 portrays Hypothesis Fourteen which posits a moderating effect of risk attitude on the positive relationship between auditor business risk and the planned extent of audit evidence of auditors.

Figure 3.24

$\underline{H}_{14}$



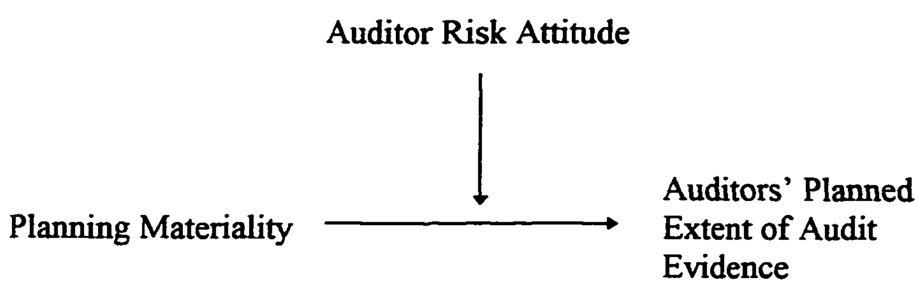
It has been argued earlier that high risk-averse auditors, on average, plan to perform more audit work at high risk levels or for more uncertain situations. The level of planning materiality represents an uncertain situation, and consequently high risk-averse auditors are more likely to transcribe low levels of planning materiality into higher planned extents of audit evidence. To test whether the risk attitudes of auditors interact with the planning materiality variable to affect the evidential planning decisions of auditors, the following hypothesis is proposed:

H_{15}: The negative relationship between planning materiality and auditors' planned extent of audit evidence is dependent upon auditor risk attitude.

Figure 3.25 portrays Hypothesis Fifteen which posits a moderating effect of risk attitude on the negative relationship between planning materiality and the planned extent of audit evidence of auditors.

Figure 3.25

$\underline{H}_{15}$



3.8 SUMMARY

This chapter began with a discussion of the evidential planning decisions of auditors. It provided the justification for the operationalization of those decisions in terms of the planned extent of audit evidence. The chapter then presented the hypotheses developed to empirically test the auditors' evidential planning model. These hypotheses included testing the main effects of risk model components, auditor business risk, and planning materiality, and testing the moderating effects of audit structure, tolerance for ambiguity, and auditor risk attitude. The next chapter will discuss the research methodology of this research study.

CHAPTER FOUR

RESEARCH METHODOLOGY

4.1 INTRODUCTION

This chapter describes the procedures employed in this research study to collect, analyze, and evaluate the evidential planning decisions of auditors. The second section of this chapter discusses the independent and moderating variables of this study. It also describes the measurement of these variables. Section Three then describes the experimental design. It provides justification for the use of a field experiment approach to examine the factors that can affect the planning decisions of auditors. The study uses a mixed between- and within-subjects design. Section Three also justifies the reasons for the use and describes the details of this research design.

The next section, Section Four, discusses the experimental tasks of this research study. The auditor-subjects are required to perform six experimental tasks, and this section describes these tasks in detail. The fifth section then provides descriptive statistics about the auditor-subjects who participated in the experiment. This section also discusses the selection criteria, the selection method, and some important characteristics of the selected subjects.

Section Six sets forth the administrative procedures of the experiment. Section Seven then describes the research instrument used to elicit responses from the selected subjects. While Section Eight describes the statistical procedures used to analyse the data of this research study, Section Nine presents the methodological limitations of the study. The final and tenth section contains a summary of this chapter.

4.2 VARIABLES OF INTEREST

Consistent with the objectives of the study, the variables selected for testing are those used by auditors in determining their planned extent of audit evidence. Table 4.1 lists all these variables and their treatment levels.

This research study treats inherent risk (see Section 1.3.1 for definition) as a within-subjects variable, and manipulates it at either a high or low level. "High" and "Low" levels is a relative concept here. The auditor-subjects are familiar with such classification because CPA firms in Hong Kong use this classification in practice and HKSA SAS No. 300 also recommends this classification. Furthermore, professional bodies in the United Kingdom and Australia also use a similar classification for establishing inherent risk.

Table 4.1

Experimental Variables and Treatment Levels

	Treatment 1	Treatment 2
Within-subjects variables		
Inherent risk	high	low
Control risk	high	low
Desired audit risk	high	low
Auditor business risk	high	low
Planning materiality	high	low
Between-subjects variables		
Audit structure	structured	unstructured
Tolerance for ambiguity	high	low
Auditor risk attitude	high risk-averse	low risk-averse

More explanation of the inherent risk variable is given in the case study[1] because several auditors with expertise in auditing textile companies were consulted during the case construction stage and they indicated: while they had no problems in interpreting the treatment levels of other variables, they suggested to include more explanation of the inherent risk variable in order to manipulate the high and low levels of that variable in a more realistic manner[2]. After further discussion, they agreed that the additional information given below would improve significantly the manipulation of the inherent risk variable. For the high level of the inherent risk variable, it is assumed that:

a. The audit client's financial condition is relatively weak with: (1) a relatively high gearing ratio compared to the industry average; and (2) deteriorating operating results in terms of no growth in sales and declining profits for the past three years.

b. In addition to its manufacturing facilities in Hong Kong, the audit client has a sizable manufacturing facility in the People's Republic of China.[3]

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[1] The field experiment of this research involves a case study of audit planning for hypothetical textile company. Section 4.7, "Research Instrument", presents the justification for using a textile company as the hypothetical audit client and describes details of the case study.

[2] There is no evidence to show that the expanded description of this variable attracted undue subject attention. Specifically, the results reveal that a total of three factors including inherent risk display high ω^2 and inherent risk is not the most significant one.

[3] Bamber et al. (1993) suggests that the more diverse and complex the client's operation (e.g., manufacturing facilities situated in two geographical areas in this case), the greater the likelihood of material errors and the greater the inherent risk. This argument is in line with HKSA (1996) which suggests that the number of locations and geographical spread of the manufacturing facilities are two important determinants of inherent risk. Consistent with the textile industry practice, the second manufacturing facility is assumed to be situated in the People's Republic of China in order to enhance realism of the case.

For the low level of the inherent risk variable, it is assumed that:

a. The audit client's financial condition is relatively strong with: (1) a relatively low gearing ratio compared to the industry average; and (2) a modest and steady growth pattern for sales and profit for the past three years.

b. The audit client has manufacturing facilities only in Hong Kong.

It should be noted that a textile company is used to explain the above inherent risk levels because the main decision task involves the audit of a hypothetical textile company.

The second independent variable is control risk (see Section 1.3.1 for definition). This study treats the control risk variable as a within-subjects variable, and manipulates it at either a high or low level. The subjects are informed that a high (low) level refers to the situation in which the audit involves a high (low) level of control risk based on an assessment made by the auditor after reviewing and ascertaining the audit client's accounting and internal control systems (see Appendix B, "The Research Instrument", for details). For the same reasons stated previously for inherent risk, the auditor-subjects of this study are familiar with the "High" and "Low" classifications of control risk.

Professional standards require auditors to keep the audit risk (see Section 1.3.1 for definition) to an acceptable low level. However, it should be emphasized that there exists no guidance on what constitutes "acceptable low level". The desired audit risk of the auditor indicates the degree of his/her preference for the tolerable level of audit risk when issuing an opinion. The effect of desired audit risk on the planned level of audit evidence is an interesting and researchable issue. If the level of desired audit risk remains only at a low level as implied by the auditing standards, there will be no way to determine its interaction effect with the auditor business risk variable. As mentioned earlier, Brumfield et al. (1983) asserted that auditor business risk may interact with desired audit risk to affect an auditor's audit scope decisions. Therefore, this study assigns the desired audit risk variable to be set at either a high or low level. In other words, in order to evaluate the interaction effects of the desired audit risk variable, it is necessary to manipulate the factor as high/low though this represents some degree of artificiality. Again, it should be noted that the use of "High" and "Low" levels is a relative concept in this study. The definition of desired audit risk is given to the subjects in the questionnaire and the auditor-subjects are familiar with what audit risk refers to.

This study treats auditor business risk (see Section 1.3.1 for definition) as a within-subjects variable, and manipulates it at either a high or low level. In line with (1) the current auditing practice of using risk-based approaches to auditing and (2) Brumsfield et al.'s (1983) definition of business risk, high (low) auditor business risk refers to high (low) probability that the auditors will suffer a loss or injury to their professional practice when issuing an inappropriate audit opinion and this study assumes that the cost of a loss is material if incurred. When business risk is increased, it is hypothesized that auditors will collect more evidence. The change in extent of audit evidence is not just measured in terms of a yes/no answer, but in terms of a 10 point interval scale such that some auditors may collect more evidence than others because of various reasons such as different personality and/or different emphasis being placed on the importance of business risk. Ideally, each of the components of business risk (i.e., litigation risk and loss of reputations) should be manipulated to evaluate the relative impact of each of these components on evidence collected. However, such a strategy would require the inclusion of another variable in the within-subjects design. As a result, it was decided to treat business risk as one variable but defined in terms of litigation risk and cost, loss of client and loss of reputation (see the Information Variables Section of Appendix B for detailed description).

The fifth independent variable is planning materiality (see Section 1.3.1 for definition). The subjects are informed that this variable reflects the preliminary materiality level that the auditor determines early in the audit for planning purposes and that when the auditor chooses a higher (lower) planning materiality, he/she can tolerate a higher (lower) amount of monetary error (These information are similar to the discussion included in HKSA SAS No. 220, "Audit Materiality"). This research study treats planning materiality as a within-subjects variable, and manipulates it at either a high or low level.

Audit structure, the first moderating variable, refers to the degree of structure of the audit process. This study manipulates audit structure at two levels, either structured or unstructured. A structured audit firm is expected to use a structured approach to perform the audit, while an unstructured firm is expected to use an unstructured approach to perform the audit. Consistent with Cushing and Loebbecke's (1986) and Kinney's (1986) structure classification, structured audit firms refer to KPMG Peat Marwick and Deloitte Touche Tohmatsu, and unstructured audit firms refer to Coopers and Lybrand and Price Waterhouse[4]. This research treats audit structure as a between-subjects variable because it is too unrealistic to ask the auditor-subjects to assume that they are working in a structured firm and then ask them to assume that they are working in an unstructured firm, or vice versa, for the repeated measures purpose.

[4] The author has developed an audit structure questionnaire and required the subjects to complete it in order to confirm the reasonableness of this classification. Section 4.7 further describes the detail of this classification.

Since tolerance for ambiguity, the second moderating variable, constitutes a classification variable, this study treats it as a between-subjects variable in accordance with Winer et al. (1991). This variable relates to an individual's tendency to perceive ambiguous situations as either desirable or as a source of threat. The research study then classifies subjects as having either a high or low tolerance for ambiguity on the basis of the median split of scores obtained from the MacDonald's (1970) test, which appears as Task 3 of the research instrument. (Section Seven of this chapter, "Research Instrument", discusses and justifies the use of the MacDonald scale). Several prior research studies have also adopted the median split classification method (Oliver & Flamholtz, 1978; Gul 1984, 1986), and applying the same classification method for this research study will facilitate the comparability of results.

The last moderating variable studied is the risk attitudes of auditors. Auditors' risk attitudes are related to individual preferences for increased payoffs due to performing fewer audit procedures. The research study adopts Clarke's (1987) scale to measure this variable, and the justification for its use appears in section seven of this chapter. Consistent with Clarke's (1987) methodology, this study separates the subjects into high, medium and low risk-averse classes on the basis of their total scores obtained from answering ten different scenarios given in Task 5 of the research instrument, and the subjects in the medium class will be deleted from the data analysis.

4.3 EXPERIMENTAL DESIGN

4.3.1 A Field Experiment Approach

A field experiment is a research study conducted in a realistic situation in which the researcher manipulates one or more independent variables under as carefully controlled conditions as the situation will permit (Kerlinger 1986, p.369). This approach allows the manipulation of independent variables and the control of extraneous factors while portraying to the greatest extent possible a realistic setting (Campbell and Stanley 1963). Consequently, a high degree of internal validity is to be achieved that will allow making inferences about the causal relationships between the independent variables and the dependent variable. In addition, the realism feature of the field experiment improves the strength of experimental effects. "Another virtue of field experiments is their appropriateness for studying complex social and psychological influences, processes, and changes in lifelike situation" (Kerlinger 1986, p.370). Because this study involves psychological influences in professional accounting, a field experiment appears particularly appropriate for testing hypotheses about those influences. In particular, in order to study the effects of the two personality variables (i.e., tolerance for ambiguity and auditor risk attitude) and their interactions with other factors such as business risk on auditors' planning decisions, it is necessary for this study to adopt a field experiment approach. For example, the effect of tolerance for ambiguity and auditor risk attitude cannot be estimated through an archival study involving examination of actual audit files. A study of the auditor business risk through empirical approaches such as studies of actual or potential litigation cases and in depth personal interviews are also subject to serious constraints which include (1) unwillingness of the CPA firms to disclose confidential client information and to discuss the details of actual or potential litigation faced by the CPA firms, and (2) the difficulty in relating the auditor business risk information to the personality variables studied. Based on the above considerations, a field experiment approach is used to test the hypotheses developed in Chapter Three.

In adopting the field experiment approach, it is necessary to identify its major weakness and find ways to overcome the problem. The major problem of using a field experiment approach relates to the generalizability of the findings. An empirical approach will have a greater degree of external validity than a field experiment approach[5]. This is due to the use of actual empirical data in an empirical approach, rather than using a facsimile of actual information and volunteer subjects as in a field experiment approach. This major threat to external validity is reduced in this study by two means: (1) the use of a realistic experimental task, and (2) the choice of subjects with appropriate auditing experience as respondents who are similar to the target population of this study.

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[5] There is a trade-off between external and internal validity. In compensating for higher internal validity, a field experiment has a lower degree of external validity.

4.3.2 A Mixed Factorial Design

The research design of this study uses a mixed ANOVA model with three between-subjects variables and a one-half fractional replication of five within-subjects variables.[6] The ANOVA approach constitutes an appropriate statistical technique for the current research study because it takes into account a single continuous dependent variable and multiple categorical independent variables and because it facilitates the investigation of both the main and interaction effects (Keppel 1989, 1991; Winer et al. 1991; Sekaran 1992). And as Ekehammar (1974) has pointed out, the application of ANOVA is better than the use of correlation or factor analysis because it is a more direct empirical test of interactionist theory. Hence, a statistically significant interaction indicates the presence of a moderating effect which would be difficult to obtain from correlation or factor analysis.

The five independent variables of this study adopted a within-subjects design because Schepanski et al. (1992, p139) suggest that "if the constraint is on the number of subjects, within-subjects designs would be preferred since the researcher can collect multiple data points from each subject." In particular, this study aims at recruiting experienced auditors from four (two structured and

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[6] Other accounting researchers (e.g., Libby 1979; Gul 1989; Huang 1992) have also used the mixed between- and within-subjects designs. See Hays (1988) for further discussion of this type of mixed model, i.e., ANOVA: Model III.

two unstructured) big 6 CPA firms in Hong Kong. Gaining co-operation from those CPA firms is critical to the success of the study and the number of volunteer auditor-subjects from CPA firms is expected to be small.

4.3.3 Demand Effects Bias

A principal concern for the use of within-subjects designs in judgement and decision-making research relates to the issue of demand effects bias (Schepanski et al. 1992). A demand effects bias occurs when subjects can form a hypothesis about the objective of the experiment and respond in a manner that introduces bias into the interpretation of the effect of the manipulated treatment variable(s). Cook and Campbell (1979) interpreted this bias as a threat to the construct validity of the inferred causal relationship.

Earlier, Pany and Reckers (1987) studied the problem of demand effects bias in a within-subjects design where the independent variable spanned over four levels, thus making the experimental manipulation more transparent. In this research study, all the within-subjects independent variables span over only two levels, and Harsha and Knapp (1990) demonstrate that it is unlikely that demand effects basis is a problem with repeated measures over two levels. Moreover, recently Gul and Windsor (1994) suggest that demand effects basis may not be driven only by the within-subjects design but also by the nature of the issue being investigated. More importantly, Schepanski et al. (1992, p.142) note "... there appears to be no empirical basis for concern about demand [effects] bias from the adoption of subject roles in within-subjects designs ... The numerous concerns expressed in the accounting literature appear unwarranted".

For the research reported here, the auditor-subjects' responses were unlikely to be demand-biased because the conditional probability of a subject's acting on a hypothesis was very low in this study[7]. In particular, the subjects were not motivated and thus were unlikely to act on the experimental hypotheses because:

(1) The auditor-subjects have high prior knowledge and well established opinions[8].

(2) Subjects' anonymity was provided and subjects were assured of the anonymity of their firm[9].

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[7] Schepanski et al. (1992) suggest that three conditions are necessary for a subject to be demand-biased: (1) the subject has encoded the demand cues, (2) the subject has discerned the hypothesis given that the demand cues have been encoded, and (3) the subject acts on the hypothesis to provide biased responses given that he or she has decoded the cues and discerned the hypothesis (See also Weber and Cook 1972; Carlston and Cohen 1980; Shimp et al. 1991).

[8] Schepanski et al. (1992, pp.128-129) note that "... demand characteristics [i.e., demand effects bias] are simply a form of social influence (see, e.g., Wyer 1974). A well-known result in social psychology is that subjects who have high prior knowledge and strong prior opinions are less subject to social influence (see, e.g., Willis and Levine 1976, Petty and Cacioppo 1986). Schepanski et al. further suggest that auditors, professional accountants, or financial statement users typically have higher prior knowledge and stronger prior opinions and therefore should be less motivated to act on the experimental hypothesis.

[9] Schepanski et al. (1992) note that an apprehensive subject wants to discern the rationale of the experiment in order to represent himself or herself

(3) A superior-subordinate relationship did not exist between the researcher and the subject[10].

In addition, several procedures have been used to minimize the possible demand effects bias, and these are:

(1) The research instrument uses neutral wordings. For example, no desirable responses are explicitly provided to the subjects.

(2) The use of a computer program to completely randomize the order of the cases so that the presentation order of the 20 cases varies from subject to subject.[11]

(3) The use of a computer program to completely randomize the variables within each case, thus allowing the presentation order of the five within-subjects variables to vary from case to case. This approach makes it very difficult for a subject to compare the changes from one case to another.

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in a favourable light and thus has more motivation to act on the hypotheses studied. Weber and Cook (1972), Silverman (1968), and Rosnow et al. (1973) refer to response anonymity as a method of reducing subject apprehensiveness. Schepanski et al. (1992, p.129) then suggest that "If the subjects in judgement studies in accounting perform the experimental task anonymously and are assured of the anonymity of their firm, they should be less motivated to act on a hypotheses."

[10] Weber and Cook (1972) suggest that subject apprehensiveness (see preceding footnote for explanation of this term) can be reduced if the experimenter is not a person of high status or an authority figure. Schepanski et al. (1992, p.129) further note that "Experimenters' in judgement studies in accounting are unlikely to be perceived as controlling a goal region or evaluating the subject's emotional adequacy. More often, it is the subject who is viewed as the authority from whom the researcher is looking for guidance."

[11] It would have been better to just have one case per page. However, this was not practical because this would add another 15 pages (though this does not change the actual length) to the research instrument, which already had 13 pages. It is very unlikely that a CPA firm in Hong Kong would be willing to participate in a research project that involved a 28 page instrument. Actually, in response to a common concern expressed by the participants of the pilot study about the length of the instrument, the author had shortened the research instrument to the current 13 pages from 17 pages by eliminating certain background audit information.

(4) Providing specific instructions to the subjects requiring them to complete each case in the order in which it is presented, and not to return to a case after he/she has completed it.

4.3.4 One-half Fractional Replication

Winer et al. (1991) defines a fractional replication design as a factorial design which only includes a fraction of the total set of treatment combinations required by the full factorial design. The main advantage of using a fractional replication design is that it allows five or more factors to be included simultaneously in an experiment of a practicable size, thereby allowing the researcher to quickly discover which factors have important effects on the dependent variable (Cochran and Cox 1992, p.244).

In the research reported here, a full combination of the five within-subjects variables with two levels each would generate a total of 32 (i.e., 2^5) case scenarios. Requesting each subject to make judgements on 36 (including four duplicate cases[12]) treatment combinations or case scenarios would be an unreasonable request and, according to prior accounting researchers (e.g., Boatsman and Robertson 1974; Huang 1992), an excessive number of cases may create problems in monitoring the experiment. For example, Huang (1992) has pointed out that subject fatigue and time constraints have negative effects

[12] The subjects are also required to complete four duplicate cases for the purpose of assessing intra-auditor consistency (stability).

on the cooperation of subjects and on their interest in the experiment, and these will have adverse effects on data quality.

More importantly, the contact persons of the targeted CPA firms indicated that they were unwilling to complete 36 case scenarios due to the extra time involved[13]. Therefore, this study adopts a one-half replication of the five within-subjects variables, and this requires the subjects to respond to only 16 of the 32 possible treatment combinations[14]. The major disadvantage of using such a one-half fractional replication relates to the confounding of the four-way interaction effects with the main effects and the three-way interaction effects with the two-way interaction effects. This will not cause a significant interpretation problem here because this study is not looking for any three-way or higher order interaction among the five variables based on theory. In fact, based on the professional standards and the available evidence from the auditing literature, there is no theory to support any three-way or higher order interaction among those five variables.

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[13] The extra time involved is estimated to be 15 minutes. It should be noted that the CPA firms are currently charging HK$2,000-3,000 per hour for their supervisor/manager rank staff who are the targeted auditor-subjects of this study. In fact, as noted earlier, the research instrument had been shortened to the current 13 pages from 17 pages in response to a common concern expressed by the participants of the pilot study about the length of the instrument.

[14] Each subject is therefore required to complete a total of 20 cases, i.e., 16 original case scenarios plus four duplicate cases.

In their often cited work, Cochran and Cox[15] (1992) lay out the rules for selecting the set of treatment combinations that can maximize the number of main and interaction effects for evaluation. This research study adopts Cochran and Cox's (1992, p.261) Plan No. 6A.3, which is a readily designed one-half replication of a 2^5 experiment resulting in 16 treatment combinations with ABCDE being the defining contrast[16] (see Table 4.2). This design permits evaluation of all main and two-factor interaction effects of the five independent (all within-subjects) variables, assuming that the interactions among three or more independent variables are negligible (Appendix A illustrates how to estimate the main and two-factor interaction effects).

[15] Cochran and Cox's fractional factorial designs have been used widely in accounting studies, e.g., Brown 1983, Messier 1983, Meixner and Welker 1988. Note that the first edition of Cochran and Cox's book was published in 1950.

[16] A defining contrast refers to an interaction of factors which is used to split the factorial into fractional replicates. The researcher can no longer measure the effect of an interaction used as a defining contrast.

Table 4.2

One Half Replicate of a 2^5 Factorial Design
Cochran and Cox (1992, p.261) Plan No. 6A.3

			Factor		
Treatment	A	B	C	D	E
1	+	+	+	+	+
2	+	+	+	–	–
3	+	+	–	+	–
4	+	+	–	–	+
5	+	–	+	+	–
6	+	–	+	–	+
7	+	–	–	+	+
8	+	–	–	–	–
9	–	+	+	+	–
10	–	+	+	–	+
11	–	+	–	+	+
12	–	+	–	–	–
13	–	–	+	+	+
14	–	–	+	–	–
15	–	–	–	+	–
16	–	–	–	–	+

Notes

1. In this design, ABCDE is used as the defining contrast. This design permits evaluation of all main and two-factor interaction effects.
2. The five factors (A, B, C, D and E) refer to the five within-subjects variables of this study: auditor business risk, inherent risk, control risk, desired audit risk and planning materiality.
3. The signs, "+" and "–", represent the two levels of each factor. A "+" sign in this study denotes a high level, while a "–" sign denotes a low level.
4. Treatments 4, 5, 9 and 10 in the above list were selected for repetition.

4.3.5 Four Duplicate Cases

Consistent with prior accounting studies (e.g., Joyce 1976; Srinidhi and Vasarhelyi 1986; Colbert 1988; Meixner and Welker 1988), this study repeats four of the above 16 original treatment combinations to permit an assessment of the intra-auditor consistency (stability) for each subject. Trotman (1990) suggests that the inclusion of more extreme cases, i.e., cases with all "high" or "low" cues, will produce higher correlation coefficients of judgement consensus than more non-extreme cases. Trotman's findings can be readily applied to the assessment of judgement stability, i.e., the inclusion of more extreme cases would likely to produce higher correlation coefficients of judgement stability than more non-extreme cases. In the research reported here, the four duplicate cases, as shown in Table 4.2, are all non-extreme cases in order to avoid overstating the degree of judgement consistency.

4.4 EXPERIMENTAL TASK

This research study requires the auditor-subjects to perform the following six tasks: (1) providing judgements of the dependent variable of interest, i.e., the planned extent of audit evidence; (2) subjectively allocating 100 points over the five within-subjects variables of interest; (3) completing the MacDonald's (1970) Tolerance For Ambiguity Test; (4) completing the Audit Structure Questionnaire; (5) completing the Clarke's (1987) Risk Attitude Test; and (6) providing answers to the debriefing questionnaire. The remainder of this section describes these experimental tasks, and the research instrument section of this chapter then provides further discussion about the tasks.

The first task elicited each auditor-subject's judgements on the dependent variable for each of the 20 cases provided. The subjects provided these responses after considering both the audit information (see Section 4.7 for details) and the pre-answered estimates of inherent risk, control risk, desired audit risk, auditor business risk and planning materiality as specified in each case. The subjects indicated, for each case, the extent of audit evidence that is to be collected in order to satisfactorily complete the audit of a hypothetical company. Responses to the planned extent of audit evidence task are provided on a 10-point scale ranging from "much lower than normal" to "much higher than normal" extent of evidence.

After completing the first task, the auditor-subjects then subjectively allocated a total of 100 points over the following five independent variables to indicate their relative importance in making their planning decisions:

(1) inherent risk;

(2) control risk;

(3) auditor business risk;

(4) desired audit risk; and

(5) planning materiality.

The allocations indicate the relative importance the subjects place on each variable, and they can be compared with the cue utilizations or usages obtained in task 1 to compute the auditor self-insight index (Section 4.8 provides further discussion).

The third task of this experiment required the subjects to complete the MacDonald's (1970) TA Test. These responses were used to compute the TA score of each subject. To confirm the reasonableness of Cushing and Loebbecke's (1986) and Kinney's (1986) audit structure classification, the fourth task required the subjects to complete the audit structure questionnaire. The researcher then used the responses to estimate the subjects' perceived degree of audit structure inherent in their evidential planning decisions. The fifth task required the subjects to complete the Clarke's (1987) risk attitude test, and responses to this test were used to compute the subject's risk attitude score.

The sixth and final task required the subjects to answer a debriefing questionnaire which solicited responses to the following items:

(1) gender;

(2) professional qualifications;

(3) educational background;

(4) present job title;

(5) years of auditing experience;

(6) familiarity with the audit planning of manufacturing companies;

(7) familiarity with auditing textile companies;

(8) level of interest about answering the questionnaire; and

(9) the time required to complete the experimental tasks.

4.5 SUBJECTS

Use of actual auditors as subjects in this study is appropriate because Calder et al. (1981, p.199) pointed out that "when effects application is the goal, correspondence procedures require that research participants match individuals in the real world setting of interest". Ashton and Kramer (1980) also suggested that if the purpose of the research is the direct implementation of a judgement - improvement program, it is desirable to use actual auditors as subjects. Because of the nature of audit judgements, this study examines the judgements of auditors with professional qualifications or with at least four years of auditing experience. Based upon discussions with some auditors, audit planning in the Big Six CPA firms is usually performed by staff having at least three years auditing experience.

Ideally, the auditors used in a research study should be randomly selected from the target population in order to enhance external validity. However, to conduct such an approach there exist several practical problems.

First, in Hong Kong, a list of all the auditors working in public practice does not exist, and the cost of compiling such a list would be prohibitively expensive. Second, even though the target population is restricted to the very experienced CPAs (as per the register of the HKSA, there are about 2000 CPAs who have the authority under the Laws of Hong Kong to certify reports), the decline rate of the randomly selected subjects is likely to be high because of the generally low response rate in Hong Kong. The high expected decline rate would cast doubt on the representativeness of the sample, even though the subjects were randomly selected. Third, because one of the constraints of the current study relates to the amount of time each subject is required to devote to complete the questionnaire, it is very difficult to select the subjects by random sampling. Due to these practical reasons, the approach taken is to allow the contact partners, principals and managers to select the qualified subjects in their firms to participate in this study.

Applying that method, a sample of 79 experienced auditors from four Big Six CPA firms in Hong Kong was obtained for the analysis[17]. The subjects consisted of 47 males and 32 females, and of these, 44 subjects came from structured firms and 35 from unstructured firms. In terms of educational background, 64 subjects had at least one college or university degree and 15

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[17] All subjects were assured that their names and affiliations would be kept strictly confidential. Consequently, the names of the participating CPA firms and their auditors are not identified in the research, and the results are not reported by firm.

had no degrees. All the subjects possess comparable levels of professional experience with subjects used in other accounting judgement studies, and they had an average auditing experience of 6.3 years (range from 3 to 14 years). Their duties revealed that of the 79, there were 50 managers, 23 supervisors and 6 seniors. Seventy subjects were HKSA Associate members or equivalent, six subjects were HKSA Fellow members or equivalent, and the remaining subject was a supervisor with 5 years auditing experience. Moreover, all the subjects are to some extent familiar with the audit planning of manufacturing companies and with auditing textile companies[18]. The subjects' average familiarity level with the audit planning of manufacturing companies and with auditing textile companies are 67 and 54 out of a 100-points scale, respectively.

In an attempt to assess whether or not the treatment effects are confounded by the potential heterogeneity of the above sample characteristics, the sample distributions of the treatment groups of the three between-subjects variables have been examined[19]. As shown in Table 4.3, the two audit structure groups (i.e., unstructured and structured) are not significantly different in any of the seven characteristics[20]. Similarly, the results reported in Tables 4.4

[18] The experiment involves a case study of audit planning for a hypothetical large-sized textile company, whose principal activity is the manufacture of garments.

[19] The sample distributions of the within-subjects groups need not be examined because each subject is exposed to the same 16 within-subjects treatment combinations.

[20] T-tests and χ^2 tests have been conducted for continuous variables and categorical variables, respectively.

indicate no significant difference between the high TA and low TA groups in terms of the sample distributions for the seven characteristics. In addition, the results reported in Table 4.5 also suggest that the seven characteristics do not differ significantly between auditors with low and high degrees of risk-aversion.

Table 4.3

Comparison of Demographic Characteristics
Audit Structure

Panel A: Continuous Variables

Demographic Characteristics	Unstructured (n = 35) Mean	S.D.	Structured (n = 44) Mean	S.D.	t-statistics	p-value
Auditing Experience (Years)	6.34	2.22	6.18	1.73	0.36	0.718
Manufacturing[a]	69.71	16.54	65.00	18.36	1.18	0.240
Textile[b]	53.71	22.50	53.41	19.52	0.06	0.949

Panel B: Categorical Variables

Demographic Characteristics	Unstructured (n = 35) Number	%	Structured (n = 44) Number	%	Chi-square statistics	p-value
Gender						
Female	15	42.9	17	38.6	0.14	0.704
Male	20	57.1	27	61.4		
Degree						
Yes	32	91.4	32	72.7	3.30	0.069
No	3	8.6	12	27.3		
Membership Status						
Fellow or equivalent	5	14.3	1	2.3	5.43	0.066
Associate or equivalent	29	82.9	43	97.7		
No professional designation	1	2.8	0	0.0		
Position						
Manager	18	51.4	32	72.7	4.03	0.133
Supervisor	14	40.0	9	20.5		
Senior	3	8.6	3	6.8		

[a] Manufacturing = familiarity with audit planning of manufacturing companies (maximum point = 100)

[b] Textile = familiarity with auditing textile companies (maximum point = 100)

Table 4.4

Comparison of Demographic Characteristics
Tolerance For Ambiguity

Panel A: Continuous Variables

Demographic Characteristics	Low TA (n = 31) Mean	S.D.	High TA (n = 38) Mean	S.D.	t-statistics	p-value
Auditing Experience (Years)	6.52	1.81	6.08	1.78	1.01	0.316
Manufacturing[a]	67.42	17.88	68.68	14.55	-0.32	0.747
Textile[b]	54.19	19.11	53.95	20.87	0.05	0.960

Panel B: Categorical Variables

Demographic Characteristics	Low TA (n = 31) Number	%	High TA (n = 38) Number	%	Chi-square statistics	p-value
Gender						
Female	15	48.4	14	36.8	0.93	0.334
Male	16	51.6	24	63.2		
Degree						
Yes	7	22.6	6	15.8	0.52	0.473
No	24	77.4	32	84.2		
Membership Status						
Fellow or equivalent	3	9.7	2	5.3	0.50	0.482
Associate or equivalent	28	90.3	36	94.7		
Position						
Manager	21	67.7	25	65.8	0.37	0.832
Supervisor	8	25.8	9	23.7		
Senior	2	6.5	4	10.5		

Note: 10 subjects with a median score of 9 from the MacDonald's (1970) test were deleted from the analysis.

[a] Manufacturing = familiarity with audit planning of manufacturing companies (maximum point = 100)

[b] Textile = familiarity with auditing textile companies (maximum point = 100)

Table 4.5

Comparison of Demographic Characteristics
Risk Attitude

Panel A: Continuous Variables

Demographic Characteristics	Low Risk-averse (n = 22) Mean	S.D.	High Risk-averse (n = 30) Mean	S.D.	t-statistics	p-value
Auditing Experience (Years)	6.09	1.71	6.03	1.58	0.12	0.901
Manufacturing[a]	68.64	16.12	64.33	17.75	0.90	0.374
Textile[b]	56.36	18.91	50.33	22.20	1.03	0.309

Panel B: Categorical Variables

Demographic Characteristics	Low Risk-averse (n = 22) Number	%	High Risk-averse (n = 30) Number	%	Chi-square statistics	p-value
Gender						
Female	8	36.4	13	43.3	0.26	0.613
Male	14	63.6	17	56.7		
Degree						
Yes	18	81.8	25	83.3	0.00	1.000
No	4	18.2	5	16.7		
Membership Status						
Fellow or equivalent	2	9.1	2	6.7	1.53	0.466
Associate or equivalent	19	86.4	28	93.3		
No professional designation	1	4.5	0	0.0		
Position						
Manager	14	63.6	19	63.3	1.36	0.507
Supervisor	7	31.8	7	23.3		
Senior	1	4.6	4	13.4		

Note: 27 subjects with risk-attitude scores falling into the middle range of scores were dropped from the analysis.

[a] Manufacturing = familiarity with audit planning of manufacturing companies (maximum point = 100)

[b] Textile = familiarity with auditing textile companies (maximum point = 100)

In order to assess the external validity of this study, the sample distribution and the HKSA distributions have been compared in three aspects: gender, degree and membership status. Table 4.6 provides a summary of these comparisons. As of May 1997, a total of 3945 qualified accountants (HKSA members) worked in professional practice in Hong Kong. Of the 3945, 2520 were employees and 1425 were employers, i.e., partners or sole proprietors. The results of χ^2 tests (α=0.05, df=1) indicate no significant difference between the sample and the HKSA gender distributions, thus suggesting that the gender distribution of the sample is similar to those of the HKSA. With regard to the degree profile of the subjects, the results of χ^2 tests (α=0.05, df=1) indicate significant differences between the sample and the HKSA distributions. Specifically, the sample consists of a higher proportion of degree holders than those of HKSA. Nevertheless, the results of an ANOVA test using degree as an independent variable reveals that the variable is not statistically significant at the 0.05 level, thus suggesting that degree holders and non-degree holders do not differ in their evidential planning decisions. This provides some evidence that the findings of this study are not affected by the differences in the degree profile.

Table 4.6

Demographic Description of Respondents

	No. of Respondents	Distribution of HKSA members working in professional practice May 1997	
		Employees Only	Employers & Employees
Panel A: Gender			
Male	47 (59.5%)	1519 (60.3%)	2772 (70.2%)
Female	32 (40.5%)	1001 (39.7%)	1173 (29.8%)
Total	79 (100.0%)	2520 (100.0%) *	3945 (100.0%) *
Panel B: Degree			
Yes	64 (81.0%)	1645 (65.3%)	1911 (48.4%)
No	15 (19.0%)	875 (34.7%)	2034 (51.6%)
Total	79 (100.0%)	2520 (100.0%) **	3945 (100.0%) **
Panel C: Membership Status			
Fellow or equivalent	6 (7.7%)	145 (5.8%)	727 (18.4%)
Associate or equivalent	72 (92.3%)	2375 (94.2%)	3218 (81.6%)
Total	78 (100.0%)	2520 (100.0%) *	3945 (100.0%) **

* The results of a χ^2 test ($\alpha = 0.05$, df = 1) indicate no significant difference between the sample and the HKSA distribution.

** The results of a χ^2 test ($\alpha = 0.05$, df = 1) indicate significant difference between the sample and the HKSA distribution. Nevertheless, the results of an ANOVA test using degree (membership status) as an independent variable reveals that the variable was not significant at 0.05 level. This provides some evidence that the findings of this study were not affected by the differences in the degree (membership status) profile.

Regarding the membership status of the subjects, the results of a χ^2 tests (α=0.05, df=1) indicates no significant difference between the sample and the HKSA distribution (employees only). This finding suggests that the sample contains a similar proportion of fellow and associate members of the HKSA when compared with that of the HKSA distribution (employees only). However, the results of another χ^2 test (α=0.05, df=1) reveal significant difference between the sample and the HKSA distribution (employers and employees), thus indicating that the sample includes a relatively low proportion of HKSA fellow members. Nevertheless, the results of an ANOVA test using membership status as an independent variable reveal that the variable is not statistically significant at the 0.05 level. This provides some evidence that the findings of this study are not affected by the differences in the membership status profile.

To further assess the external validity of this study, 40 experienced auditors from four Big Six CPA firms in Hong Kong participated in a follow-up study to assess their levels of TA and risk attitude. The contacted partners were instructed to randomly select staff with at least 3 years auditing experience to participate in the follow-up study. Of these 40 subjects, 21 subjects came from a structured firm, 15 from two semi-structured firms and 4 from an unstructured firm. Their auditing experience, position, gender and educational background profiles were similar to those of the 79 subjects in this study. In particular, they had an average auditing experience of 5.7 years (range from 3 to 13 years) . There were 21 mangers and 19 supervisors and seniors. Twenty four of them were male and the remaining 16 were female. In terms of educational background, 34 subjects had at least one college or university degree and 6 had no degree. Subjects of the follow-up study were requested to complete the MacDonald's (1970) TA Test and Clarke's (1987) risk attitude test. Table 4.7 compares the mean, standard deviation, variance and quartiles of the TA distributions of this study and the follow-up study. The sample distribution of subjects' TA scores in this study is similar to that of the follow-up study. In particular, the results of a t-test ($t = 0.17$, p-value = 0.869) and of a Cochran C test (C-statistic = 0.60, critical value = 0.668) indicate no significant difference in mean and variance between the two sample distributions. Similarly, as Table 4.8 shows, the sample distribution of subjects' risk attitude scores of this study is similar to that of the follow-up study. Again, the results of a t-test ($t = -1.27$, p - value = 0.205) and of a Cochran C test (C-statistic = 0.570, critical value = 0.668) reveal no significant difference in mean and variance between the two sample distributions. It is thus likely that the TA and risk attitude distributions of additional follow-up samples will also be similar to those of this study. Altogether, these results suggest that the auditor-subjects of this study constitutes a representative sample of the Hong Kong auditors.

Table 4.7

A Comparison of Tolerance For Ambiguity Scores

	Follow-up study	This study
Number of Subjects	40	79
Mean	9.48	9.38*
Standard Deviation	2.56	3.14
Variance	6.55	9.86**
Quartiles:		
Maximum	15[a]	15[a]
3rd Quartile	11	12
Medium	9	9
1st Quartile	8	7
Minimum	4	0

[a] The theoretical maximum score is 20.

* The result of a t-test (t = 0.17, p-value = 0.869) indicates no significant difference in mean between sample distributions of this study and the follow-up study.

** The result of a Cochran C test (C-statistic = 0.60, critical value = 0.668) indicates no significant difference in variance between the sample distributions of this study and the follow-up study.

Table 4.8

A Comparison of Risk Attitude Scores

	Follow-up study	This study
Number of Subjects	40	79
Mean	6.10	6.63*
Standard Deviation	2.36	2.05
Variance	5.57	4.20**
Quartiles:		
Maximum	10[a]	10[a]
3rd Quartile	8	8
Medium	6.5	7
1st Quartile	5	5
Minimum	0	0

[a] The theoretical maximum score is 10.

* The result of a t-test ($t = -1.27$, p-value $= 0.205$) indicates no significant difference in mean between the sample distributions of this study and the follow-up study.

** The result of a Cochran C test (C-statistic = 0.570, critical value = 0.668) indicates no significant difference in variance between the sample distributions of this study and the follow-up study.

4.6 PROCEDURES

A pilot test on the research instrument was first conducted with 14 experienced auditors and 10 accounting academics prior to using it in the field. Although the subjects in the pilot test reported no major problems, the researcher modified the research instrument based on several constructive comments. For example, some subjects commented that it might take too long to complete the research instrument, and, accordingly, the researcher shortened the background information and the presentation format of the case study.

Then, to conduct the experiment, the researcher approached partners, principals and managers of the targeted CPA firms as mentioned in Section 4.2 of this chapter, and explained to them the motivation and objective of the research and the nature of the experiment. The researcher and/or the contact persons then administered the experiment at the subjects' offices or at any place which was most convenient for all the subjects. The subjects then completed the experimental tasks in an average time of 32 minutes. One subject's response was discarded because of incompleteness. The final sample contained 79 subjects. Appendix B shows the research instrument containing the experimental tasks presented to the subjects. The next section briefly summarizes the research instrument.

4.7 RESEARCH INSTRUMENT

The research instrument consists of the following sections: (1) an introduction; (2) audit information; (3) the assumptions; (4) information variables; (5) a set of cases provided to the subjects to record their planning judgements; (6) a form used to record the subject's subjective evaluation of the independent variables of interest in this research study; (7) MacDonald's TA Test; (8) an audit structure questionnaire; (9) Clarke's Risk Attitude Test; and (10) a debriefing questionnaire[21]. The following paragraphs describe these sections in detail.

The introductory section outlines the objectives of the research, describes the nature of the tasks to be performed, and assures subjects that their names and affiliations will remain anonymous. The next four sections of the research instrument deal with a hypothetical audit assignment.

In the audit information section, the subject was presented with a case study regarding the audit of a hypothetical textile company called Leadtex Ltd. A textile company was selected for two reasons. First, there is a need to control for industry differences and, second, the textile industry is a major industry in Hong Kong and auditors are familiar with the characteristics associated with

[21] The presentation format of the research instrument used in this study is similar to that of Strawser (1985). However, the variables and the experimental tasks of this research study are different.

this industry. The researcher constructed the case based on the annual reports of several real companies in the same industry. Several auditors with expertise in textile manufacturing were consulted to ensure that the contents of the case resemble real-life situations. As shown in Appendix B, "the Research Instrument", the information provided to the subjects includes projected turnover and total assets for the current year and a brief description of the company's history and business (For details, refer to the research instrument in Appendix B). The turnover and total assets figures were presented in order to maintain the same amount for each case. The researcher then instructed the subjects to role play as the audit partner who is responsible for the audit of Leadtex Ltd.

Next, the assumptions section, Section Three, indicates the mix of the audit staff in the audit team. This assumption is important because a different planned extent of audit evidence may result simply because of using a different mix of audit staff to perform the audit. This section also indicates that the characteristics of the account balances (e.g., location of the stocks) and the particular accounting and internal control systems (e.g., strength of the internal controls) will be varied from case to case and are described in more detail in the information variables section. The information variables section, Section Four, describes the information presented to the subjects in each case. Each of the five manipulated cues, i.e., the five independent variables, was discussed in detail.

The next section, Section Five, describes the actual set of cases. It started with specific instructions to the subjects regarding the nature of the tasks to be performed. The subjects were then instructed to complete each case in the order in which it was presented and not to return to the case after it was completed. Next, this section presented the actual set of cases, which were used to elicit judgements on the dependent variable of interest in this research. These cases contained the manipulated cues for the five within-subjects variables. A total of 20 cases were presented to each subject (see Section 4.3 for the composition of the cases).

After the presentation of the case set, there is a form for the subjects to use to record their subjective evaluations of the significance of the five within-subjects variables. Following this, they then completed the MacDonald's TA Test. The test is given a general title, Personality Characteristics Test, in order to disguise the fact that the purpose of the test is to their TA. As shown in Appendix B, the test consists of 20 questions, and the test score can range from 1 to 20, where a higher score represents a higher level of TA. MacDonald (1970) pointed out that the scale is superior to previous versions of the test and has a split-half reliability coefficient of 0.86 and the cross-validation yield a test and retest reliability of 0.63.

Then, Section Eight presented the audit structure questionnaire to the subjects. The questionnaire consists of 10 statements, and the instructions required the subjects to state to what extent they agreed with each of the statements regarding planning the audit of a typical client of their firm. The 10 statements are based on Cushing and Loebbecke's (1986) "Format for Developing an Audit Methodology". In order to help a firm to develop its audit approach, Cushing and Loebbecke (1986) constructed a set of 110 questions that underline a firm's potential policies for each step of the audit process. These potential policies range from de-emphasizing control on one end to heavy emphasis on control and the use of static structure techniques on the other end. Since the focus of this study is on audit planning, the researcher considered only those questions related to audit planning in developing the 10 audit structure statements of this study.

Initially, a total of 15 audit structure statements was developed. Since pilot subjects commented that 15 statements were too many and that some statements seemed to cover similar characteristics, the following procedures were followed to reduce the number of statements to 10. First, the responses from 30 experienced auditors with at least 3 years auditing experience were analysed by a factor analysis[22]. Second, the principal components of the rotated factors were examined to identity items which could possibly be combined due to similarity in nature (e.g., both statements may relate to inherent risk). Finally, statements were then combined if their Pearson's and Spearman's correlation coefficients indicated that they were highly correlated.

A group of 40 experienced auditors with at least 3 years auditing experience was used to validate the audit structure questionnaire. More specifically, each auditor was provided a definition of a structured audit methodology. Assuming that his/her audit firm used a structured audit methodology, each auditor then stated to what extent he/she agreed that each of the 10 statements constituted a characteristic of the structured audit approach. The response scale ranges from 0 "strongly disagree" to 100 "strongly agree". The results of t-tests indicate that auditors' average response scores for Statements 2 to 10 (range: 59 - 75.8; overall average: 67.5) were all significantly above the neutral point of 50 at the 0.05 level. In addition, the result of a t-test indicates that the average score for Statement 1 (35.5) was significantly less than the neutral point of 50 at the 0.05 level. These results suggest that only Statements 2 to 10 should be used as a measure of the degree of audit structure. This 9-statement scale had a split-half reliability coefficient of 0.79 and a Cronbach's alpha of 0.80. Consequently, in the analysis of the

[22] Since factor analysis should normally be conducted with more subjects, the results of this procedure should be reviewed with some caution.

research study, the average audit structure score was based on the answers of Statements 2 to 10, and the scores for Statement 1 were not included in the data analysis.

The next section, Section Nine, covers Clarke's (1987) Risk Attitude Test (Gamble Format). The test is presented with a general description in order to disguise the purpose of the test. Clarke (1987) uses three different methods, i.e., a gamble format, a lottery format, and an audit decision task format, to measure auditor risk attitude.

Clarke's gamble format consists of 10 gambles which are constructed based on Schoemaker (1982) and Farquhar (1984). Consistent with the standard-gamble method of Farquhar (1984), each gamble involves a choice between a certain outcome versus an alternative with two possible outcomes[23]. Consistent with Schoemaker (1982) and Waller (1988), Clarke (1987, p.113-4) argues that selection of the certain outcome is considered to be more conservative than selection of the gamble:

> This can be seen through an examination of the three feasible relationships between the expected value of the gamble and the certain outcome.

[23] Farquhar (1984) specifies that under the standard-gamble method one of the two gambles is degenerate in each comparison. A gamble is degenerate when a particular outcome occurs for certain.

1. If the expected value of the gamble exceeds the certain payoff, a risk neutral person would select the gamble[24]. A conservative person, however, would desire to eliminate the risk a gamble presents and thus may be willing to accept the lower expected value of the certain outcome [25] .

2. If the expected value of the gamble is equal to the certain payoff, a risk neutral person would be indifferent between the two alternatives. A more conservative person would, however, select the certain outcome due to the lower risk of an undesirable outcome[26].

3. If the expected value of the gamble is less than the certain payoff, a risk neutral person would select the certain payoff [27]. A low risk-averse individual may, however, prefer the gamble.

Clarke's standard gambles are also consistent with the typical participative budgeting problem presented by Kim (1992). This is further described in Appendix C.

Clarke's lottery format comprises of 10 of the lotteries used by Lopes (1984). Each lottery involves a choice between two alternatives which have the

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[24] Alternatively, Schoemaker (1982, p.137) suggests that psychologically a person is risk-taking, i.e. less risk-averse, if he or she prefers a gamble over a certain payoff given that the certain payoff is greater than the payoff for losing the gamble but less than the payoff for winning the gamble.

[25] This reasoning is in line with the arguments of Schoemaker (1982, p.137) and Waller (1988): according to traditional expected utility theory, a person is risk-averse if he or she selects a certain payoff that is less than the gamble's expected value.

[26] Consistent with Schoemaker (1982, pp.57 and 116), the certain payoff represents a safe alternative and the gamble represents a risky alternative. Waller (1988) indicates that a high risk-averse person should choose the alternative with certain outcome.

[27] It can be argued that a conservative or more risk-averse person would also select the certain payoff because he or she would desire to eliminate the risk a gamble presents and at the same time obtain a higher expected value.

same expected value but have different variances (greater versus lower) in the distribution of the possible outcomes. In the lottery selection decision, the auditor-subject must base the decision solely on the distribution. Clarke's audit decision task format provides the auditor with 10 independent decisions encompassing a variety of audit scenarios. In each case, the auditor-subject is required to choose between more risky and less risky audit decision alternatives. The alternatives have been predetermined by a panel of experts to be "more risky" or "less risky".

The results of a coefficient of concordance test and correlation analyses (Clarke 1987, pp.136-147) indicate that the three assessment formats show strong similarities across auditors. In particular, Kendall's coefficient of concordance for the three assessment formats was computed to be .591, and this provided evidence to reject the null hypothesis of no agreement between the three assessment formats[28]. The Pearson (Spearman) correlations between any two of three formats were all significantly different from zero at the 0.95 level of significance[29]. These results suggest that general risk attitude formats (e.g., the gamble format) can be used to extract relative risk attitudes for application to specific decision environments (e.g., auditors' evidential planning decisions of this study). Clarke (1987, p.181) further notes that "Since

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[28] The computed χ^2 value of 76.19 was greater than the critical χ^2 (α=0.01, df=43) value of 63.69.

[29] The Pearson's correlations ranged from 0.243 to 0.522, while the Spearman's correlations ranged from 0.254 to 0.578.

general formats are much simpler to develop and administer, the results support the use of general formats by reducing concerns that general formats are measuring artificial risk attitude." As a result, Clarke's gamble format is adopted for this research study[30].

To further support the construct validity of the gamble format, the following procedures have been performed to provide some assurance that the gamble format measures risk attitudes of auditors as intended:

(1) Before pilot testing the research instrument, a total of eight experienced auditors were requested to make comments on the draft research instrument, which included the Clarke's gamble format. Among other things, these auditors confirmed that a more risk-averse person would select the certain outcome option.

(2) During the pilot testing stage of the research instrument, 10 subjects were interviewed after they filled in the research instrument. They were asked to describe themselves as a high, moderate or low risk-averse person. Their responses were then checked to determine whether they were classified into the right risk-category as per Clarke's classification score. Eight of the 10 subjects fit into the right category.

To measure his/her risk attitude, a subject of this study is required to indicate his/her preference in 10 different scenarios in standard gamble format.

[30] It will take about 30 minutes to complete the 10 audit cases of the audit decision task format. Because of the practical reasons discussed earlier (especially in relation to the concern of time constraint), this study adopts the gamble format which would take not more than five minutes to complete.

These 10 gambles are the same as those of Clarke except that all the figures have been multiplied by 10 to reflect the difference in US and Hong Kong currencies (see Appendix B, Task 5). The major advantage of using Clarke's 10 standard gambles is that these scenarios as a group in the gamble format has been validated by Clarke's two other measures : the lottery format and the audit decision task format. The major disadvantage of using this 10-item scale is that the expected score of a risk-neutral person (i.e., 3.5 out of a maximum score of 10) is not set at the middle point (i.e., 5) of the 10-point scale. However, this may not cause significant problem in classifying the subjects into low or high risk-averse because this study only examines subjects' relative risk attitudes and an ordinal scale is sufficient for classifying the subjects into appropriate groups.

In this study, the selection of the certain outcome is scored a 1, while selection of the gamble is scored a 0. The subject's total score can range from 0 (indicating all risky choices were selected) to 10 (indicating all conservative choices were selected). A low score suggests a low risk-averse attitude, while a high score suggests a high risk-averse attitude[31]. Based on the responses to the 10 scenarios, this risk-attitude scale has a split-half reliability coefficient of 0.70 and a Cronbach's alpha of 0.61. In addition, when the 10 scenarios are

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[31] As noted earlier, this study treats risk attitude as a personality variable and only examines relative risk attitudes of subjects. As such, this study is not intended to measure the utility functions of the subjects.

divided into three subgroups (i.e., those scenarios with expected value of the gamble greater than, equal to, or less than the certain outcome), the result of a coefficient of concordance test indicates that the three subgroups show strong similarities across auditors. Specifically, Kendall's coefficient of concordance for the three subgroups is computed to be 0.4482, and this provides evidence to support that the ranking order of the subjects in the three subgroups are highly correlated[32]. As a result, similar to Clarke's (1987), subjects are grouped into low, medium or high risk-averse according to their total scores for the 10 scenarios. Each group is intended to have same number of subject, and the subjects in the medium group are dropped from the analysis. This classification method is consistent with Schoemaker (1982, p.58) who considered a subject as low (high) risk-averse if he or she exhibited risk-taking (risk-averse) preference for all four lottery questions under the strict classification criterion or for only three out of four lottery questions under the weak classification criterion.

The tenth and final section of the research instrument is a debriefing questionnaire requesting the subjects to provide relevant demographic information. The next section of this chapter discusses the data analysis techniques used in this research study.

[32] The computed χ^2 value of 104.88 is greater than the critical χ^2 (α = 0.025, df = 78) value of 103.82.

4.8 DATA ANALYSIS TECHNIQUES

This section discusses the statistical procedures used to analyze the auditor-subjects' judgements of the planned extent of audit evidence. More specifically, these procedures include: (1) overall ANOVAs for all subjects; (2) individual ANOVAs for each auditor-subject; and (3) judgement consistency indices. The following subsections describe these statistical procedures in more detail.

4.8.1 Overall ANOVAs

Several ANOVAs are used to determine the main and interaction effects of the independent and moderating variables on the dependent variable. In order to single out the moderating effect of a particular between-subjects variable, three separate ANOVAs are constructed in the first stage of the analyses. Each of these ANOVAs consists of one between- and five within-subjects variables. More specifically, audit structure and the five within-subjects variables form into one ANOVA. Tolerance for ambiguity and the five within-subjects variables form into another ANOVA. Finally, the auditor risk attitude and the five within-subjects variables form into a third ANOVA. In the second stage of the analyses, all the eight variables, including the three moderating variables, are combined into one ANOVA so as to provide additional insights into how these variables jointly affect auditors' planning decisions.

To facilitate the computer analyses and presentation of results, the between- and within- variables are coded as follows:

Between-subjects variables

Aud_stru	=	Audit structure
Rsk_attu	=	Auditor risk attitude
TA	=	Tolerance for ambiguity

Within-subjects variables

Aud_Bus	=	Auditor business risk
Control	=	Control risk
Desired	=	Desired audit risk
Inherent	=	Inherent risk
Planning	=	Planning materiality

In a mixed ANOVA model, such as the one used in this research study, it is necessary to use specific error terms to calculate the F-ratio of different effects. For between-subjects variables, their main effects (e.g., Aud_Stru, TA) and all the interactions among them (e.g., Aud_Stru*TA) share a common error term which consists of subjects confined or nested within the between-subjects variables (e.g., Subject nested within Aud_Stru and TA). For within-subjects variables (e.g., Control, Inherent), their main effects, all interactions among them (e.g., Control*Inherent), and all mixed interactions among within-subjects and between-subjects variables (e.g., Control*Aud_Stru) require separate error terms. In general, the error term for the main effect of a within-subjects variable and its interactions with a between-subjects variable (e.g., Control, and Control*Aud_Stru) is the interaction between the within-subjects variable and the subjects nested within the between-subjects variable (e.g., Control*Subject nested within Aud_Stru); and the error term for the interaction between two within-subjects variables (e.g., Control*Inherent) is the interaction of both variables with the subject nested within the between-subjects variable (e.g., Control*Inherent*Subject nested within Aud_Stru). (See Winer et al. 1991, Chapter 7, for more details.)[33]

The data collected have an unequal number of subjects in each of the between-subjects sub-groups. With unequal group size, a factorial design becomes non-orthogonal and the main effects and interactions are no longer independent because the same variance can be attributed to more than one source (Cody and Smith 1987; Winer et al. 1991; Huang 1992). The SAS programme has a special function to deal with this problem. Specifically, when there exists unequal group size, the GLM (General Linear Model) procedures, instead of the ANOVA procedures, are employed (Cody and Smith 1987; SAS 1992).

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[33] The SAS programme provides a function for this type of analysis. Cody and Smith (1987, Chapter 7) also provides more detail.

The omega-squared statistics (ω^2) are also computed to provide a measure of the weight ascribed to each effect by estimating the proportion of total variance which they explain (Hays 1988). In other words, ω^2 provides an estimate of the proportion of the total variation in a person's judgements that can be predicted from a knowledge of the particular levels of a given cue or a pattern of cues (Hoffman et al. 1968). In ANOVA, it is possible that trivial effects may be significant because the F statistic is partly a function of sample size, and so the ω^2 statistic provides additional insight into an effect's significance (Gul 1986). As Hoffman et al. (1968, p.341) pointed out, "the ω^2 makes possible the interpretation of the effects of ANOVA variables in terms of degree, rather than in terms of level of significance."

4.8.2 Individual ANOVAs

In addition to the overall ANOVAs, individual ANOVAs are produced for each auditor-subject to provide additional insights. These individual ANOVAs are computed from the subjects' responses to the 16 treatment combinations and are used to evaluate the effects of the five within-subjects variables on the auditors' judgements of the planned extent of audit evidence. Table 4.9 shows the form of these individual ANOVAs. This research study evaluates main effects only because it is inappropriate to study any two-factor effects. It should be noted that in this study each level of the two-factor effects has only four observations.

Table 4.9

Format of Individual ANOVAs

Source of Variation		Degree of Freedom
Aud_Bus[a]		2-1 = 1
Control[b]		2-1 = 1
Desired[c]		2-1 = 1
Inherent[d]		2-1 = 1
Planning[e]		2-1 = 1
Error		10
	Total	16 - 1 = 15

[a] Aud_Bus = Auditor business risk
[b] Control = Control risk
[c] Desired = Desired audit risk
[d] Inherent = Inherent risk
[e] Planning = Planning materiality

Based on these individual ANOVAs, several analyses are conducted. First, the model's F-ratio, probability factor (p-value) and R^2 value are used to evaluate the extent to which the total model explains the variance of the dependent valuable, the planned extent of audit evidence. The F-ratios and p-values for each individual ANOVA's main effects are used to determine their significance. A significant main effect suggests that the responses of auditors vary systematically with changes in the level of the within-subjects variable. Finally, an individual ANOVA's sum of squares and mean squares are used to compute the ω^2 statistics which provide additional insight into the cue utilizations of auditor-subjects. The ω^2 statistics are also used to compare the relative strength of association between each independent variable and the dependent variable. A higher ω^2 means that the auditor-subject places relatively more emphasis on that independent variable than on other independent variables in determining audit planning decisions.

4.8.3 Judgement Consistency Indices

In this research study, three types of judgement consistency are examined: (1) inter-auditor consistency (consensus), (2) intra-auditor consistency (stability), and (3) auditor self-insight. As discussed in Chapters One and Two, these judgement consistency measures have previously been examined in the behavioral accounting literature, particularly by Ashton (1974a, 1974b), Joyce (1976), Ashton and Brown (1980), Colbert (1988), Brown and Solomon (1990, 1991), and Strawser (1990), and they are discussed in the following paragraphs.

In this study, consensus refers to the strength of association between each auditor-subject and every other auditor-subject regarding the impact of the five within-subjects variables on their evidential planning decisions. This strength of association was determined by correlating each pair of subjects' responses to the 16 original cases. This approach has been widely used in prior auditing studies, such as Ashton (1974a, 1985), Joyce (1976), and Srinidhi and Vasarhelyi (1986). Both parametric (Pearson's product-moment correlations) and nonparametric (Kendall's coefficient of concordance) statistics were used to compute the consensus index. A nonparametric test was used in order to overcome total reliance on the Pearson's product-moment correlations and to provide corroborating evidence (Strawser 1985; Srinidhi and Vasarhelyi 1986). In order to compute the Kendall's coefficients, each auditor-subject's responses to the 16 original cases were converted into ranks. These rankings were then compared between all the possible pairs of auditor-subjects.

The second consistency index is auditor stability. This correlation constitutes a test-retest reliability measure, and it reports on the ability of the auditor-subjects to respond to the four duplicate cases included in this study in a consistent manner. This approach has been widely used in prior auditing studies (e.g., Ashton 1974a, Joyce 1976 and Colbert 1988). Both parametric (Pearson's product-moment correlations) and nonparametric (Spearman's rank-order correlation coefficients) tests were used to compute this stability index. Similar to the argument for using nonparametric statistics to measure the consensus index, Spearman's coefficients were used to supplement the parametric statistical testing. In order to compute the Spearman's coefficients, each auditor's responses to the four original and four duplicate cases were converted into ranks before comparison. The final measure of the auditor stability variable is based upon the number of deviations of response scale categories for each auditor-subject's duplicate response. For example, if an auditor's initial response to the planned extent of audit evidence is a scale of 5, and if his/her response to the duplicate case is a scale of 7, then the deviation is considered to be two categories.

The auditor self-insight index, the third consistency index, measures the strength of association between an auditor-subjects' cue utilization coefficients (represented by the ω^2 statistics) and his/her perceptions of the importance of each cue to the judgement process (represented by the subjective allocation of 100 points over the five within-subjects independent variables). Each auditor-subject's self-insight index was computed by correlating, across the five cues, the subjective allocation of 100 points with the corresponding ω^2 statistics. This approach has been widely used in prior auditing studies, such as Ashton and Brown (1980), Colbert (1988) and Strawser (1990). Again, both parametric (Pearson's product-moment correlations) and non-parametric (Spearman's rank-order correlation coefficients) statistical tests are used to compute this consistency index. In order to compute the Spearman's coefficients, each auditor-subject's ω^2 statistics for the five within-subjects variables and his/her subjective allocation of 100 points over the same five variables were converted into rank orderings.

4.9 METHODOLOGICAL LIMITATIONS

This section discusses the methodological limitations of the research study. While those limitations do not attenuate the results, they should be considered when generalizing or interpreting the findings of this research. The limitations relate to concepts regarding the judgement process, the interpretation of the ω^2 statistics, the Pearson's product-moment correlation statistics, the independent observations and the representativeness of subjects.

4.9.1 The Judgement Process

The first research objective is to develop a comprehensive and integrated model to capture the evidential planning decisions of auditors. This is achieved by manipulating certain independent variables, i.e., cues, examining the cue utilization patterns of auditors in terms of cue usages, and evaluating the quality of judgement in terms of consensus, stability and self-insight. The patterns explain which independent variables the auditor-subjects have relied upon in making their judgements, though they do not provide the reasons why the auditor-subjects have chosen a particular pattern nor do they describe the sequential steps in their judgement processes. In spite of these limitations, this approach is still warranted because this research study is an initial determination of auditors' judgement processes of evidential planning, and the reasons for particular patterns or the sequential steps leading to them are topics for future research.

4.9.2. Interpretation of Omega-Squared Statistics

When using any strength-of-association measure, e.g., ω^2, an interpretation problem arises from the degree of representativeness of various levels of the independent variables. In this study, each independent variable has two levels which cover the entire range of the independent variables. It may be argued that levels between these extremes should have been included, and that the extent to which the variable did not incorporate all possible levels represents a limitation of this and other such studies, e.g., Strawser (1985). As stated earlier, however, the use of two levels for several of the independent variables is quite realistic since such a format is used by the HKSA and is thus incorporated into the pattern of the auditor-subjects' planning models. In this research, the use of ω^2 statistics and the subjective allocations of 100 points by the auditor-subjects may cause a limitation involving negative correlations of values within each set of X's and Y's. In particular, a high cue usage for one variable precludes some other cue usages from being high. Similarly, if an auditor-subject allocates a large number of the 100 points to one variable, he/she will then have to allocate less points to others.

4.9.3. Pearson's Product-Moment Correlation Statistics

In order to avoid total reliance on the parametric Pearson's statistics, two non-parametric tests, i.e., Kendall's coefficient of concordance and Spearman's rank correlation coefficient, have been used to provide corroborating evidence to the findings of the Pearson's statistics. It should be noted that non-parametric statistical techniques, compared to parametric statistical techniques, require fewer assumptions about the distribution of the sample data.

4.9.4. Independent Observations

A concern of any within-subjects design relates to a possible lack of independence between repeated observations of the same subject, for example, the responses to the case scenarios by the auditor-subjects of this research. In order to help eliminate this dependency among observations, the presentation order of the 20 cases and the presentation order of the five within-subjects variables within each case are completely randomized. The findings of this research study are limited to the extent that these randomized techniques were not completely effective in eliminating the problem of dependency among observations. Nevertheless, a preliminary analysis of the data indicates that all the variables of this study are not statistically correlated at the 0.05 level of significance.

4.9.5 Representativeness of Subjects

Because of the various practical reasons as stated in Section 4.5 of this chapter, volunteer auditors have been used as subjects for this study. This method of subject selection is not random and, therefore, it is possible that the subjects selected may not be representative of Hong Kong auditors. Nevertheless, this method of subject selection has been used extensively in a number of prior related studies, e.g., Gul (1984, 1986), Strawser (1990, 1991) and Tsui (1993). More importantly, the analyses reported in Section 4.5 suggest that (1) the gender distribution of the sample is similar to those of HKSA, (2) the sample contains a similar proportion of fellow and associate members of the HKSA (employees only), (3) the findings of this study are not affected by the differences in the membership status profile (for employers and employees combined category) and in the degree profile, and (4) the distributions of the TA scores and Risk Attitude scores of this study are similar to those of a follow-up sample.

4.10 SUMMARY

This chapter focused on the research methodology adopted for this research study. It started with a discussion of the variables of interest. The chapter then discussed the research design of the study. This was followed by a discussion of the experimental tasks, the subjects, the administration of the experiment and the research instrument. Finally, the chapter described the statistical procedures used to analyze the evidential planning decisions of auditors, and discussed the methodological limitations of the research study. The next chapter presents the results and contains a discussion of those results.

CHAPTER FIVE

RESULTS AND DISCUSSION

OVERALL ANOVAS

5.1 INTRODUCTION

This chapter covers the analysis of the evidential planning decisions of auditors. The next two sections describe some descriptive statistics for the variables examined and discuss how to deal with the ANOVA assumptions in this study. The overall ANOVA results of the various statistical tests for the earlier stated hypotheses are then presented and discussed in the fourth and fifth sections. Finally, a comparison with the prior studies is included in order to shed additional light on the results of this study.

5.2 DESCRIPTIVE STATISTICS

Preliminary data analysis included computing simple correlations among the eight independent and moderating variables. Table 5.1 indicates that the correlations among these variables are very low, and all of them are statistically insignificant at the 0.05 level. The five independent variables are manipulated variables and should have zero correlation, as shown in Table 5.1. Table 5.2 summarizes the responses of the auditor-subjects, revealing that the responses varied greatly from subject to subject. The overall mean response for the planned extent of audit evidence was 6.33, and the mean response for each individual auditor ranged from a low of 4.63 to a high of 8.31.

Table 5.1

Spearman Correlation Matrix
Independent and Moderating Variables

C	0.00						
D	0.00	0.00					
I	0.00	0.00	0.00				
P	0.00	0.00	0.00	0.00			
AS	0.00	0.00	0.00	0.00	0.00		
TA	0.00	0.00	0.00	0.00	0.00	-0.11	
RSK	0.00	0.00	0.00	0.00	0.00	-0.01	-0.06
	A	**C**	**D**	**I**	**P**	**AS**	**TA**

Note: all correlations are not significant at 0.05 level.

Independent Variables
- **A** Audit Business Risk
- **C** Control Risk
- **D** Desired Audit Risk
- **I** Inherent Risk
- **P** Planning Materiality

Moderating Variables
- **TA** Tolerance for Ambiguity
- **AS** Audit Structure
- **RSK** Auditor Risk Attitude

Table 5.2

Frequency of Planned Audit Evidence by Auditors

	Planned Extent of Audit Evidence										
Auditor	1	2	3	4	5	6	7	8	9	10	Mean
1	0	0	1	0	1	3	7	3	1	0	6.75
2	0	0	2	1	4	6	2	0	1	0	5.56
3	0	1	0	0	0	2	3	7	3	0	7.38
4	0	1	0	2	1	1	3	7	0	1	6.75
5	0	0	0	1	1	2	7	5	0	0	6.88
6	1	1	1	5	0	2	2	2	0	2	5.50
7	0	0	0	0	0	2	1	6	4	3	8.31
8	0	0	0	1	2	3	5	4	0	1	6.81
9	0	2	1	1	2	2	2	4	1	1	6.13
10	0	2	0	2	2	5	1	3	0	1	5.81
11	0	0	0	0	2	4	1	5	3	1	7.38
12	0	0	0	0	1	4	3	6	2	0	7.25
13	0	0	0	0	1	0	0	10	4	1	8.19
14	0	2	2	1	0	2	4	4	1	0	5.94
15	0	0	1	1	1	5	4	2	2	0	6.50
16	0	0	0	1	0	3	7	3	2	0	7.06
17	0	0	1	1	1	3	4	3	2	1	6.88
18	0	0	1	4	0	3	4	3	0	1	6.19
19	0	0	0	0	1	5	6	2	2	0	6.94
20	1	0	1	1	0	4	5	1	1	2	6.50
21	0	0	0	1	1	0	8	4	2	0	7.19
22	1	0	0	2	5	3	1	3	1	0	5.75
23	0	0	2	0	3	5	3	3	0	0	6.00
24	0	1	0	2	3	3	2	4	1	0	6.13
25	0	1	1	1	2	3	2	5	1	0	6.25
26	0	1	0	3	1	1	4	5	1	0	6.38
27	0	0	1	2	5	1	6	0	1	0	5.81
28	0	0	1	1	0	2	5	5	2	0	7.00
29	0	0	0	2	1	3	6	3	0	1	6.69
30	0	1	4	1	2	0	4	1	2	1	5.75
31	0	0	0	0	8	0	0	4	3	1	6.81
32	0	1	0	3	3	1	3	4	1	0	6.06
33	1	0	2	1	0	4	1	5	0	2	6.38
34	0	1	2	4	3	1	2	2	1	0	5.25
35	1	1	1	1	1	2	5	3	0	1	6.00
36	0	0	1	1	2	5	6	0	0	1	6.19
37	0	0	1	5	5	2	1	1	1	0	5.25
38	0	2	3	2	1	0	2	2	3	1	5.81
39	0	1	4	0	0	5	3	3	0	0	5.56
40	0	0	0	0	0	1	8	4	3	0	7.56
41	0	0	1	1	0	2	8	1	3	0	6.88
42	0	0	0	2	2	2	5	4	0	1	6.69

(continued)

Table 5.2 (continued)

Auditor	Planned Extent of Audit Evidence										Mean
	1	2	3	4	5	6	7	8	9	10	
43	0	0	0	1	2	3	3	2	4	1	7.19
44	0	1	2	4	1	2	0	3	2	1	5.81
45	1	4	1	1	1	5	2	0	1	0	4.63
46	0	0	0	3	4	5	0	4	0	0	5.88
47	0	0	0	2	3	3	6	1	1	0	6.25
48	1	0	1	1	5	2	2	3	0	1	5.81
49	0	3	3	1	2	1	2	2	2	0	5.19
50	1	1	1	1	3	2	3	1	3	0	5.81
51	0	0	2	2	2	0	4	5	1	0	6.31
52	0	0	2	1	1	3	3	2	4	0	6.63
53	1	1	3	0	1	4	2	2	2	0	5.56
54	0	0	0	2	1	1	0	7	3	2	7.63
55	0	2	2	1	0	1	8	1	1	0	5.81
56	1	1	2	4	2	1	1	2	2	0	5.13
57	0	4	2	2	0	0	0	4	2	2	5.75
58	0	1	1	0	1	6	2	4	0	1	6.38
59	1	1	4	2	3	1	0	2	1	1	4.94
60	0	0	0	1	1	2	4	4	4	0	7.31
61	0	5	2	0	0	0	0	3	6	0	5.88
62	0	3	0	5	1	2	2	3	0	0	5.06
63	1	2	1	3	1	1	2	4	1	0	5.38
64	0	0	0	1	1	2	8	2	2	0	6.94
65	0	0	0	0	3	4	5	3	0	1	6.75
66	0	1	0	1	0	5	1	5	2	1	6.94
67	0	0	2	1	3	2	4	3	1	0	6.13
68	0	0	0	1	2	2	7	3	1	0	6.75
69	0	0	0	0	1	5	5	3	1	1	7.06
70	0	1	0	4	4	3	1	1	2	0	5.56
71	1	0	0	3	0	1	2	4	5	0	6.88
72	0	0	1	0	5	3	3	4	0	0	6.19
73	0	0	0	0	5	6	3	1	1	0	6.19
74	0	0	1	0	0	2	4	3	6	0	7.56
75	0	0	3	1	1	4	4	1	2	0	6.00
76	0	0	0	1	0	1	8	3	2	1	7.38
77	0	0	1	4	1	1	5	2	1	1	6.25
78	1	2	3	1	1	2	3	2	1	0	5.06
79	0	0	0	1	4	7	3	0	1	0	6.00
Total	14	52	75	113	134	202	268	245	123	38	6.33
Percent	1.1	4.1	5.9	9.0	10.6	16.0	21.2	19.4	9.7	3.0	

One-way ANOVA tests were conducted to compare the average mean responses of auditors grouped by gender (female and male), degree (yes and no), membership status (fellow and associate), and position (manager, supervisor and senior). F values for all four tests were not significant at the 0.05 level. Three regression analyses, using the average mean responses of auditors as the dependent variable, were also conducted for each of the three continuous demographic variables, i.e., years of auditing experience, familiarity with audit planning of manufacturing companies, and familiarity with auditing textile companies. F values for all three tests were not significant at the 0.05 level. These results indicate that the respondents' judgement processes were not significantly related to the variability in the above demographic variables.

5.3 DEALING WITH ANOVA ASSUMPTIONS FOR MIXED MODELS

To further support the appropriateness of using ANOVA for hypothesis testing, this section briefly describes the ANOVA assumptions for a mixed model and then discusses the procedures used in the study to deal with those assumptions. Winer et al. (1991) provides detailed discussion of the assumptions, which include (1) normality, (2) homogeneity of variance, (3) statistical independence of the errors, and (4) circularity.

5.3.1 The Assumption of Normality

The assumption of normality requires that the samples are drawn from normally distributed populations. Winer et al. (1991, p.102) and Keppel (1991, p.97) suggest that if the sample size is large, the violation of normality assumption creates little adverse impact on the significant level and the power of F tests. Because this study had a total of 1264 observations (76 subjects x 16 observations per subject) and sample size per cell were large (see later sections of this chapter for exact numbers), any violation of the normality assumption would make very little difference to the results. The results of Shapiro-Wilk W Test of normality for all treatment levels of the variables also indicate that the W statistics[1] for the sample data ranged from 0.90 to 0.94 ($Pr < W = 0.0001$), thus providing support for the null hypothesis that the sample data values are drawn from normally distributed populations.

5.3.2 The Assumption of Homogeneous Variance

This assumption requires that the variance due to experimental error within each of the treatment populations is homogeneous. In this study, the ratio of the largest to the smallest group size ranged from 1 to 1.36 which were well below Hays' (1998, p.373) criterion of not more than 1.5, and therefore any violation of the assumption of homogeneous variances would make little difference in the results of the ANOVA F test. More importantly, the impact of any violation of the assumption of homogeneous variances has been indirectly taken care of by the experimental design of this study. In particular, this study manipulates all the variables at two levels only. When there is only two levels

[1] W must be greater than zero and less than or equal to one, with small values of W leading to rejection of the null hypothesis that the input data values are a random sample form a normal distribution (see Shapiro and Wilk (1965) and Royston (1982) for further discussion).

in each variable, the regular F test is already the conservative F test and this implies that the result is really significant if the F value is significant (see Hays 1988, p.525 for detail explanation). In addition, the results of Hartley's F test (F-max Statistics: range 1.01-2.39, df 12-78) and Cochran's C test (Cochran's C Statistics: range 0.14-0.59, df 12-78) indicate that the assumption of homogeneous variance is valid for all treatment populations of this study.

5.3.3 The Assumption of Statistical Independence

This assumption requires that the errors are independently distributed. To deal with this assumption, this study employed the following randomization strategies. First, CPA firms were instructed to randomly select appropriate staff to participate in the experiment. This was evidenced by the fact that auditors came from different audit groups of the CPA firms. Second, the order of the experimental cases and the variables within each case were completely randomized such that no two sets of experimental cases were exactly the same.

5.3.4 The Assumption of Circularity

This assumption requires that the sum of any two treatment variances minus twice their covariance equals a constant and that this is true for all pairs of treatments on which there are repeated measures. This assumption has been dealt with by the experimental design. In particular, each of the within-subjects variables has only two levels. As SAS (1992) points out, when there are only two levels of the within-subject effect, there is only one transformed variable, and a circularity test cannot be applied, nor is one needed. Note also that when the within-subjects variable has only two levels, the regular F test is already the conservative Greenhouse-Geisser test, and this implies that the result is really significant if the F value is significant (see Winer et al., 1991, PP. 545-555 for further discussion).

5.4 OVERALL ANOVAs

Tables 5.3 summarizes the 15 hypotheses of this research study, labeling those that are supported and those that are not supported. Section 5.4.1 first presents and discusses the results of the statistical tests for the first six hypotheses. This is followed by presenting and discussing the results of the statistical tests for Hypotheses Seven to Nine, which deal with the moderating effects of the audit structure variable. Section 5.4.3 then covers the moderating effects of the tolerance for ambiguity variable, i.e., Hypotheses Ten to Twelve. Finally, Section 5.4.4 presents and discuss the results for Hypotheses Thirteen to Fifteen, which deal with the moderating effects of the auditor risk attitude variable.

Table 5.3

Summary of Hypotheses and the Results

Hypotheses		Supported (Not Supported)
H_1	There is a positive relationship between inherent risk and auditors' planned extent of audit evidence.	Supported
H_2	There is a positive relationship between control risk and auditors' planned extent of audit evidence.	Supported
H_3	There is a negative relationship between desired audit risk and auditors' planned extent of audit evidence.	Supported
H_4	There is a negative relationship between planned detection risk and auditors' planned extent of audit evidence.	Supported
H_5	There is a positive relationship between auditor business risk and auditors' planned extent of audit evidence.	Supported
H_6	There is a negative relationship between planning materiality and auditors' planned extent of audit evidence.	Supported
H_7	The negative relationship between planned detection risk and auditors' planned extent of audit evidence is dependent upon audit structure (structured vs. unstructured).	Not supported
$H_{7(1)}$	The positive relationship between inherent risk and auditors' planned extent of audit evidence is dependent upon audit structure (structured vs. unstructured).	Not supported
$H_{7(2)}$	The positive relationship between control risk and auditors' planned extent of audit evidence is dependent upon audit structure (structured vs. unstructured).	Not supported

Table 5.3 (continued)

Hypotheses		Supported (Not Supported)
$H_{7(3)}$	The negative relationship between desired audit risk and auditors' planned extent of audit evidence is dependent upon audit structure (structured vs. unstructured).	Not supported
H_8	The positive relationship between auditor business risk and auditors' planned extent of audit evidence is dependent upon audit structure (structured vs. unstructured).	Supported
H_9	The negative relationship between planning materiality and auditors' planned extent of audit evidence is dependent upon audit structure (structured vs. unstructured).	Not supported
H_{10}	The negative relationship between planned detection risk and auditors' planned extent of audit evidence is dependent upon tolerance for ambiguity (high vs. low).	Not supported
$H_{10(1)}$	The positive relationship between inherent risk and auditors' planned extent of audit evidence is dependent upon tolerance for ambiguity (high vs. low).	Not supported
$H_{10(2)}$	The positive relationship between control risk and auditors' planned extent of audit evidence is dependent upon tolerance for ambiguity (high vs. low).	Not supported
$H_{10(3)}$	The negative relationship between desired audit risk and auditors' planned extent of audit evidence is dependent upon tolerance for ambiguity (high vs. low).	Not supported
H_{11}	The positive relationship between auditor business risk and auditors' planned extent of audit evidence is dependent upon tolerance for ambiguity (high vs. low).	Not supported

Table 5.3 (continued)

Hypotheses		Supported (Not Supported)
H_{12}	The negative relationship between planning materiality and auditors' planned extent of audit evidence is dependent upon tolerance for ambiguity (high vs. low).	Not supported
H_{13}	The negative relationship between planned detection risk and auditors' planned extent of audit evidence is dependent upon auditor risk attitude.	Not supported
$H_{13(1)}$	The positive relationship between inherent risk and auditors' planned extent of audit evidence is dependent upon auditor risk attitude.	Not supported
$H_{13(2)}$	The positive relationship between control risk and auditors' planned extent of audit evidence is dependent upon auditor risk attitude.	Not supported
$H_{13(3)}$	The negative relationship between desired audit risk and auditors' planned extent of audit evidence is dependent upon auditor risk attitude.	Not supported
H_{14}	The positive relationship between auditor business risk and auditors' planned extent of audit evidence is dependent upon auditor risk attitude.	Not supported
H_{15}	The negative relationship between planning materiality and auditors' planned extent of audit evidence is dependent upon auditor risk attitude.	Supported

5.4.1 Hypotheses One to Six

Tables 5.4 and 5.5, respectively, present the ANOVA results and the pertinent marginal means of the planned extent of audit evidence. Small interactive effects are identified in this study as the total ω^2 for the 10 possible two-way interactions amounted to only 0.48%. This finding suggests that interactions are quite unimportant in terms of explaining variance in the auditors' judgements[2]. As shown in the later part of this section, the three significant two-way interactions only augment or attenuate, rather than reverse, the implications of the main effects of the related variables (cues). Therefore, this section proceeds to discuss the main effects of the variables before discussing their interactive effects.

[2] ω^2 measures the magnitude of significance (see discussion in Section 4.8.1).

Table 5.4

ANOVA for Hypotheses 1-3 and 5-6

Sources	df	MS	F	Pr > F	ω^2
Within-subjects					
Inherent[a]	1	635.14	184.86	0.0001	11.98%
Inherent * Subject	78	3.44			
Control[b]	1	714.00	190.32	0.0001	13.47%
Control * Subject	78	3.75			
Desired[c]	1	103.67	16.89	0.0001	1.85%
Desired * Subject	78	6.13			
Aud_Bus[d]	1	524.21	129.22	0.0001	9.86%
Aud_Bus * Subject	78	4.06			
Planning[e]	1	15.95	5.72	0.0192	0.25%
Planning * Subject	78	2.79			
Inherent * Planning	1	7.60	5.10	0.0268	0.12%
Inherent * Planning * Subject	78	1.49			
Control * Planning	1	12.16	12.05	0.0008	0.21%
Control * Planning * Subject	78	1.01			
Control * Aud_Bus	1	9.23	8.50	0.0046	0.15%
Control * Aud_Bus * Subject	78	1.09			

[a] Inherent = Inherent risk (H_1)
[b] Control = Control risk (H_2)
[c] Desired = Desired audit risk (H_3)
[d] Aud_Bus = Auditor business risk (H_5)
[e] Planning = Planning materiality (H_6)

Note : Insignificant interactions are not presented here because no hypotheses have been developed to test for these interactions and they have zero ω^2.

Table 5.5

Marginal Means[a] for Hypotheses 1-3 and 5-6

Variables	N	Treatment Level	
		High	Low
Inherent[b]	632	7.04	5.62
Control[c]	632	7.08	5.58
Desired[d]	632	6.04	6.62
Aud_Bus[e]	632	6.97	5.69
Planning[f]	632	6.22	6.44

[a] The planned extent of audit evidence ranges from 1 (much lower than the normal extent) to 10 (much higher than the normal extent).
[b] Inherent = Inherent risk
[c] Control = Control risk
[d] Desired = Desired audit risk
[e] Aud_Bus = Auditor business risk
[f] Planning = Planning materiality

The results reported in Table 5.4 reveal that inherent risk affects the evidential planning decisions of auditors at the 0.0001 level of significance, thus providing support for H_1. As shown in Table 5.5, auditors, on average, plan to collect less audit evidence at the low level of the inherent risk variable (5.62 out of a maximum level of 10.0) than at the high level of that variable (7.04). This statistically significant effect provides evidence to support the predicted effect of inherent risk in the earlier stated evidential planning model as well as the audit risk model, i.e., the higher the inherent risk, the higher the planned extent of audit evidence. Lending further support to this result is the fact that the ω^2 of the inherent risk variable is 11.98 percent, indicating that this variable alone accounts for 11.98 percent of the variance in the dependent variable, the planned extent of audit evidence.

Further, the findings reported in Table 5.4 indicate that control risk affects auditors' planning decisions at the 0.0001 level of significance, thus providing support for H_2. Table 5.5 shows that auditors, on average, plan to perform more audit work at the high level of the control risk variable (7.08) than at the low level of that variable (5.58), and the direction of the effect is consistent with that predicted by the earlier stated auditors' evidential planning model as well as the audit risk model. The control risk variable also has the highest ω^2, 13.47 percent, and, compared to other variables, explains the largest extent of the evidential planning decisions of auditors.

Regarding the desired audit risk, the research reported here found that this variable affects the planning decisions of auditors at the 0.0001 level of significance, thus providing support for H_3. Consistent with the predicted effect of the evidential planning model stated in Chapter Two and of the audit risk model, auditors, on average, plan to collect less audit evidence at the high level of the desired audit risk variable (6.04) than at the low level of that variable (6.62). Compared to inherent risk and control risk, auditors place much less emphasis on this factor, which has an ω^2 of only 1.85 percent.

Table 5.6 provides additional insight on the impact of planned detection risk, which is a function of inherent risk, control risk, and desired audit risk. As that table shows, planned detection risk affects the evidential planning decisions of auditors at the 0.0001 level of significance. This variable also explains a very high proportion (ω^2 = 31%)[3] of the variations in auditors' evidential planning decisions, thus providing support for H_4. In addition, Table 5.7 reveals that at the low level of the planned detection risk variable, representing a combination of high inherent risk, high control risk and low desired audit risk, auditors, on average, plan to perform more audit work (7.52) than at the high level of that variable (5.15), representing a combination of low inherent risk, low control risk and high desired audit risk.

[3] Note that only those observations relating to the high and low levels of the planned detection risk variable (i.e., 316 out of a total of 1264 observations) are included in the analysis. As a result, the ω^2 statistic computed here is different from the total ω^2 statistics of 27.3% for the inherent risk, control risk and desired audit risk as reported in Table 5.4.

In sum, the above findings suggest that auditors do consider the audit risk model in determining the planned extent of audit evidence. This provides some evidence that auditors consider the audit risk model as a useful tool in audit planning. It can also be inferred that the factors that affect inherent risk, control risk or desired audit risk do have significant impacts on the planned extent of audit evidence. This conclusion has significant implications for practitioners and their clients. An improved system of internal controls by a client, e.g., by forming an audit committee within its board of directors to strengthen its corporate governance function, is likely to decrease the degree of control risk, thus reducing auditors' planned extent of audit evidence and resulting in lower costs to clients.

In relation to auditor business risk, Table 5.4 revealed that this factor affects the evidential planning decisions of auditors at the 0.0001 level of significance, thus providing support for H_5. Auditors, on average, as indicated in Table 5.5, plan to perform more audit work at the high level of the auditor business risk variable (6.97) than at the low level of that variable (5.69). This research finding suggests that auditors consider auditor business risk as an important variable that alone has a significant impact on their evidential planning decisions. In particular, auditors are sensitive and aware of the likelihood that if an audit client suffers serious losses or goes bankrupt, they may be facing litigation and/or other adverse consequences, such as damaged reputations and future losses of revenues.

Table 5.6

ANOVA for Hypothesis 4

Sources	df	MS	F	Pr > F	ω^2
PDR[a]	1	442.65	112.14	0.0001	31%
PDR * Subject	156	3.95			

[a]PDR = Planned detection risk

Table 5.7

Marginal Means[a] for Hypothesis 4

		Treatment Level	
Variable	N	High[c]	Low[d]
PDR[b]	158	5.15	7.52

[a] The planned extent of audit evidence ranges from 1 (much lower than the normal extent to 10 (much higher than the normal extent).
[b] PDR = Planned detection risk
[c] High level represents low inherent risk, low control risk and high desired audit risk
[d] Low level represents high inherent risk, high control risk and low desired audit risk

The results are also consistent with those reported in Simunic and Stein (1996). Using a sample of 249 audits done by a US Big Six CPA firm, they found that the firm's auditors appear to respond to higher client-specific litigation risk by increasing their audit effort levels. Simunic and Stein used two proxies for the client-specific litigation risk: (1) whether a company is publicly held and (2) a company's leverage ratio. They noted that to the extent these risk measures convey information unrelated to liability risk, they over-estimate the auditors' response to liability exposure. Using an experimental approach to better control the confounding effects of extraneous variables, the results of this study indicate that auditor business risk has significant impact on auditors' planned audit effort levels. In particular, auditors' planned audit effort levels are higher for the high level of the auditor business risk variable than for the low level of that variable.

In another important finding, this research provides empirical evidence that auditor business risk and desired audit risk do not interact to affect the planned extent of evidence. Therefore, auditor business risk and desired audit risk should be considered as independent variables that have direct influences on the planning decisions of auditors. Future research studying the role of auditor business risk in other aspects of audit judgement should take this finding into consideration.

With respect to planning materiality, Table 5.4 revealed that this variable affects auditors' planning decisions at the 0.02 level of significance, thus providing support for H_6. As shown in Table 5.5, auditors, on average, plan to collect more audit evidence at the low level of the planning materiality variable (6.44) than at the high level of that variable (6.22). This result is consistent with the predicted effect of the planning materiality variable, i.e., a higher (lower) level of that variable corresponds with a lower (higher) level of the planned extent of audit evidence of auditors. Moreover, this finding also lends support to the need for auditors to comply with professional standards, which require them to consider materiality in determining the extent of auditing procedures. However, the strength of this association (ω^2) is relatively weak because the planning materiality variable accounts for only 0.25% of the variations in the evidential planning decisions of auditors.

Some final remarks on Table 5.4 relate to the interactive effects between (1) inherent risk and planning materiality, (2) control risk and planning materiality, and (3) control risk and auditor business risk. The following paragraphs provide a brief explanation of these interactions.

An examination of Table 5.4 reveals that inherent risk and planning materiality interacts to affects the evidential planning decisions of auditors at the 0.0268 level of significance. As Table 5.8 indicates, auditors, on average, plan for the greatest extent of audit evidence (7.07) at the level which represents high inherent risk and low planning materiality, and they plan for the least extent of audit work (5.43) at the level which represents low inherent risk and high planning materiality. The graph of Figure 5.1 portrays this interactive effect, and reveals that, at the high level of the inherent risk variable, the planning materiality variable exerts a relatively small impact on the planned extent of audit evidence, i.e., a difference of only 0.07. However, at the low level of the inherent risk level, the change in levels of the planning materiality variable exerts a stronger influence on the planned extent of audit evidence, i.e., a difference of 0.38. In sum, the above findings suggest that the effect of planning materiality is more pronounced at the low level of the inherent risk variable. It may be argued that auditors behave more conservatively at the high level of inherent risk by not reducing the planned extent of audit evidence so much in response to a change in levels of the planning materiality variable. Since the ω^2 statistic for the interaction accounts for only 0.12 percent of the variations in auditors' planning decisions, the findings reported here should be interpreted with caution and future research studying this issue in more detail is warranted.

Table 5.8

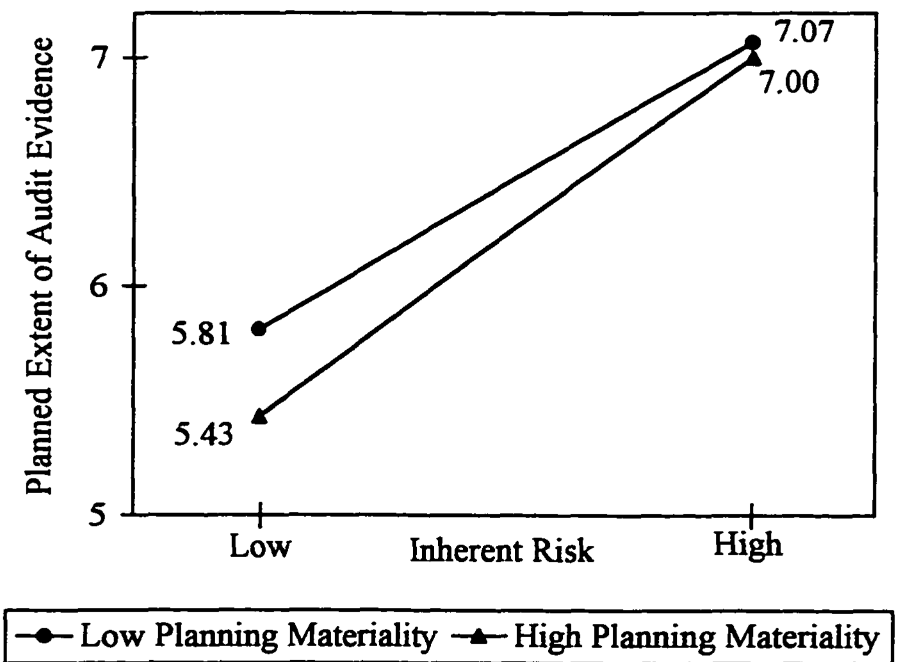
Marginal Means[a] for Inherent*Planning Interaction

Levels of Inherent[b]	Levels of Planning[c]	N	Means
Low	Low	316	5.81
Low	High	316	5.43
High	Low	316	7.07
High	High	316	7.00

[a] The planned extent of audit evidence ranges from 1 (much lower than the normal extent) to 10 (much higher than the normal extent).
[b] Inherent = Inherent risk
[c] Planning = Planning Materiality

Figure 5.1

Inherent Risk, Planning Materiality and Planned Extent of Audit Evidence



The second interaction of concern relates to the control risk and planning materiality variables. Turning again to Table 5.4, it can be seen that these two variables interact to affect auditors' planning decisions at the 0.0008 level of significance. As indicated in Table 5.9, auditors, on average, plan to perform the greatest extent of audit evidence (7.10) at the level that indicates high control risk and low planning materiality, and plan to collect the smallest extent of audit evidence (5.37) when there exists low control risk and high planning materiality. Also, Figure 5.2 depicts the interactive effect of control risk and planning materiality. In particular, at the high level of the control risk variable, the planning materiality variable exerts a relatively small influence on the planned extent of audit evidence, i.e., a difference of only 0.03, but at the low level of the control risk variable, the change in levels of the planning materiality variable has a more pronounced effect on the planned extent of audit evidence, amounting to a difference of 0.42. Similar to the argument for the inherent risk variable, it appears that auditors act more prudently at the high level of the control risk variable by not significantly reducing the planned extent of audit evidence in response to a change in the levels of the planning materiality variable. It should be noted that both low inherent risk and low control risk represent lower probabilities of containing material errors in the financial statements. Whether this possibility of material misstatements has any implications for the materiality judgements of auditors also constitutes a researchable topic for future study. In line with the analyses of the interaction of inherent risk and planning materiality, the findings regarding the interaction of control risk and planning materiality should be interpreted carefully because of the low ω^2 statistic, i.e., 0.21 percent, associated with the effect of that interaction.

The third and final interactive effect relates to the control risk and auditor business risk variables. Table 5.4 revealed that these two variables interact to affect the planning decisions of auditors at the 0.0046 level of significance. In addition, Table 5.10 shows that auditors, on average, plan to perform the greatest extent of audit work (7.64) when both control risk and auditor business risk remain at high levels, and to perform the least extent of audit work (4.85) when these two risks remain at low levels. The graph of Figure 5.3 portrays this interactive effect, whereby the impact of auditor business risk on the change in the planned extent of audit evidence becomes more pronounced at the low level of the control risk variable, i.e., a difference of 1.46, than at the high level of that variable, i.e., a difference of 1.12. Because of the relatively weak strength of association for the interaction, i.e., ω^2 equal to only 0.15 percent, again one should interpret the findings reported here with caution, and future research could be conducted to provide additional insights concerning this interactive effect. For example, do auditors' interpretations of control test results, an element of the control risk variable, depend upon the degree of auditor business risk? This completes the analysis of the first subsection. The next subsection presents and discusses the results of the statistical tests for the moderating effects of the audit structure variable.

Table 5.9

Marginal Means[a] for Control*Planning Interaction

Levels of Control[b]	Levels of Planning[c]	N	Means
Low	Low	316	5.79
Low	High	316	5.37
High	Low	316	7.10
High	High	316	7.07

[a] The planned extent of audit evidence ranges from 1 (much lower than the normal extent) to 10 (much higher than the normal extent).
[b] Control = Control risk
[c] Planning = Planning Materiality

Figure 5.2

Control Risk, Planning Materiality and Planned Extent of Audit Evidence

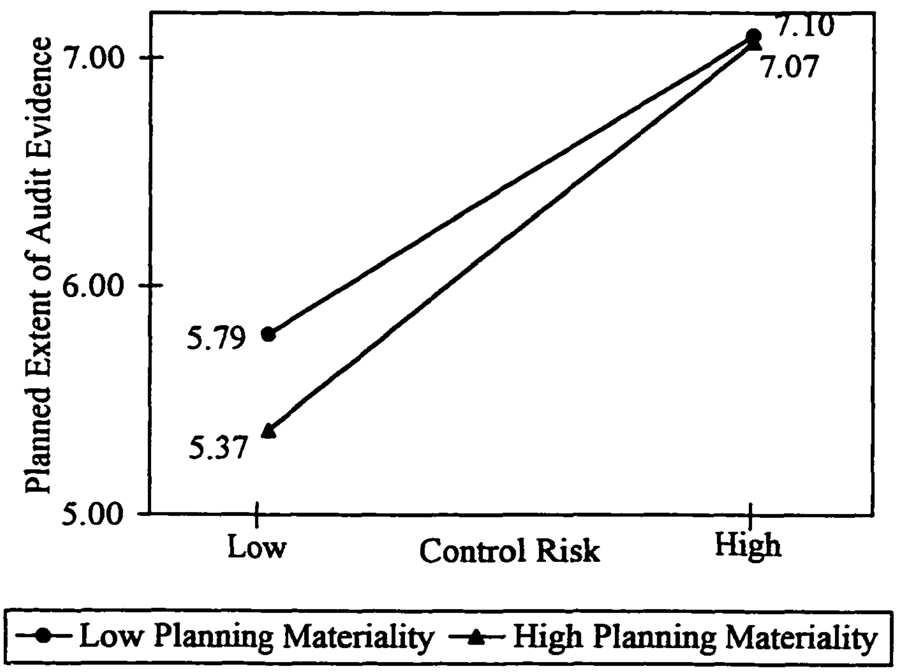


Table 5.10

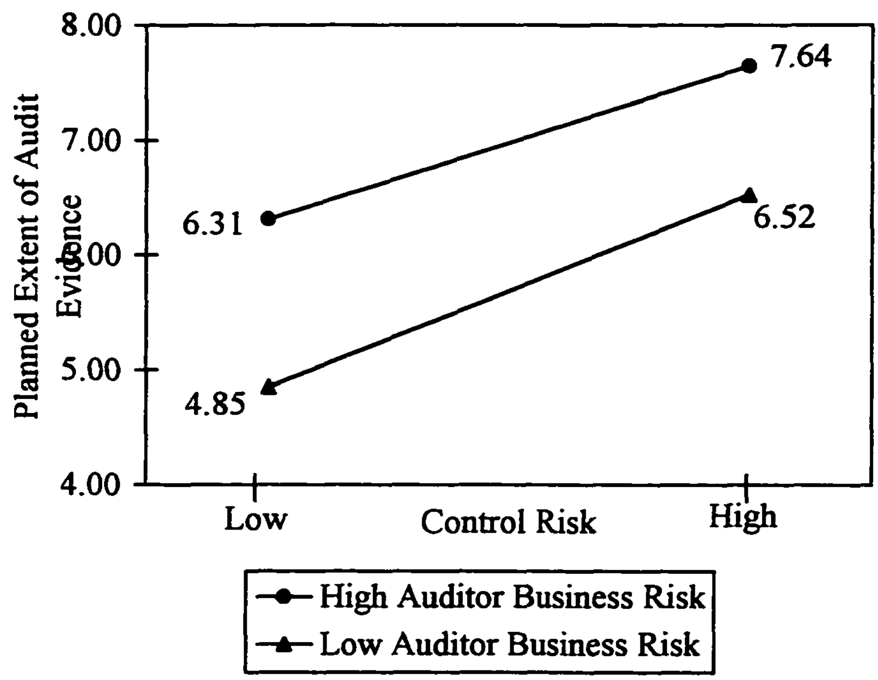
Marginal Means[a] for Control*Aud_Bus Interaction

Levels of Control[b]	Levels of Aud_Bus[c]	N	Means
Low	Low	316	4.85
Low	High	316	6.31
High	Low	316	6.52
High	High	316	7.64

[a] The planned extent of audit evidence ranges from 1 (much lower than the normal extent) to 10 (much higher than the normal extent).
[b] Control = Control risk
[c] Aud_Bus = Auditor business risk

Figure 5.3

Control Risk, Auditor Business Risk and Planned Extent of Audit Evidence



5.4.2 Hypotheses Seven to Nine

Hypotheses Seven to Nine examine the moderating effects of the audit structure variable. Of the 79 subjects, 44 auditors worked in structured audit firms and 35 auditors worked in unstructured firms. The result of a t-test indicates that structured firm auditors had higher average audit structure score (62 out of a maximum of 100) than that of unstructured firm auditors (an average of 55) at the 0.001 level of significance, thus providing support for the structured/unstructured classification of this research study. In addition, the Cronbach's alpha for the audit structure scale is 0.70, thus suggesting that the internal consistency reliability of the scale is acceptable according to Sekaran (1992). This result adds strength to the validity of the structured/ unstructured classification used in this study. The reminder of this subsection presents and discusses the results of the statistical tests for Hypotheses Seven to Nine.

Table 5.11 presents the results of the statistical test for Hypothesis Seven, revealing that audit structure does not interact with planned detection risk to affect the evidential planning decisions of auditors, thus not providing support for H_7. According to Table 5.12, the planned detection risk variable does not depend upon the degree of audit structure. The graph shown in Figure 5.4 further supports this statistically insignificant relationship. More specifically, the two lines for the structured and unstructured firms remain almost parallel irrespective of different levels of the planned detection risk variable, and this clearly indicates the lack of an interactive effect between those variables. Furthermore, Table 5.11 also reveals the insignificant main effect of the audit structure variable. In conclusion, the audit structure variable alone does not act independently or jointly with the planned detection risk variable to affect the evidential planning decisions of auditors. Since the planned detection risk variable consists of three elements, i.e., inherent risk, control risk and desired audit risk, further analyses of the independent effects of these elements would be useful.

Table 5.11

ANOVA for Hypothesis 7

Sources	df	MS	F	Pr > F	ω^2
Between-subjects					
Aud_stru[a]	1	1.84	0.64	0.4265	nil
Subject (Aud_stru)	77	2.87			
Within-subjects					
PDR[b]	1	436.81	85.62	0.0001	30.5%[c]
PDR x Aud_stru	1	0.01	0.00	0.9722	nil
PDR * Subject (Aud_stru)	77	5.10			

[a] Aud_stru = Audit structure
[b] PDR = Planned detection risk
[c] This ω^2 resembles the ω^2 obtained in the analysis without considering the audit structure variable, i.e., 31 percent as shown in Table 5.6.

Table 5.12

Marginal Means[a] for Hypothesis 7

Levels of PDR[b]	Levels of Aud_Stru[e]	N	Means
Low[c]	unstructured	70	7.43
Low	structured	88	7.59
High[d]	unstructured	70	5.07
High	structured	88	5.22
Low	–	158	7.52
High	–	158	5.15
–	unstructured	158	6.25
–	structured	158	6.40

[a] The planned extent of audit evidence ranges from 1 (much lower than the normal extent) to 10 (much higher than the normal extent).
[b] PDR = Planned detection risk
[c] Low level represents high inherent risk, high control risk and low desired audit risk
[d] High level represents low inherent risk, low control risk and high desired audit risk
[e] Aud_stru = Audit Structure

Figure 5.4

Planned Detection Risk, Audit Structure and Planned Extent of Audit Evidence

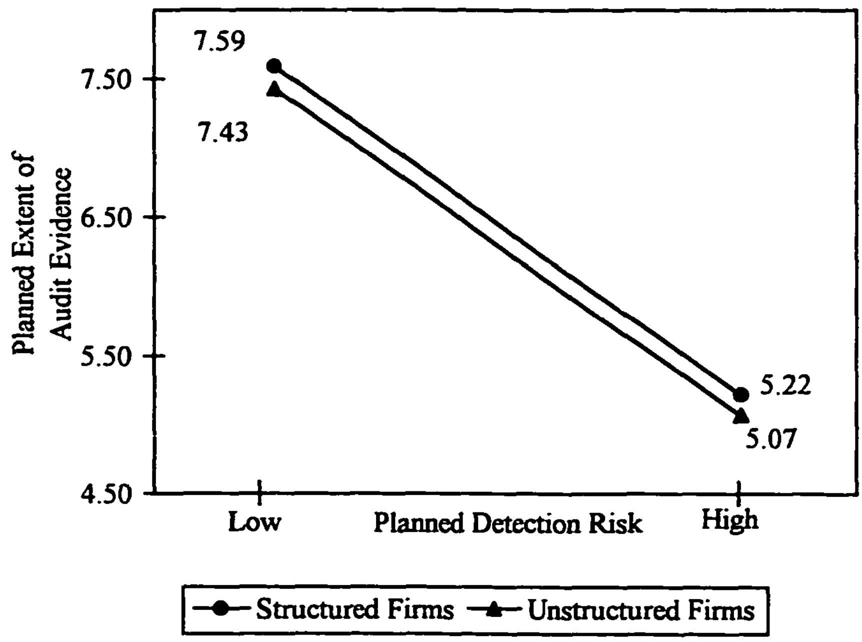


Table 5.13 reveals that the total ω^2 for the 10 possible two-way interactions among the five within-subjects variables amounted to only 0.49%. For similar reasons stated in Section 5.4.1, this section proceeds to discuss the main effects of the within-subjects variables before discussing their interactive effects.

With respect to the inherent risk variable, Table 5.13 reveals that the relationship between this variable and auditors' planned extent of audit evidence does not depend on the audit structure variable, i.e., the interaction remains insignificant at the 0.05 level and its ω^2 statistic amounts to only 0.03 percent, thus not providing support for $H_{7(1)}$. Therefore, according to Table 5.14, auditors, on average, plan to obtain a similar amount of audit evidence for both the unstructured and structured levels of the audit structure variable given the high or low level of the inherent risk variable. Figure 5.5 further illustrates this statistically insignificant effect by showing that the lines for the firms with unstructured or structured audit approaches remain almost parallel. Thus, it appears that the audit structure variable alone does not independently or jointly with the inherent risk variable affect auditors' planning decisions. However, the relationship between inherent risk and audit structure is in fact more complex than the findings reported in Table 5.13 because when audit structure, TA and auditor risk attitude are included in a comprehensive model, a three-way interaction of inherent risk, audit structure and TA becomes significant at the 0.0467 level. Section 5.5, "A Comprehensive Evidential Planning Model", discusses this three-way interaction in detail.

Table 5.13

ANOVA for Hypotheses 7(1) to 9

	df	MS	F	Pr > F	ω^2
Between-subjects					
Aud_stru[a]	1	20.68	2.26	0.1369	0.22%
Subject (Aud_stru)	77	9.15			
Within-subjects					
Inherent[b]	1	639.66	187.21	0.0001	12.07%
Inherent * Aud_stru ($H_{7(1)}$)	1	4.89	1.43	0.2354	0.03%
Inherent * Subject (Aud_stru)	77	3.42			
Control[c]	1	703.56	185.18	0.0001	13.27%
Control * Aud_stru ($H_{7(2)}$)	1	0.08	0.02	0.8875	nil
Control * Subject (Aud_stru)	77	3.80			
Desired[d]	1	108.29	17.66	0.0001	1.94%
Desired * Aud_stru ($H_{7(3)}$)	1	6.67	1.09	0.3001	0.01%
Desired * Subject (Aud_stru)	77	6.13			
Aud_Bus[e]	1	505.03	125.43	0.0001	9.50%
Aud_Bus * Aud_stru (H_8)	1	6.39	1.59	0.2117	0.04%
Aud_Bus * Subject (Aud_stru)	77	4.03			
Planning[f]	1	16.31	5.78	0.0186	0.26%
Planning * Aud_stru (H_9)	1	0.39	0.14	0.7096	nil
Planning * Subject (Aud_stru)	77	2.82			
Inherent * Planning	1	7.05	4.69	0.0334	0.11%
Inherent * Planning * Subject (Aud_stru)	77	1.50			
Control * Planning	1	12.50	12.29	0.0008	0.22%
Control * Planning * Subject (Aud_stru)	77	1.02			
Control * Aud_Bus	1	9.74	8.95	0.0037	0.16%
Control * Aud_Bus * Subject (Aud_stru)	77	1.09			

[a] Aud_stru = Audit structure
[b] Inherent = Inherent risk
[c] Control = Control risk
[d] Desired = Desired audit risk
[e] Aud_Bus = Auditor business risk
[f] Planning = Planning materiality

Note : Insignificant interactions are not presented here because no hypotheses have been developed to test for these interactions and they have zero ω^2.

Table 5.14

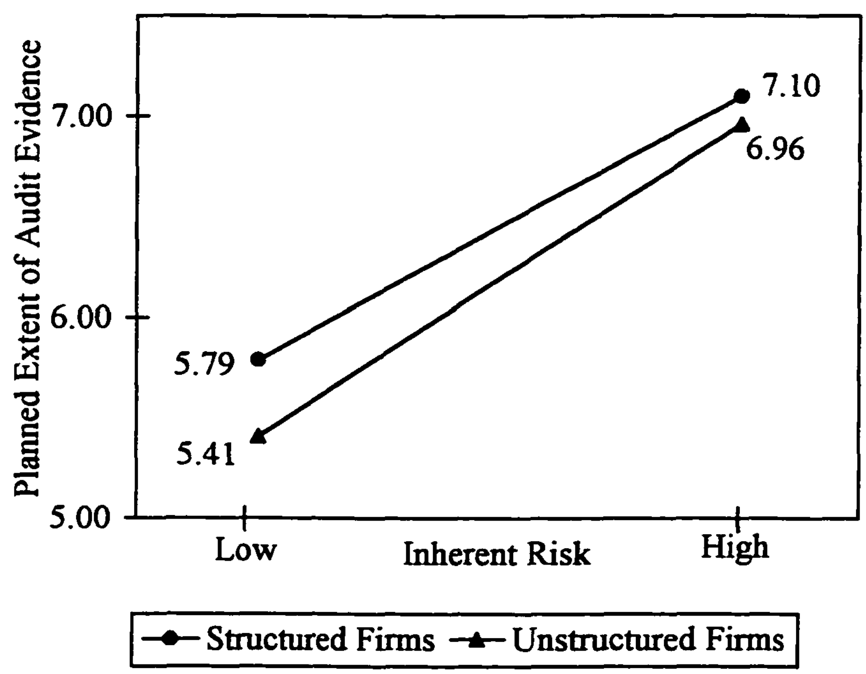
Marginal Means[a] for Hypothesis 7(1)

Level of Inherent[b]	Level of Aud_Stru[c]	N	Means
Low	unstructured	280	5.41
Low	structured	352	5.79
High	unstructured	280	6.96
High	structured	352	7.10
Low	–	632	5.62
High	–	632	7.04
–	unstructured	560	6.19
–	structured	704	6.44

[a] The planned extent of audit evidence ranges from 1 (much lower than the normal extent) to 10 (much higher than the normal extent).
[b] Inherent = Inherent risk
[c] Aud_Stru = Audit structure

Figure 5.5

Inherent Risk, Audit Structure and Planned Extent of Audit Evidence



Also, as Table 5.13 reveals control risk, the second element of the planned detection risk variable, does not interact with audit structure to affect the evidential planning decisions of auditors, thus not providing support for $H_{7(2)}$. Lending further support to this insignificant interaction are the relatively few changes in the planned extent of audit evidence at different levels of the audit structure variable given either high or low level of control risk as seen in Table 5.15, and to the nearly parallel lines for the unstructured and structured firms as the graph in Figure 5.6 shows. Unlike the inherent risk variable, there exists no three-way interaction between control risk, audit structure and personality variables. In summary, these findings suggest that CPA firms' audit approaches (structured vs. unstructured) exert insignificant influences on auditors in the determination of the planned extent of audit evidence based on assessments of control risk.

Table 5.15

Marginal Means[a] for Hypothesis 7(2)

Level of Control[b]	Level of Aud_Stru[c]	N	Means
Low	unstructured	280	5.44
Low	structured	352	5.68
High	unstructured	280	6.93
High	structured	352	7.20
Low	–	632	5.58
High	–	632	7.08
–	unstructured	560	6.19
–	structured	704	6.44

[a] The planned extent of audit evidence ranges from 1 (much lower than the normal extent) to 10 (much higher than the normal extent).
[b] Control = Control risk
[c] Aud_Stru = Audit structure

Figure 5.6

Control Risk, Audit Structure and Planned Extent of Audit Evidence

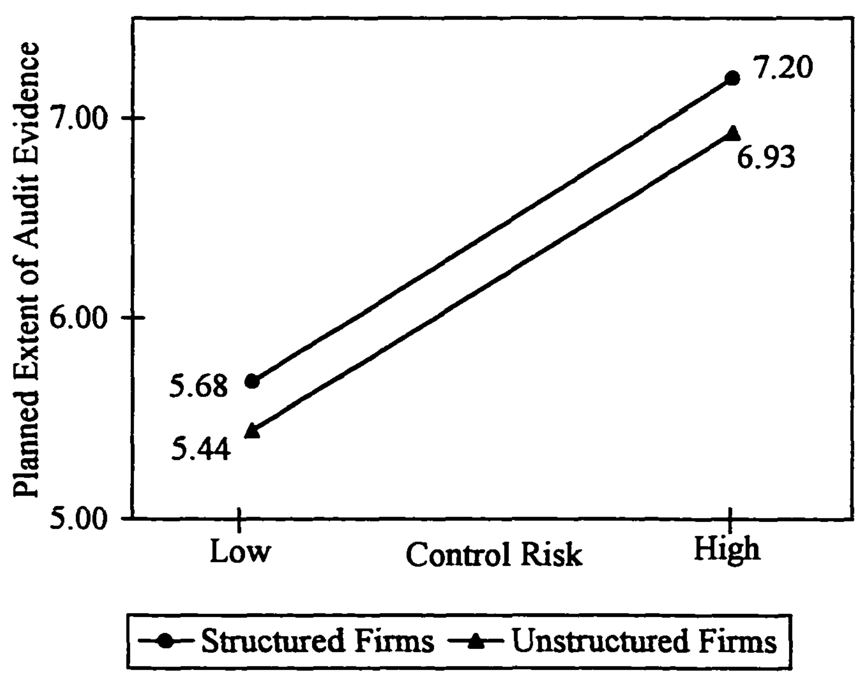


Table 5.13 then reveals that the third and final element of the planned detection risk variable, i.e., desired audit risk, does not interact with the audit structure variable to affect the evidential planning decisions of auditors, thus not providing support for $H_{7(3)}$. There exists an extremely weak association (ω^2 = 0.01%) for this interactive effect. This is further evidenced by the relatively small change in the planned extent of audit evidence with respect to the audit structure variable as shown in Table 5.16 and depicted in Figure 5.7. These research findings, thus, suggest that auditors of unstructured and structured CPA firms display consistency in transcribing a level of desired audit risk into similar planned extent of audit evidence.

Table 5.16

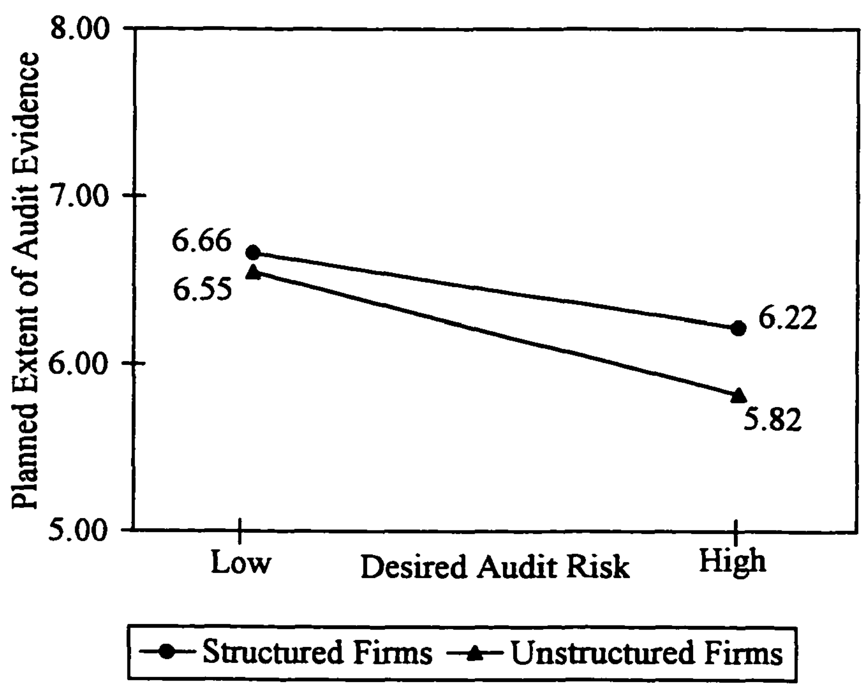
Marginal Means[a] for Hypothesis 7(3)

Level of Desired[b]	Level of Aud_Stru[c]	N	Means
Low	unstructured	280	6.55
Low	structured	352	6.66
High	unstructured	280	5.82
High	structured	352	6.22
Low	–	632	6.62
High	–	632	6.04
–	unstructured	560	6.19
–	structured	704	6.44

[a] The planned extent of audit evidence ranges from 1 (much lower than the normal extent) to 10 (much higher than the normal extent).
[b] Desired = Desired audit risk
[c] Aud_Stru = Audit structure

Figure 5.7

Desired Audit Risk, Audit Structure and Planned Extent of Audit Evidence



Proceeding with the stated hypotheses, the hypothesis of H_8 states that the auditor business risk variable interacts with the audit structure variable to affect auditors' planning decisions. Although Table 5.13 reveals a statistically insignificant relationship for this interactive effect, the result of a stronger test of the interactive effect conducted in the comprehensive model, as seen in Table 5.17, suggests that the interaction becomes statistically significant at the 0.0185 level of significance after controlling for auditors' personality differences, thus providing support for H_8. The comprehensive model consists of 45 subjects with 720 observations. Table 5.18 reports the pertinent marginal means for H_8 showing that auditors, on average, plan to perform the greatest extent of audit work (7.27) at the level which represents high auditor business risk and structured audit approach, and plan to perform the smallest amount of audit evidence (5.50) at the level which represents low auditor business risk and a structured audit approach. Figure 5.8 then depicts the marginal means of the auditor business risk variable and the audit structure variable, and it clearly shows an interactive effect. In particular, the impact of auditor business risk on auditors' planned extent of audit evidence becomes more pronounced under structured audit approaches, i.e., a difference of 1.77, than under unstructured audit approaches, i.e., a difference of 1.05. Thus, it appears that auditors of structured firms, compared to auditors of unstructured firms, plan to perform less audit work at the low level of the auditor business risk variable and to perform more audit work at the high level of that variable. A possible explanation is that the more structured audit approach "forces" or "encourages" auditors to explicitly consider the impact of auditor business risk on the planned extent of audit evidence. Such a formal recognition and consideration of the influence of auditor business risk is important for auditors who are now facing a more litigious environment. One may, however, argue that such formal consideration could make the auditors overreact to the effect of auditor business risk. Nevertheless, the research findings reported here clearly suggest that future research could explain the behavioral reasons for the differences in the interactive effect of audit structure and auditor business risk at different levels of audit business risk, determining whether indeed the "overreaction" could be regarded as cost justified and therefore overall beneficial.[4]

Table 5.17

ANOVA Results for Aud_Bus*Aud_Stru Interaction

Sources	df	MS	F	Pr > F	ω^2
Between-subjects					
Aud_stru[a]	1	5.15	0.95	0.3357	nil
TA[b]	1	0.48	0.09	0.7684	nil
R[c]	1	10.04	1.85	0.1814	0.15%
Subject (Aud_stru TA R)	38	5.42			
Within-subjects					
Aud_Bus[d] * Aud_stru	1	23.41	6.07	0.0185	0.65%
Aud_Bus * Subject (Aud_stru TA R)	38	3.86			

[a] Aud_stru = Audit structure
[b] TA = Tolerance for ambiguity
[c] R = Auditor risk attitude
[d] Aud_Bus = Auditor business risk

[4] This overreaction may lead to overauditing, which in turn will have negative impact on the audit efficiency.

Table 5.18

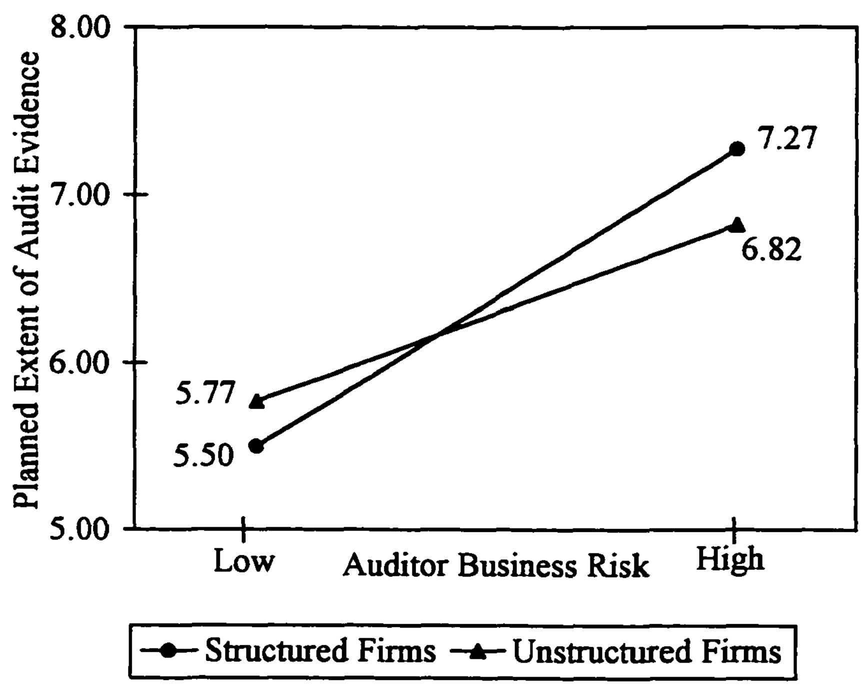
Marginal Means[a] for Hypothesis 8

Level of Aud_Bus[b]	Level of Aud_Stru[c]	N	Means
Low	unstructured	168	5.77
Low	structured	192	5.50
High	unstructured	168	6.82
High	structured	192	7.27
Low	–	360	5.56
High	–	360	7.12
–	unstructured	336	6.30
–	structured	384	6.38

[a] The planned extent of audit evidence ranges from 1 (much lower than the normal extent) to 10 (much higher than the normal extent).
[b] Aud_Bus = Auditor business risk
[c] Aud_Stru = Audit structure

Figure 5.8

Auditor Business Risk, Audit Structure and Planned Extent of Audit Evidence



Regarding planning materiality, Table 5.13 revealed that this variable does not interact with the audit structure variable to affect auditors' planned extent of audit evidence, thus not providing support for H_9. In particular, the interactive effect remains statistically insignificant at the 0.05 level[5], and it fails to account for any variation in auditors' planning decisions (ω^2 = nil percent). Table 5.19 reports the pertinent margin means, and they clearly show that audit structure exerts only minimal influence on the relationship between planning materiality and auditors' evidential planning decisions. This observation is further evidenced by Figure 5.9, which shows that the lines relating to the unstructured and structured audit approach remain almost parallel.

Finally, Table 5.20 compares the significance levels and the ω^2 statistics for the significant effects previously discussed in Subsection 5.4.1. As revealed, there exist only minor changes in the significance levels and the ω^2 statistics after including the audit structure variable in the evidential planning model presented in Subsection 5.4.1. The previous discussions in Subsection 5.4.1 for the five within-subjects variables, i.e., Hypotheses 1 to 3 and 5 to 6, and for the three significant interactions thus remain relevant for an evidential planning model which includes the audit structure variable.

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[5] Twenty-one auditors of a structured firm and 15 auditors of two semi-structured firms completed a modified version of the research instrument in which actual amounts of planning materiality were specified (low level = 1 million; high level = 6 millions), the results of the statistical tests remain almost the same.

Table 5.19

Marginal Means[a] for Hypothesis 9

Level of Planning[b]	Level of Aud_Stru[c]	N	Means
Low	unstructured	280	6.32
Low	structured	352	6.54
High	unstructured	280	6.05
High	structured	352	6.35
Low	–	632	6.44
High	–	632	6.22
–	unstructured	560	6.19
–	structured	704	6.44

[a] The planned extent of audit evidence ranges from 1 (much lower than the normal extent) to 10 (much higher than the normal extent).
[b] Planning = Planning materiality
[c] Aud_Stru = Audit structure

Figure 5.9

Planning Materiality, Audit Structure and Planned Extent of Audit Evidence

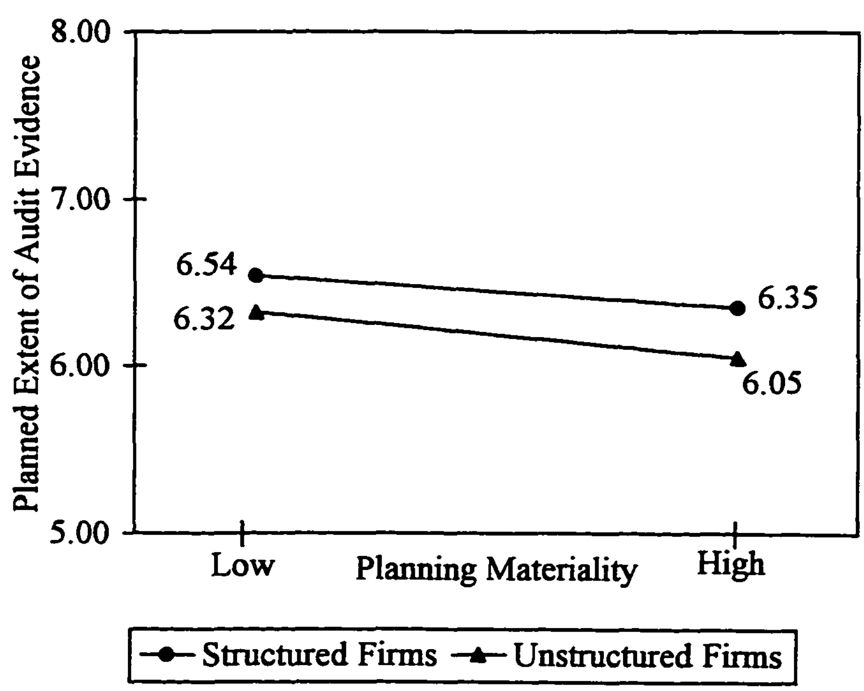


Table 5.20

Audit Structure and Within-Subjects Variables: Significant Level and Omega-Squared Statistics

Variable	Excluding Aud_Stru[a]		Including Aud_Stru		Change in ω^2	Hypothesis
	$P_r > F$	ω^2	$P_r > F$	ω^2		
Inherent[b]	0.0001	11.98%	0.0001	12.07%	+0.09%	1
Control[c]	0.0001	13.47%	0.0001	13.27%	-0.20%	2
Desired[d]	0.0001	1.85%	0.0001	1.94%	+0.09%	3
Aud_Bus[e]	0.0001	9.86%	0.0001	9.50%	-0.36%	5
Planning[f]	0.0192	0.25%	0.0186	0.26%	+0.01%	6
Inherent*Planning	0.0268	0.12%	0.0334	0.11%	-0.01%	NA
Control*Planning	0.0008	0.21%	0.0008	0.22%	+0.01%	NA
Control*Aud_Bus	0.0046	0.15%	0.0037	0.16%	+0.01%	NA

[a] Aud_stru = Audit structure
[b] Inherent = Inherent risk
[c] Control = Control risk
[d] Desired = Desired audit risk
[e] Aud_Bus = Auditor business risk
[f] Planning = Planning materiality

5.4.3 Hypotheses Ten to Twelve

This subsection reports the results of the statistical tests for Hypotheses Ten to Twelve. As previously discussed in Chapter 4, "Research Methodology", this research study classifies the subjects as having either a high or low tolerance for ambiguity (TA) on the basis of the median split of scores obtained from the MacDonald's (1970) test.[6] Subjects' scores range from zero to 15, with a median score of 9. Thirty-one subjects with scores less than 9 are grouped into low TA, while 38 subjects with scores greater than 9 are classified into high TA. Ten subjects with score of 9 were deleted from the analysis.

Table 5.21 reports the results of the statistical test for Hypothesis Ten, revealing that TA does not interact with planned detection risk to affect auditors' planned extent of audit evidence, thus not providing support for H_{10}. As indicated in Table 5.22, the planned detection risk variable does not depend on the extent of TA. The graph shown in Figure 5.10 also supports this insignificant effect. In particular, the two lines representing high TA and low TA, respectively, remain almost parallel irrespective of different levels of the planned detection risk variable, and this definitely suggests the lack of an interactive effect between these variables. In addition, Table 5.21 also reveals

[6] Because the results of the statistical tests remain almost the same when the subjects are classified on the basis of mean score plus 1/2 σ or on the basis that subjects with scores 8, 9 and 10 are dropped from the analysis, only those results using the median split rule are reported here.

the insignificant main effect of the TA variable and indicates that the variable fails to account for any variations in auditors' planning decision (ω^2 = nil percent). In summary, the TA variable alone does not act independently or jointly with the planned detection risk variable to affect auditors' planned extent of audit evidence. As stated earlier, the planned detection risk variable is a function of inherent risk, control risk and desired audit risk, and therefore additional analyses of the independent effects of these component risks would be useful.

Table 5.21

ANOVA for Hypothesis 10

Sources	df	MS	F	Pr > F	ω^2
Between-subjects					
TA[a]	1	0.97	0.33	0.5701	nil
Subject (TA)	67	2.97			
Within-subjects					
PDR[b]	1	370.33	75.04	0.0001	30.1%[c]
PDR * TA	1	0.20	0.04	0.8423	nil
PDR * Subject (TA)	67	4.93			

[a] TA = Tolerance for ambiguity
[b] PDR = Planned detection risk
[c] This ω^2 resembles the ω^2 obtained in the analysis without considering the TA variable, i.e., 31 percent as shown in Table 5.6.

Table 5.22

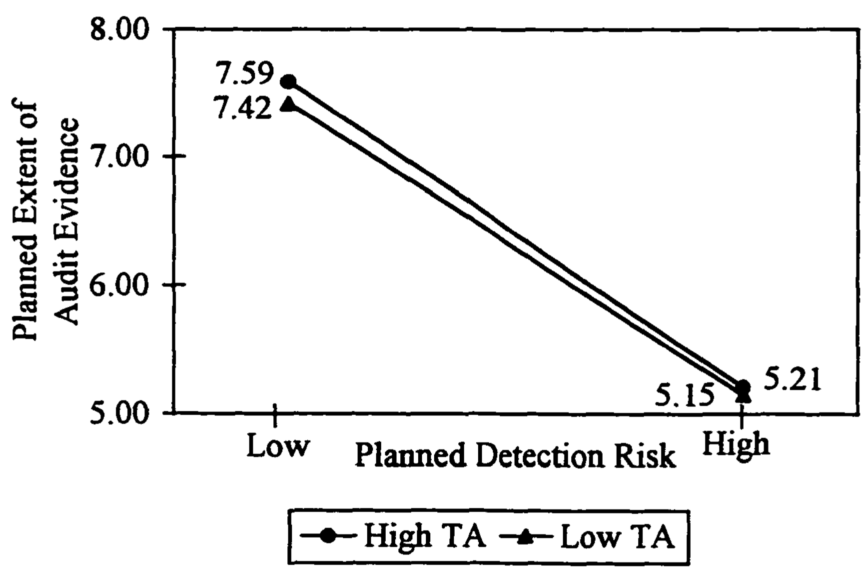
Marginal Means[a] for Hypothesis 10

Levels of PDR[b]	Levels of TA[e]	N	Means
Low[c]	Low	62	7.42
Low	High	76	7.59
High[d]	Low	62	5.15
High	High	76	5.21
Low	–	138	7.52
High	–	138	5.18
–	Low	124	6.28
–	High	152	6.40

[a] The planned extent of audit evidence ranges from 1 (much lower than the normal extent) to 10 (much higher than the normal extent).
[b] PDR = Planned detection risk
[c] Low level represents high inherent risk, high control risk and low desired audit risk
[d] High level represents low inherent risk, low control risk and high desired audit risk
[e] TA = Tolerance for ambiguity

Figure 5.10

Planned Detection Risk, Tolerance for Ambiguity and Planned Extent of Audit Evidence



Regarding the inherent risk variable, the first component of the planned detection risk, Table 5.23 indicates that the interactive effect between this variable and TA remains insignificant at the 0.05 level of significance and the pertinent ω^2 is nil percent, thus not providing support for $H_{10(1)}$. However, an interesting pattern is shown in Table 5.24, in which auditors with low TA, when compared to auditors with high TA, plan to obtain a lesser extent of audit evidence at the low level of the inherent risk variable and a slightly greater extent of audit evidence at the high level of that variable. This result is consistent with the contention that auditors with low TA are more responsive to high risk situations and require more evidence to support the same level of assurance than that is required by auditors high on TA. The crossover of the lines with respect to high and low levels of TA, as shown in Figure 5.11, further substantiates an interactive effect. Nevertheless, the interactive effect was not strong enough to be significant at the 0.05 level of significance. Thus, it seems that the TA variable alone does not act independently or jointly with the inherent risk variable to affect auditors' planning decisions. In fact, the role of TA is more complex than that reported in Table 5.23 because when the TA, audit structure and auditor risk attitude variables are incorporated into a comprehensive evidential planning model, the two three-way interaction effects involving TA become significant at less than the 0.05 level of significance. In particular, a three-way interaction of inherent risk, TA and auditor risk attitude is significant at the 0.0431 level of significance, and an earlier stated three-way interaction of inherent risk, audit structure and TA is significant at the 0.0467 level of significance. Section 5.5 of this chapter discusses these three-way interactions.

Table 5.23
ANOVA for Hypotheses 10(1) to 12

Sources	df	MS	F	Pr > F	ω^2
Between-subjects					
TA[a]	1	0.80	0.10	0.7581	nil
Subject (TA)	67	8.33			
Within-subjects					
Inherent[b]	1	561.29	159.08	0.0001	12.45%
Inherent * TA ($H_{10(1)}$)	1	3.37	0.95	0.3323	nil
Inherent * Subject (TA)	67	3.53			
Control[c]	1	599.63	151.78	0,0001	13.30%
Control * TA ($H_{10(2)}$)	1	0.18	0.04	0.8329	nil
Control * Subject (TA)	67	3.95			
Desired[d]	1	100.31	16.83	0.0001	2.11%
Desired * TA ($H_{10(3)}$)	1	2.71	0.45	0.5028	nil
Desired * Subject (TA)	67	5.96			
Aud_Bus[e]	1	473.59	126.93	0.0001	10.49%
Aud_Bus * TA (H_{11})	1	1.21	0.32	0.5711	nil
Aud_Bus * Subject (TA)	67	3.73			
Planning[f]	1	14.83	5.68	0.0200	0.27%
Planning * TA (H_{12})	1	0.23	0.09	0.7670	nil
Planning * Subject (TA)	67	2.61			
Inherent * Planning	1	13.15	9.32	0.0032	0.26%
Inherent * Planning * Subject (TA)	67	1.41			
Control * Planning	1	14.12	16.72	0.0001	0.30%
Control * Planning * Subject (TA)	67	0.84			
Control * Aud_Bus	1	6.60	7.08	0.0097	0.13%
Control * Aud_Bus * Subject (TA)	67	0.93			

[a] TA = Tolerance for ambiguity
[b] Inherent = Inherent risk
[c] Control = Control risk
[d] Desired = Desired audit risk
[e] Aud_Bus = Auditor business risk
[f] Planning = Planning materiality

Note : Insignificant interactions are not presented here because no hypotheses have been developed to test for these interactions and they have zero ω^2.

Table 5.24

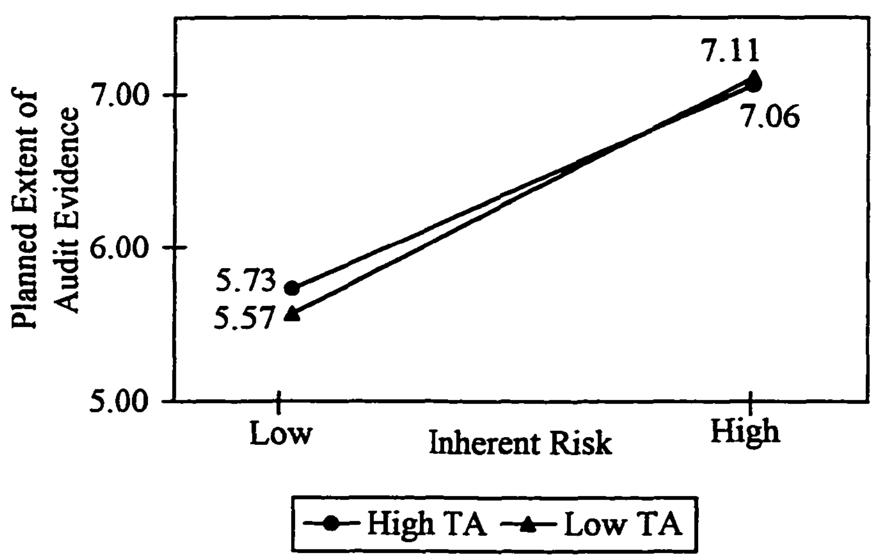
Marginal Means[a] for Hypothesis 10(1)

Level of Inherent[b]	Level of TA[c]	N	Means
Low	Low	248	5.57
Low	High	304	5.73
High	Low	248	7.11
High	High	304	7.06
Low	–	552	5.66
High	–	552	7.08
–	Low	496	6.34
–	High	608	6.40

[a] The planned extent of audit evidence ranges from 1 (much lower than the normal extent) to 10 (much higher than the normal extent).
[b] Inherent = Inherent risk
[c] TA = Tolerance for ambiguity

Figure 5.11

Inherent Risk, Tolerance for Ambiguity and Planned Extent of Audit Evidence



With respect to the control risk variable, the second element of the planned detection risk, Table 5.23 revealed that the interactive effect between this variable and TA remains insignificant at the 0.05 level of significance and the pertinent ω^2 is nil percent, thus not providing support for $H_{10(2)}$. As a result, according to Table 5.25, auditors on average, plan to perform similar extents of audit evidence for both high and low levels of the TA variable given either high or low level of the control risk variable. The graph depicted in Figure 5.12, which shows the nearly parallel lines for the two levels of TA, further supports the insignificant effect. These results then suggest that auditors with different TA's do not differ in the determination of the planned extent of audit evidence based upon assessments of control risk.

The third and last element of the planned detection risk is desired audit risk. Table 5.23 indicated that the relationship between this variable and auditors' planned extent of audit evidence does not depend on the TA variable, thus not providing support for $H_{10(3)}$. More specifically, the interactive effect remains insignificant at the 0.05 level of significance and its ω^2 does not explain any variation in the planning decisions of auditors. Similar to the interactive effect of the inherent risk and TA variables, the crossover of the two lines in Figure 5.13 and the changes in marginal means in Table 5.26 clearly indicate an interactive effect between desired audit risk and TA, though this interaction is not strong enough to be significant at the 0.05 level of significance.

Table 5.25

Marginal Means[a] for Hypothesis 10(2)

Level of Control[b]	Level of TA[c]	N	Means
Low	Low	248	5.61
Low	High	304	5.64
High	Low	248	7.07
High	High	304	7.15
Low	–	552	5.63
High	–	552	7.11
–	Low	496	6.34
–	High	608	6.40

[a] The planned extent of audit evidence ranges from 1 (much lower than the normal extent) to 10 (much higher than the normal extent).

[b] Control = Control risk

[c] TA = Tolerance for ambiguity

Figure 5.12

Control Risk, Tolerance for Ambiguity and Planned Extent of Audit Evidence

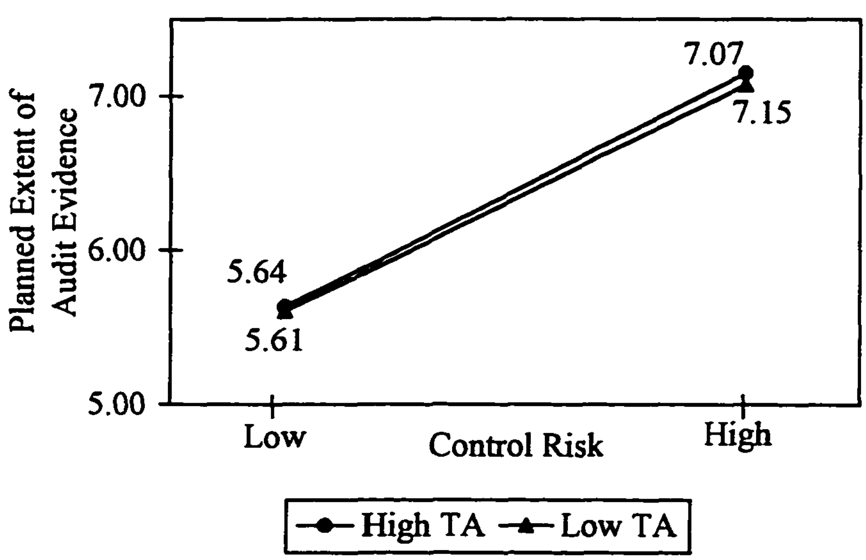


Table 5.26

Marginal Means[a] for Hypothesis 10(3)

Level of Desired[b]	Level of TA[c]	N	Means
Low	Low	248	6.69
Low	High	304	6.65
High	Low	248	5.99
High	High	304	6.14
Low	–	552	6.67
High	–	552	6.07
–	Low	496	6.34
–	High	608	6.40

[a] The planned extent of audit evidence ranges from 1 (much lower than the normal extent) to 10 (much higher than the normal extent).
[b] Desired = Desired audit risk
[c] TA = Tolerance for ambiguity

Figure 5.13

Desired Audit Risk, Tolerance for Ambiguity and Planned Extent of Audit Evidence

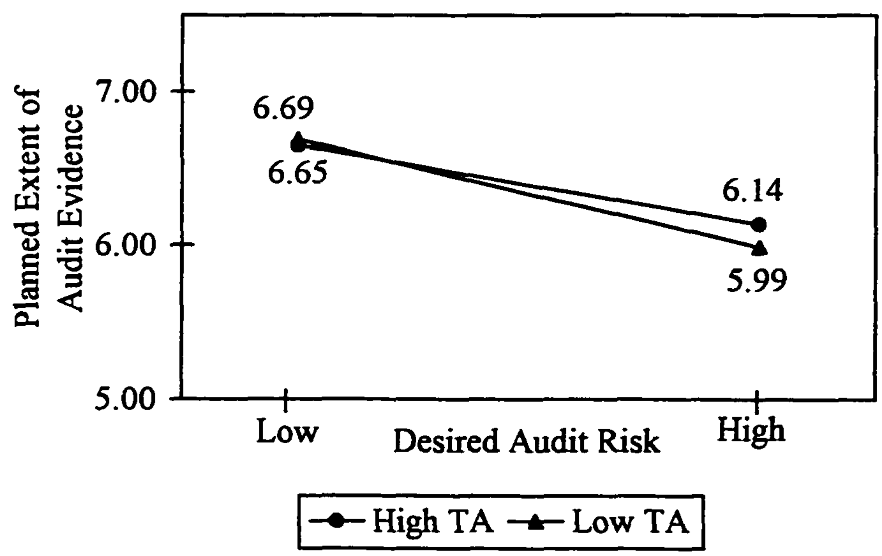


Table 5.23 then revealed that the auditor business risk variable does not interact with the TA variable to affect auditors' planned extent of audit evidence, thus not providing support for H_{11}. More specifically, the interactive effect remains statistically insignificant at the 0.05 level of significance, and it fails to account for any variation in the planning decisions of auditors (ω^2 = nil percent). Table 5.27 reports the pertinent marginal means and Figure 5.14 plots the interactive effect, both of them showing that the TA variable exerts only minimal influence on the relationship between the auditor business risk variable and auditors' planned extent of audit evidence.

Table 5.27

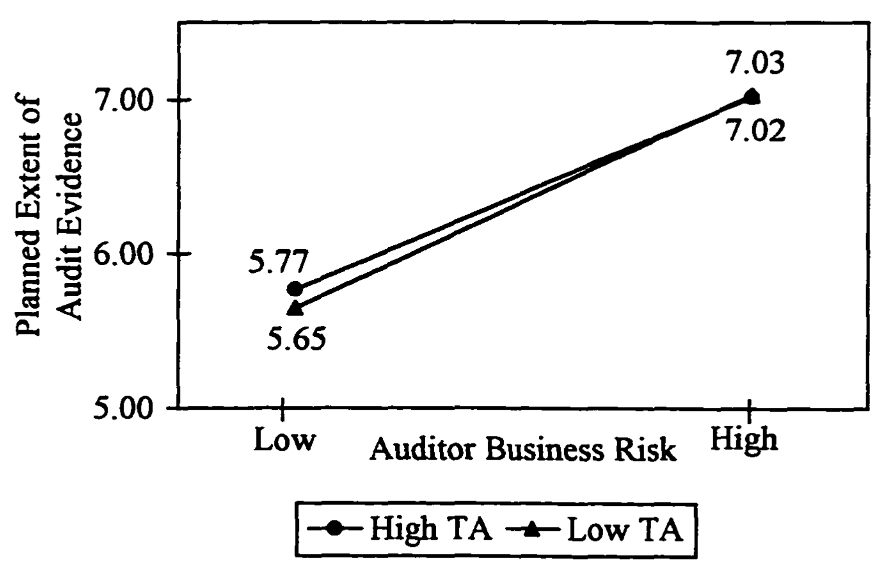
Marginal Means[a] for Hypothesis 11

Level of Aud_Bus[b]	Level of TA[c]	N	Means
Low	Low	248	5.65
Low	High	304	5.77
High	Low	248	7.03
High	High	304	7.02
Low	–	552	5.72
High	–	552	7.03
–	Low	496	6.34
–	High	608	6.40

[a] The planned extent of audit evidence ranges from 1 (much lower than the normal extent) to 10 (much higher than the normal extent).
[b] Aud_Bus = Auditor business risk
[c] TA = Tolerance for ambiguity

Figure 5.14

Auditor Business Risk, Tolerance for Ambiguity and Planned Extent of Audit Evidence



Regarding planning materiality, Table 5.23 revealed that the relationship between this variable and auditors' planned extent of audit evidence does not depend upon the TA variable, thus not supporting H_{12}. Specifically, the interaction remains insignificant at the 0.05 level of significance and the pertinent ω^2 is zero percent. Also, Table 5.28 indicates that auditors, on average, plan to obtain a similar amount of audit evidence for both levels of the TA variable given either the high or low level of the planning materiality level. Figure 5.15 further illustrates this insignificant effect by showing that the lines for different levels of TA remain about the same and almost parallel. Consequently, it appears that the TA variable alone does not act independently or jointly with the planning materiality variable to affect the evidential planning decisions of auditors. This is inconsistent with the moderating role of TA, as discussed earlier.

Lastly, Table 5.29 compares the significance levels and the ω^2 statistics for the significant effects discussed earlier in Subsection 5.4.1. According to the table, only minor differences in the significance levels and the ω^2 statistics occur after incorporating the TA variable in the evidential planning model presented in Subsection 5.4.1. The earlier discussion in Subsection 5.4.1 for the five within-subjects variables, i.e. Hypotheses 1 to 3 and 5 to 6, and for the three significant interactions thus remain relevant for an evidential planning model including the TA variable.

Table 5.28

Marginal Means[a] for Hypothesis 12

Level of Planning[b]	Level of TA[c]	N	Means
Low	Low	248	6.47
Low	High	304	6.50
High	Low	248	6.21
High	High	304	6.29
Low	–	552	6.49
High	–	552	6.30
–	Low	496	6.34
–	High	608	6.40

[a] The planned extent of audit evidence ranges from 1 (much lower than the normal extent) to 10 (much higher than the normal extent).
[b] Planning = Planning materiality
[c] TA = Tolerance for ambiguity

Figure 5.15

Planning Materiality, Tolerance for Ambiguity and Planned Extent of Audit Evidence

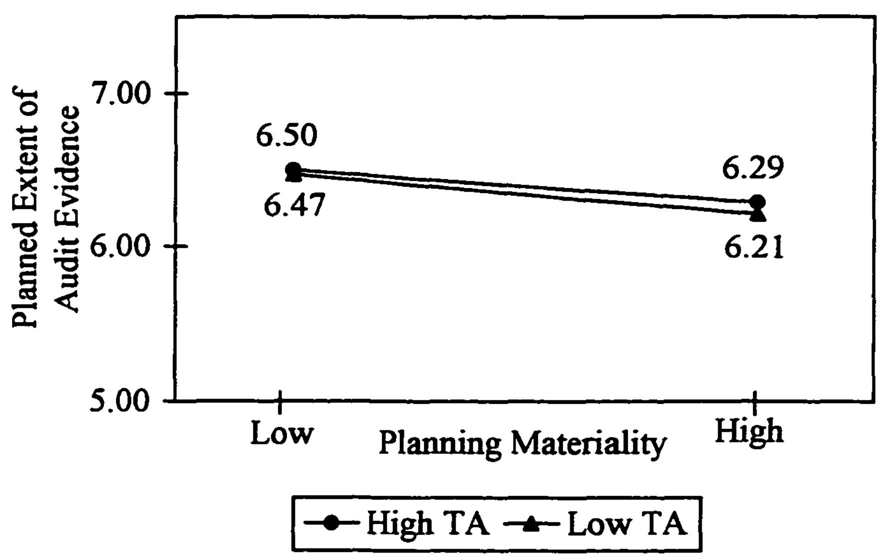


Table 5.29

Tolerance for Ambiguity and Within-Subjects Variables: Significant Level and Omega-Squared Statistics

Variable	Excluding TA[a]		Including TA		Change in ω^2	Hypothesis
	$P_r > F$	ω^2	$P_r > F$	ω^2		
Inherent[b]	0.0001	11.98%	0.0001	12.45%	+0.47%	1
Control[c]	0.0001	13.47%	0.0001	13.30%	-0.17%	2
Desired[d]	0.0001	1.85%	0.0001	2.11%	+0.26%	3
Aud_Bus[e]	0.0001	9.86%	0.0001	10.49%	+0.63%	5
Planning[f]	0.0192	0.25%	0.0186	0.27%	+0.02%	6
Inherent*Planning	0.0268	0.12%	0.0334	0.26%	+0.14%	NA
Control*Planning	0.0008	0.21%	0.0008	0.30%	+0.09%	NA
Control*Aud_Bus	0.0046	0.15%	0.0037	0.13%	-0.02%	NA

[a] TA = Tolerance for ambiguity
[b] Inherent = Inherent risk
[c] Control = Control risk
[d] Desired = Desired audit risk
[e] Aud_Bus = Auditor business risk
[f] Planning = Planning materiality

5.4.4 Hypotheses Thirteen to Fifteen

This subsection presents the results of the statistical tests for Hypotheses Thirteen to Fifteen. According to the classification method discussed in Chapter Four, "Research Methodology", this research study classifies the auditor-subjects into three groups based upon their scores obtained from Clarke's (1987) risk-attitude test. Twenty-two subjects with scores of less than 6 were grouped into the low risk-averse group, 30 subjects with scores of more than 7 were grouped into the high risk-averse group, and 27 subjects with scores falling into the middle range of the scores, i.e., scores 6 and 7, were dropped from the analysis.

Table 5.30 reports the results of the statistical tests for Hypothesis Thirteen, revealing that the auditor risk attitude variable does not moderate the relationship between the planned detection risk variable and auditors' planned extent of audit evidence, thus not providing support for H_{13}. As the table indicates, the interactive effect remains insignificant at the 0.05 level of significance and the interaction does not explain any of the variation in the dependent variable (ω^2 = nil percent).

Table 5.30

ANOVA for Hypothesis 13

Sources	df	MS	F	Pr > F	ω^2
Between-subjects					
Risk[a]	1	0.06	0.06	0.8115	nil
Subject (Risk)	50	2.21			
Within-subjects					
PDR[b]	1	321.77	60.33	0.0001	33%[c]
PDR * Risk	1	4.16	0.78	0.3812	nil
PDR * Subject (Risk)	50	5.33			

[a] Risk = Auditor risk attitude
[b] PDR = Planned detection risk
[c] This ω^2 is greater than the ω^2 obtained in the analysis without considering the Risk variable, i.e., 31 percent as shown in Table 5.6.

A further analysis of this interactive effect based on Table 5.31 and Figure 5.16 shows an interesting result. The intersection of the two lines in Figure 5.16 clearly suggests an interactive relationship between the planned detection risk variable and the auditor risk attitude variable. Moreover, Table 5.31 reveals that auditors with high risk-aversion, on average, plan to perform more audit work, compared to low risk-averse auditors, when they confront high risk situations such as low levels of planned detection risk. This result supports the notion that high risk-averse auditors are likely to act more prudently (conservatively) by planning to perform more audit work at a high risk level or for more uncertain situations. However, as indicated earlier, this interactive effect is not sufficiently strong to be statistically significant. Consistent with the analyses performed in preceding subsections, the following paragraphs provide additional analyses of the interaction between auditor risk attitude and each of the three components of the planned detection risk variable.

Table 5.31

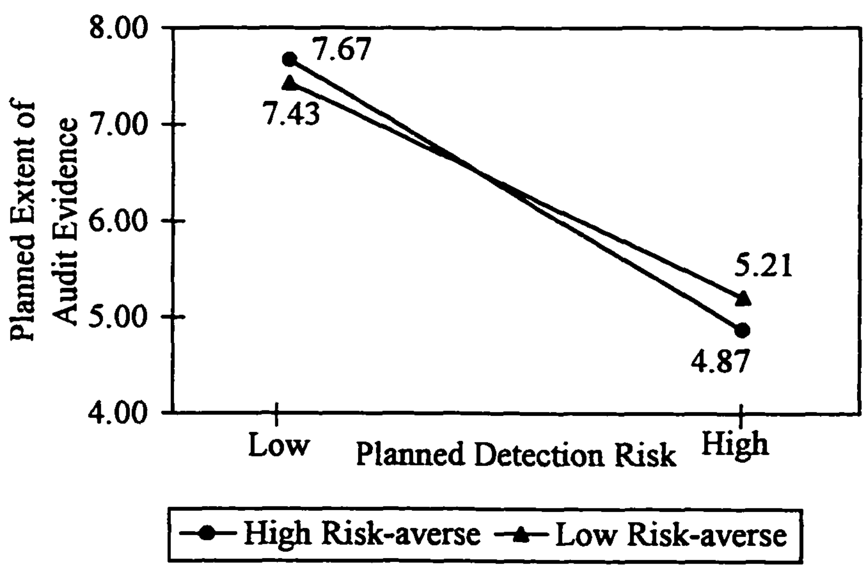
Marginal Means[a] for Hypothesis 13

Level of PDR[b]	Level of Risk[e]	N	Means
Low[c]	Low risk-averse	44	7.43
Low	High risk-averse	60	7.67
High[d]	Low risk-averse	44	5.21
High	High risk-averse	60	4.87
Low	–	158	7.57
High	–	158	5.01
–	Low risk-averse	88	6.32
–	High risk-averse	120	6.27

[a] The planned extent of audit evidence ranges from 1 (much lower than the normal extent) to 10 (much higher than the normal extent).
[b] PDR = Planned detection risk
[c] Low level represents high inherent risk, high control risk and low desired audit risk
[d] High level represents low inherent risk, low control risk and high desired audit risk
[e] Risk = Auditor risk attitude

Figure 5.16

Planned Detection Risk, Auditor Risk Attitude and Planned Extent of Audit Evidence



Regarding the inherent risk variable, Table 5.32 reveals that the interactive effect between this variable and the auditor risk attitude variable remains insignificant at the 0.05 level of significance, and the pertinent ω^2 is only 0.01 percent, thus not providing support for $H_{13(1)}$. The graph depicted in Figure 5.17, showing that the two lines with respect to different levels of the auditor risk attitude variable are almost parallel, further displays the insignificant interactive effect. Therefore, one must conclude that the auditor risk attitude variable alone does not moderate the relationship between the inherent risk variable and auditors' planned extent of audit evidence.

An examination of the marginal means, as Table 5.33 reports, shows an interesting result. In comparison with the low risk-averse auditors, high risk-averse auditors do plan for a greater extent of audit evidence (7.15 vs. 6.85) at the high level of the inherent risk variable, implying that they will act more prudently (conservatively) at a high risk level or for more uncertain situations. In fact, as mentioned in earlier sections, the moderating effect of the auditor risk variable is complex because this variable interacts with the TA variable to affect the relationship between inherent risk and auditors' planned extent of audit evidence. Section 5.5 discusses this three-way interaction in detail.

Table 5.32

ANOVA for Hypotheses 13(1) to 15

Sources	df	MS	F	Pr > F	ω^2
Between-subjects					
R[a]	1	13.87	2.14	0.1497	0.21%
Subject (R)	50	6.48			
Within-subjects					
Inherent[b]	1	460.18	117.88	0.0001	12.84%
Inherent * R ($H_{13(1)}$)	1	0.29	0.07	0.7858	0.01%
Inherent * Subject (R)	50	3.90			
Control[c]	1	519.75	138.58	0.0001	14.52%
Control * R ($H_{13(2)}$)	1	0.05	0.01	0.9117	nil
Control * Subject (R)	50	3.75			
Desired[d]	1	53.49	9.22	0.0038	1.34%
Desired * R ($H_{13(3)}$)	1	16.04	2.77	0.1026	0.37%
Desired * Subject (R)	50	5.80			
Aud_Bus[e]	1	401.83	85.17	0.0001	11.17%
Aud_Bus * R (H_{14})	1	6.09	1.29	0.2615	0.14%
Aud_Bus * Subject (R)	50	4.72			
Planning[f]	1	19.45	8.65	0.0049	0.48%
Planning * R (H_{15})	1	9.57	4.25	0.0444	0.21%
Planning * Subject (R)	50	2.25			
Inherent * Planning	1	20.10	14.86	0.0003	0.53%
Inherent * Planning * Subject (R)	50	1.35			
Control * Planning	1	14.34	14.00	0.0005	0.38%
Control * Planning * Subject (R)	50	1.02			
Control * Aud_Bus	1	9.26	7.10	0.0103	0.22%
Control * Aud_Bus * Subject (R)	50	1.30			
Control * Inherent * R	1	7.11	6.66	0.0128	0.17%
Control * Inherent * Subject (R)	50	1.07			

[a] R = Auditor risk attitude
[b] Inherent = Inherent risk
[c] Control = Control risk
[d] Desired = Desired audit risk
[e] Aud_Bus = Auditor Business risk
[f] Planning = Planning materiality

Note : Insignificant interactions are not presented here because no hypotheses have been developed to test for these interactions and they have zero ω^2.

Table 5.33

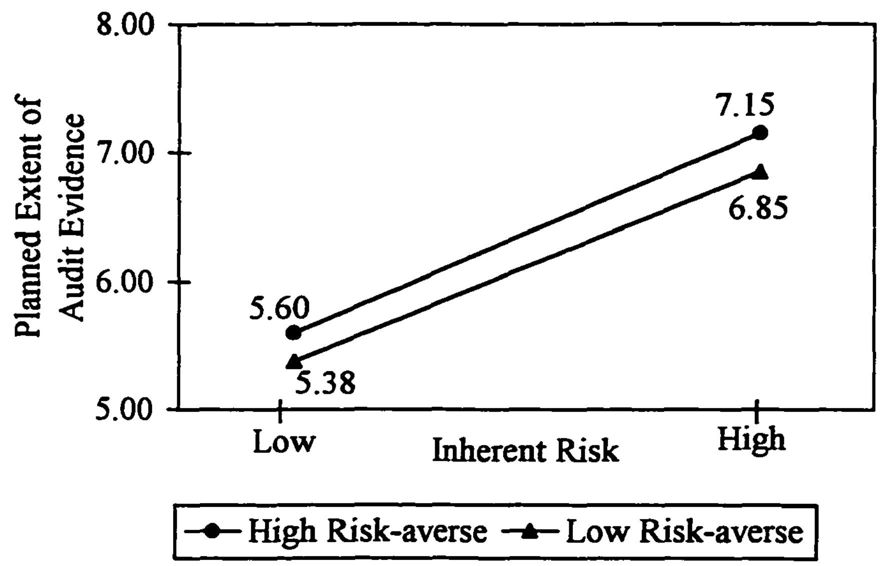
Marginal Means[a] for Hypothesis 13(1)

Level of Inherent[b]	Level of Risk[c]	N	Means
Low	Low risk-averse	176	5.38
Low	High risk-averse	240	5.60
High	Low risk-averse	176	6.85
High	High risk-averse	240	7.15
Low	–	416	5.51
High	–	416	7.02
–	Low risk-averse	352	6.11
–	High risk-averse	480	6.38

[a] The planned extent of audit evidence ranges from 1 (much lower than the normal extent) to 10 (much higher than the normal extent).
[b] Inherent = Inherent risk
[c] Risk = Auditor risk attitude

Figure 5.17

Inherent Risk, Auditor Risk Attitude and Planned Extent of Audit Evidence



The effect of the auditor risk attitude variable on the relationship between the control risk variable and the evidential planning decisions of auditors displays a similarity with that of the inherent risk variable. This interactive effect, as Table 5.32 revealed, remains insignificant at the 0.05 level of significance, and so it does not explain any variation in auditors' planned extent of audit evidence (ω^2 = nil percent), thus not providing support for $H_{13(2)}$. An examination of the marginal means, as reported in Table 5.34, and of the graph, as depicted in Figure 5.18, further supports the result of an insignificant interactive effect. Thus, auditors with different levels of risk-aversion (high vs. low) do not differ in their determination of the planned extent of audit evidence based upon their assessments of control risk.

Table 5.34

Marginal Means[a] for Hypothesis 13(2)

Level of Control[b]	Level of Risk[c]	N	Means
Low	Low risk-averse	176	5.31
Low	High risk-averse	240	5.58
High	Low risk-averse	176	6.92
High	High risk-averse	240	7.17
Low	–	416	5.46
High	–	416	7.06
–	Low risk-averse	352	6.11
–	High risk-averse	480	6.38

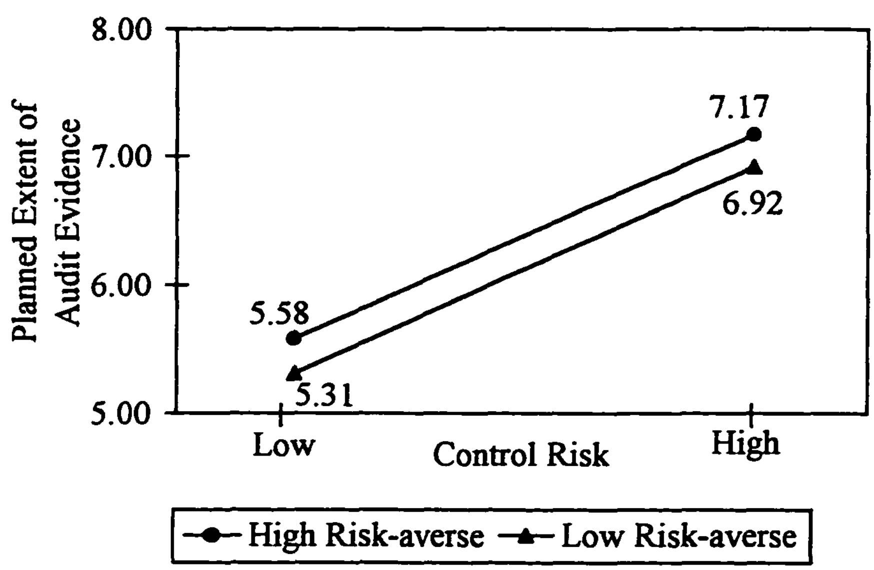
[a] The planned extent of audit evidence ranges from 1 (much lower than the normal extent) to 10 (much higher than the normal extent).

[b] Control = Control risk

[c] Risk = Auditor risk attitude

Figure 5.18

Control Risk, Auditor Risk Attitude and Planned Extent of Audit Evidence



Also, Table 5.13 revealed that the interactive effect between desired audit risk and auditor risk attitude remains insignificant at the 0.05 level of significance, thus not providing support for $H_{13(3)}$. The fact that this interactive effect is statistically significant at the 0.1026 level of significance warrants more in-depth study. An examination of the marginal means, as reported in Table 5.35, and of the graph, as depicted in Figure 5.19, indicates that the interactive effect is more pronounced at the high level of the desired audit risk variable than at the low level of that variable, i.e., a difference of 0.54 vs. a difference of 0.02. As expected, low risk-averse auditors, compared to high risk-averse auditors, plan to perform less audit work at the high level of the desired audit risk variable, which represents a low risk situation. Given the level of significance found for the moderating role of auditor risk attitude in this research, an examination of the moderating role of the auditor risk attitude deserves future study.

Table 5.35

Marginal Means[a] for Hypothesis 13(3)

Level of Desired[b]	Level of Risk[c]	N	Means
Low	Low risk-averse	176	6.51
Low	High risk-averse	240	6.49
High	Low risk-averse	176	5.72
High	High risk-averse	240	6.26
Low	–	416	6.50
High	–	416	6.03
–	Low risk-averse	352	6.11
–	High risk-averse	480	6.38

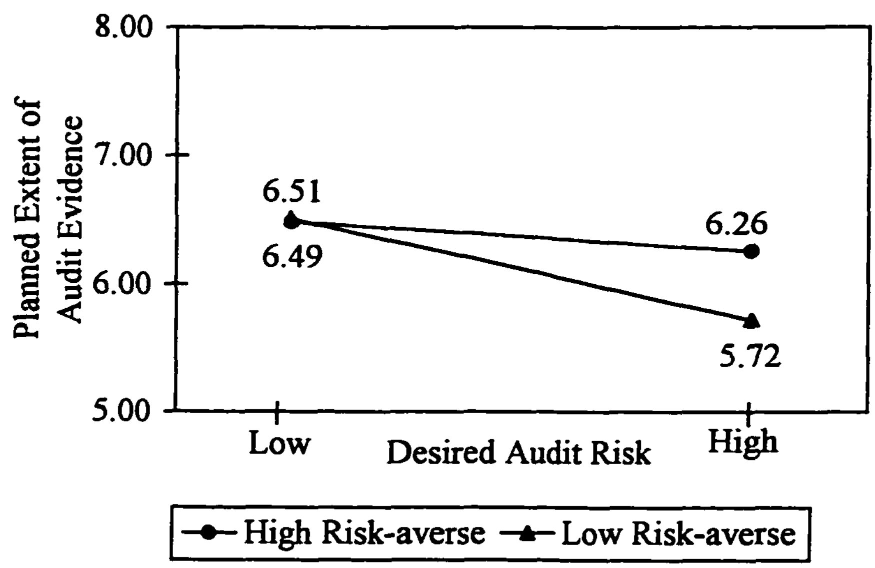
[a] The planned extent of audit evidence ranges from 1 (much lower than the normal extent) to 10 (much higher than the normal extent).

[b] Desired = Desired audit risk

[c] Risk = Auditor risk attitude

Figure 5.19

Desired Audit Risk, Auditor Risk Attitude and Planned Extent of Audit Evidence



With respect to the auditor business risk variable, Table 5.32 revealed that this variable does not interact with the auditor risk attitude variable to affect the planning decisions of auditors, thus not providing support for H_{14}. In particular, the interaction remains statistically insignificant at the 0.05 level of significance and the pertinent ω^2 is only 0.14 percent. An examination of marginal means in Table 5.36 and the pertinent graph of the interaction in Figure 5.20, however, indicates that an interactive effect does exist to certain extent. The graph of Figure 5.20 shows that, at a high level of the auditor business risk variable, the auditor risk attitude variable exerts a small impact on the planned extent of evidence, i.e., a difference of only 0.09. However, at a low level of the auditor business risk variable, changes in levels of the auditor risk attitude variable exert a much stronger influence on the planned extent of audit evidence, i.e., a difference of 0.44. To explain this, it may be argued that low risk-averse auditors behave more optimistically at a low level of auditor business risk variable by planning to perform less audit work. Since the ω^2 value for the interaction accounts for only 0.14 percent and the interactive effect remains statistically insignificant at the 0.05 level of significance, further study is warranted to determine whether an interactive effect between the auditor business risk variable and the auditor risk attitude variable do exist.

Table 5.36

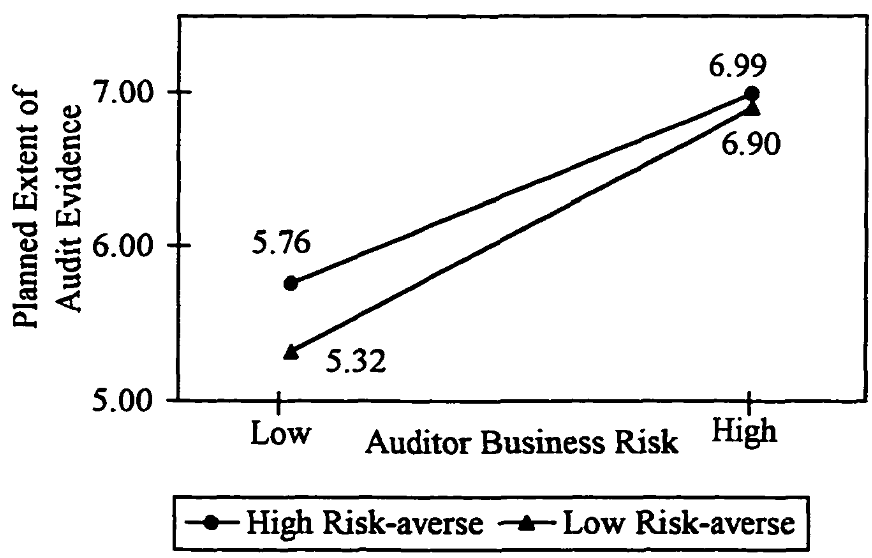
Marginal Means[a] for Hypothesis 14

Level of Aud_Bus[b]	Level of Risk[c]	N	Means
Low	Low risk-averse	176	5.32
Low	High risk-averse	240	5.76
High	Low risk-averse	176	6.90
High	High risk-averse	240	6.99
Low	–	416	5.58
High	–	416	6.95
–	Low risk-averse	352	6.11
–	High risk-averse	480	6.38

[a] The planned extent of audit evidence ranges from 1 (much lower than the normal extent) to 10 (much higher than the normal extent).
[b] Aud_Bus = Auditor business risk
[c] Risk = Auditor risk attitude

Figure 5.20

Auditor Business Risk, Auditor Risk Attitude and Planned Extent of Audit Evidence



With respect to the planning materiality variable, Table 5.32 revealed that the relationship between this variable and the planned extent of audit evidence depends on the auditor risk attitude variable, thus providing support for H_{15}. In particular, the interactive effect between the auditor risk attitude variable and the planning materiality variable remains significant at the 0.0444 level of significance, and it accounts for 0.21 percent of the variation in auditors' planning decision for the extent of audit evidence. Table 5.37 reports the marginal means of this interaction, while Figure 5.21 portrays the interactive effect. The graph of Figure 5.21 reveals that, at a high level of the planning materiality variable, the auditor risk attitude variable exerts almost no influence on the planned extent of audit evidence, i.e., a difference of only 0.04. However , at a low level of the planning materiality variable, the changes in the levels of the auditor risk attitude variable exert a stronger influence on the planned extent of audit evidence, i.e., a difference of 0.47. As predicted, auditors, on average, plan for the greatest extent of audit evidence (6.63) at a level which represents high risk-aversion and low planning materiality. This research finding, therefore, provides empirical support to the contention that high risk-averse auditors may act more prudently (conservatively) than low risk-averse auditors at a high risk situation, as indicated by the low level of the planning materiality variable.

Table 5.37

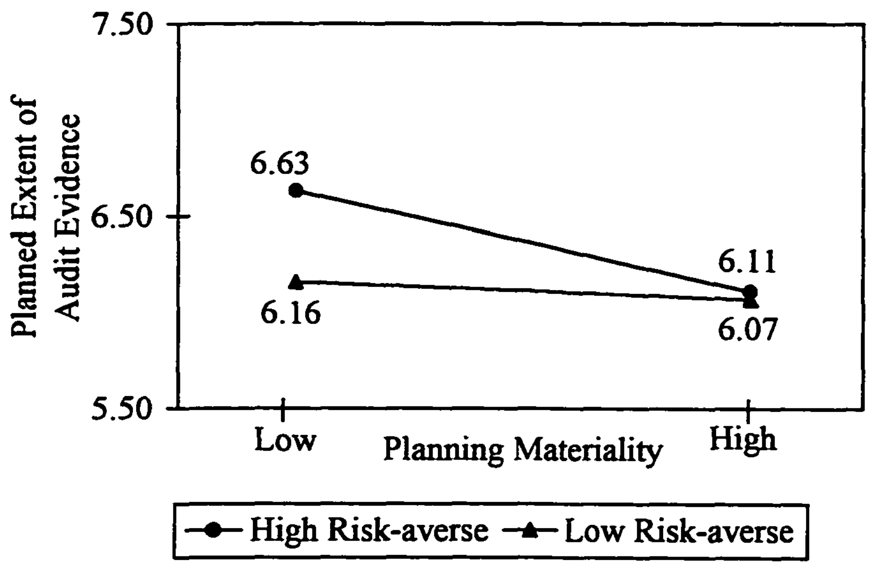
Marginal Means[a] for Hypothesis 15

Level of Planning[b]	Level of Risk[c]	N	Means
Low	Low risk-averse	176	6.16
Low	High risk-averse	240	6.63
High	Low risk-averse	176	6.07
High	High risk-averse	240	6.11
Low	–	416	6.44
High	–	416	6.09
–	Low risk-averse	352	6.11
–	High risk-averse	480	6.38

[a] The planned extent of audit evidence ranges from 1 (much lower than the normal extent) to 10 (much higher than the normal extent).
[b] Planning = Planning materiality
[c] Risk = Auditor risk attitude

Figure 5.21

Planning Materiality, Auditor Risk Attitude and Planned Extent of Audit Evidence



Lastly, Table 5.38 compares the significance levels and the ω^2 statistics for the significant effects previously discussed in Subsection 5.4.1. As revealed, there exist only minor changes in the significance levels and some increases in the ω^2 statistics after including the auditor risk attitude variable in the evidential planning model presented in Subsection 5.4.1. The previous discussions in Subsection 5.4.1 for the five within-subjects variables, i.e., Hypotheses 1 to 3 and 5 to 6, and for the three significant interactions thus remain relevant for an evidential planning model which includes the auditor risk attitude variable. In this expanded evidential planning model, the five within-subjects variables accounts for a total of 40.35 percent of the variations in auditors' planned extent of audit evidence, compared to 37.41 percent in the model without including auditor risk attitude. This suggests that the inclusion of an auditor risk attitude variable into the model does add explanatory value to auditors' planning decisions of the extent of audit evidence.

Table 5.38

Auditor Risk Attitude and Within-Subjects Variables: Significant Level and Omega-Squared Statistics

Variable	Excluding Rsk_Attu[a]		Including Rsk_Attu		Change in ω^2	Hypothesis
	$P_r > F$	ω^2	$P_r > F$	ω^2		
Inherent[b]	0.0001	11.98%	0.0001	12.84%	+0.86%	1
Control[c]	0.0001	13.47%	0.0001	14.52%	+1.05%	2
Desired[d]	0.0001	1.85%	0.0001	1.34%	-0.51%	3
Aud_Bus[e]	0.0001	9.86%	0.0001	11.17%	+1.31%	5
Planning[f]	0.0192	0.25%	0.0186	0.48%	+0.23%	6
Inherent*Planning	0.0268	0.12%	0.0334	0.53%	+0.41%	NA
Control*Planning	0.0008	0.21%	0.0008	0.38%	+0.17%	NA
Control*Aud_Bus	0.0046	0.15%	0.0037	0.17%	+0.02%	NA

[a] Rsk_Attu = Auditor risk attitude
[b] Inherent = Inherent risk
[c] Control = Control risk
[d] Desired = Desired audit risk
[e] Aud_Bus = Auditor business risk
[f] Planning = Planning materiality

5.5 A COMPREHENSIVE EVIDENTIAL PLANNING MODEL

To provide more insights into the moderating roles of the audit structure (Aud_Stru), tolerance for ambiguity (TA) and auditor risk attitude (Rsk_Attu) variables, these three between-subjects variables and the five within-subjects variables as discussed earlier are incorporated into a comprehensive evidential planning model. Table 5.39 presents the ANOVA results of this comprehensive model and reveals that the main effects of the Aud_Stru, TA and Rsk_Attu variables remain insignificant at the 0.05 level of significance, thus confirming that those variables should not be considered independent variables.

Table 5.39

Overall ANOVA

Sources	df	MS	F	Pr > F	ω^2
Between-subjects					
Aud_stru[a]	1	5.15	0.95	0.3357	nil
TA[b]	1	0.48	0.09	0.7684	nil
R[c]	1	10.04	1.85	0.1814	0.15%
Subject (Aud_stru TA R)	38	5.42			
Within-subjects					
Inherent[d]	1	408.43	113.02	0.0001	13.56%
Inherent * Aud_stru	1	9.54	2.64	0.1124	0.20%
Inherent * TA	1	3.80	1.05	0.3114	0.01%
Inherent * R	1	1.03	0.28	0.5968	nil
Inherent * TA * Aud_stru	1	15.28	4.23	0.0467	0.39%
Inherent * TA * R	1	15.82	4.38	0.0431	0.41%
Inherent * Subject (Aud_stru TA R)	38	3.61			
Control[e]	1	397.01	96.36	0.0001	13.16%
Control * Aud_stru	1	4.65	1.13	0.2947	0.02%
Control * TA	1	1.33	0.32	0.5726	nil
Control * R	1	0.37	0.09	0.7672	nil
Control * Subject (Aud_stru TA R)	38	4.12			
Desired[f]	1	46.50	7.02	0.0117	1.33%
Desired * Aud_stru	1	1.52	0.23	0.6347	nil
Desired * TA	1	3.62	0.55	0.4642	nil
Desired * R	1	12.19	1.84	0.1830	0.19%
Desired * Subject (Aud_stru TA R)	38	6.63			
Aud_Bus[g]	1	333.67	86.46	0.0001	11.05%
Aud_Bus * Aud_stru	1	23.41	6.07	0.0185	0.65%
Aud_Bus * TA	1	0.27	0.07	0.7917	nil
Aud_Bus * R	1	0.43	0.11	0.7416	nil
Aud_Bus * Subject (Aud_stru TA R)	38	3.86			
Planning[h]	1	7.64	3.25	0.0792	0.18%
Planning * Aud_stru	1	0.35	0.15	0.7018	nil
Planning * TA	1	0.03	0.01	0.9090	nil
Planning * R	1	9.84	4.19	0.0475	0.25%
Planning * Subject (Aud_stru TA R)	38	2.35			
Inherent * Planning	1	23.91	18.32	0.0001	0.76%
Inherent * Planning * Subject (Aud_stru TA R)	41	1.31			
Control * Planning	1	12.40	12.84	0.0009	0.38%
Control * Planning * Subject (Aud_stru TA R)	41	0.97			

[a] Aud_stru = Audit structure
[b] TA = Tolerance for ambiguity
[c] R = Auditor risk attitude
[d] Inherent = Inherent risk
[e] Control = Control risk
[f] Desired = Desired audit risk
[g] Aud_Bus = Auditor Business risk
[h] Planning = Planning materiality

Note : Insignificant interactions are not presented here because no hypotheses have been developed to test for these interactions and they have zero ω^2.

As stated earlier, the TA and Rsk_Attu variables interact with the inherent risk variable to affect the evidential planning decisions of auditors. Separate 2x2 ANOVA (Inherent risk*Aud_Stru) for each category of TA, i.e., high TA and low TA, were run in order to obtain more insights into the nature and directions of the three-way interaction. Only results which show a statistically significant ($p < 0.05$) two-way interaction for each of the TA categories are reported, and these results are presented in Table 5.40 and Figure 5.22. As the graph of Figure 5.22 shows, at the low level of the TA variable, the relationship between the inherent risk variable and the planned extent of audit evidence is moderated by the Aud_Stru variable. In particular, the effect is more pronounced at the low level of the inherent risk variable, i.e., auditors of structured firms, on average, plan to obtain a greater extent of audit evidence (5.91) than auditors of unstructured firms (5.10). A possible explanation is that the more structured audit approach "requires" or "encourages" auditors with low TA to plan for more standard audit procedures in order to allow them better prepare for "unanticipated" events even though these "unanticipated" events are less likely to occur in low risk situations such as low inherent risk.

Table 5.40

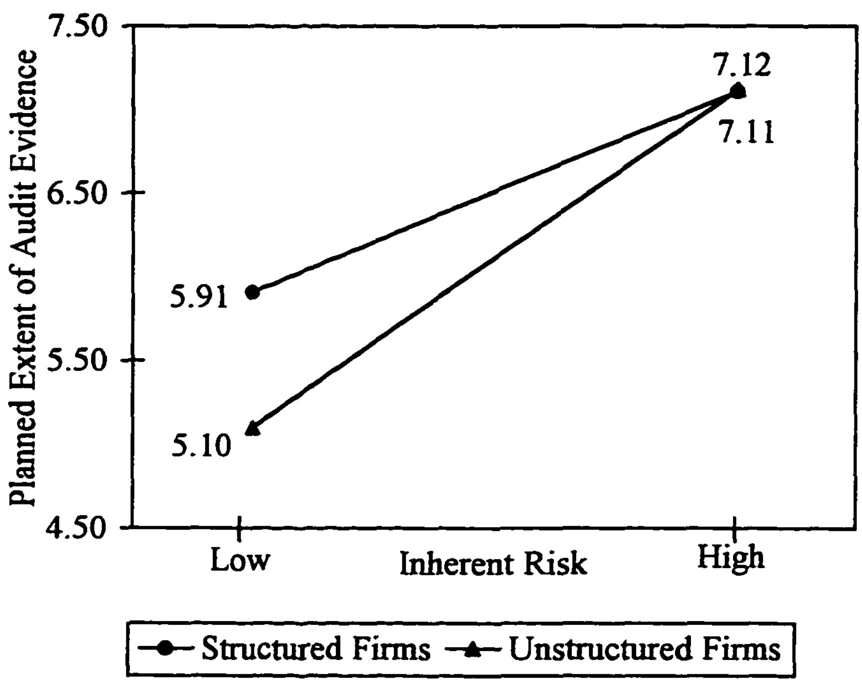
Marginal Means[a] for Inherent[b]*Aud_Stru[c] Interaction At Low Level of Tolerance for Ambiguity

Level of Inherent	Level of Aud_Stru	N	Means
Low	unstructured	104	5.10
Low	structured	144	5.91
High	unstructured	104	7.12
High	structured	144	7.11
Low	–	248	5.57
High	–	248	7.11
–	unstructured	208	6.11
–	structured	288	6.51

[a] The planned extent of audit evidence ranges from 1 (much lower than the normal extent) to 10 (much higher than the normal extent).
[b] Inherent = Inherent risk
[c] Aud_Stru = Audit structure

Figure 5.22

Inherent Risk, Audit Structure and Planned Extent of Audit Evidence At Low Level of Tolerance for Ambiguity



Similarly, separate 2x2 ANOVA (TA*Aud_Stru) for each level of the inherent risk variable, i.e., high and low levels of inherent risk, were run in order to obtain more insights into the nature and directions of the three-way interaction. Only results which show a statistically significant ($p < 0.05$) two-way interaction for each of the inherent risk levels are reported, and these results are presented in Table 5.41 and Figure 5.23. The graph of Figure 5.23 portrays this interactive effect, and reveals that, for auditors with high TA at the low level of the inherent risk variable, the audit structure variable exerts a relatively small impact on the planned extent of audit evidence, i.e., a difference of only 0.22. However, for auditors with low TA at the low level of the inherent risk variable, the audit structure variable exerts a stronger influence on the planned extent of audit evidence, i.e., a difference of 0.81. A possible explanation for this significant difference has been discussed in the preceding paragraph regarding the Inherent*Aud_Stru interaction at the low level of the TA variable.

Table 5.41

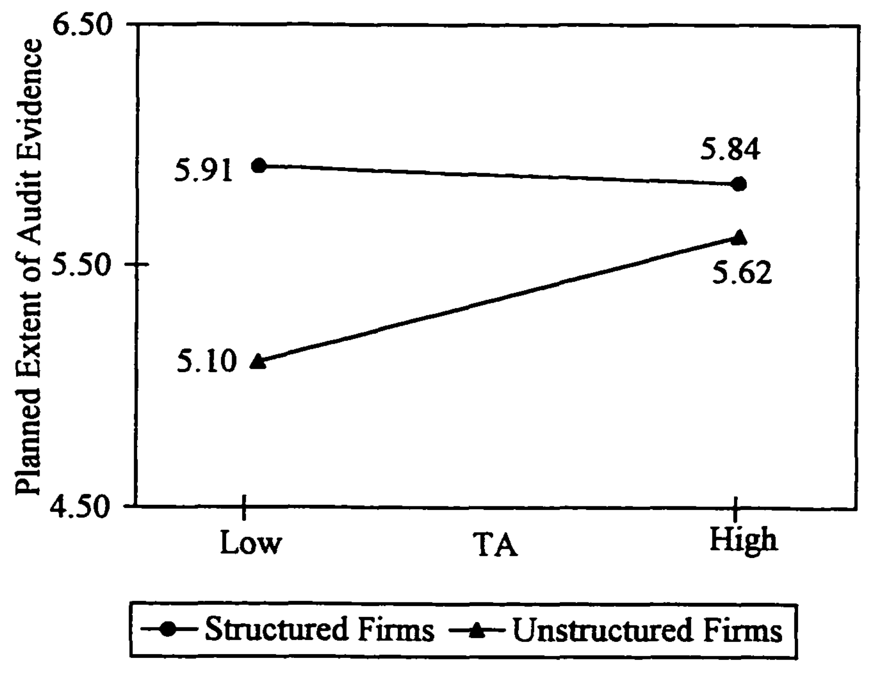
Marginal Means[a] for Aud_Stru[b]*TA[c] Interaction At Low Level of Inherent Risk

Level of TA	Level of Aud_Stru	N	Means
Low	Unstructured	104	5.10
Low	Structured	144	5.91
High	Unstructured	144	5.62
High	Structured	160	5.84
Low	–	248	5.57
High	–	304	5.73
–	Unstructured	248	5.40
–	Structured	304	5.87

[a] The planned extent of audit evidence ranges from 1 (much lower than the normal extent) to 10 (much higher than the normal extent).
[b] Aud_Stru = Audit structure
[c] TA = Tolerance for ambiguity

Figure 5.23

Audit Structure, TA and Planned Extent of Audit Evidence At Low Level of Inherent Risk



In addition, separate 2x2 ANOVA (Inherent*TA) for each level of the Aud_Stru variable, i.e., unstructured and structured, were run, and only results which show a statistically significant ($p < 0.05$) two-way interaction for each level of the Aud_Stru variable are reported. These results are presented in Table 5.42 and Figure 5.24. The graph of Figure 5.24 depicts the interactive effect of the inherent risk and TA variables on unstructured firm auditors' planning decisions. In particular, unstructured firm auditors with low TA were more responsive to the change in the levels of the inherent risk variable. They, on average, plan for a greater extent of audit evidence at the high level of the inherent risk variable than that of unstructured firm auditors with high TA (7.12 vs. 6.84), and plan for a lesser extent of audit evidence at the low level of the inherent risk variable than that of unstructured firm auditors with high TA (5.10 vs. 5.62). This result provides empirical support to the contention that auditors with low TA perceive high levels of inherent risk or more uncertain situations as sources of threat and require more audit evidence to support the same level of assurance than that is required by auditors high on TA.

Table 5.42

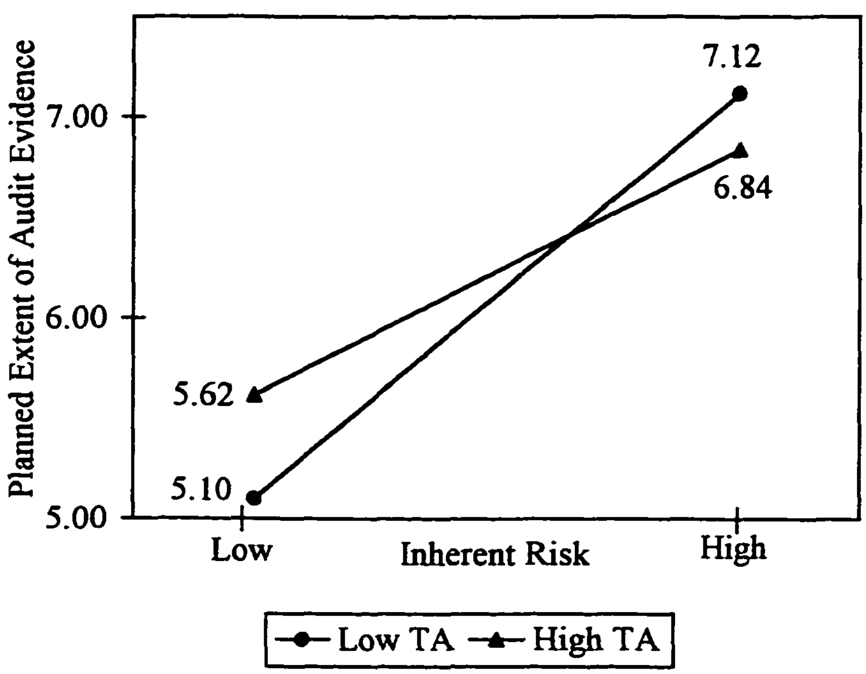
Marginal Means[a] for Inherent[b]*TA[c] Interaction For Unstructured Audit Firms

Level of Inherent	Level of TA	N	Means
Low	Low	104	5.10
Low	High	144	5.62
High	Low	104	7.12
High	High	144	6.84
Low	–	248	5.40
High	–	248	6.96
–	Low	208	6.11
–	High	288	6.23

[a] The planned extent of audit evidence ranges from 1 (much lower than the normal extent) to 10 (much higher than the normal extent).
[b] Inherent = Inherent risk
[c] TA = Tolerance for ambiguity

Figure 5.24

Inherent Risk, TA and Planned Extent of Audit Evidence For Unstructured Audit Firms



Regarding the second significant three-way interaction involving TA, i.e., TA*Inherent Risk*Rsk_Attu, separate 2×2 ANOVAs for each level of the TA, Inherent risk and Rsk_Attu variables were run and Table 5.43 reports the marginal means of the only marginally significant ($p \leq 0.0765$) two-way interaction, i.e., TA*Rsk_Attu at the high level of the inherent risk variable. Figure 5.25 depicts this interactive effect, revealing that the effect is more pronounced for auditors with high TA. In particular, at the high level of the inherent risk variable, high TA, low risk-averse auditors, on average, plan for a lesser extent of audit evidence (6.76) than high TA, high risk-averse auditors (7.29). A possible explanation is that, when facing high risk situations such as high inherent risk, low risk-averse auditors who can tolerate more uncertainties (i.e., high TA auditors) will take a more optimistic or aggressive approach in determining their planned extents of audit evidence (i.e., a lesser extent of audit evidence). In contrast, another interpretation is that, under the same situations, the high risk-averse auditors will take a more conservative or prudent approach in determining their planned extents of audit evidence (i.e., a greater extent of audit evidence). Future research examining the impact of personality should take into consideration the joint moderating role of TA and Rsk_Attu.

Table 5.43

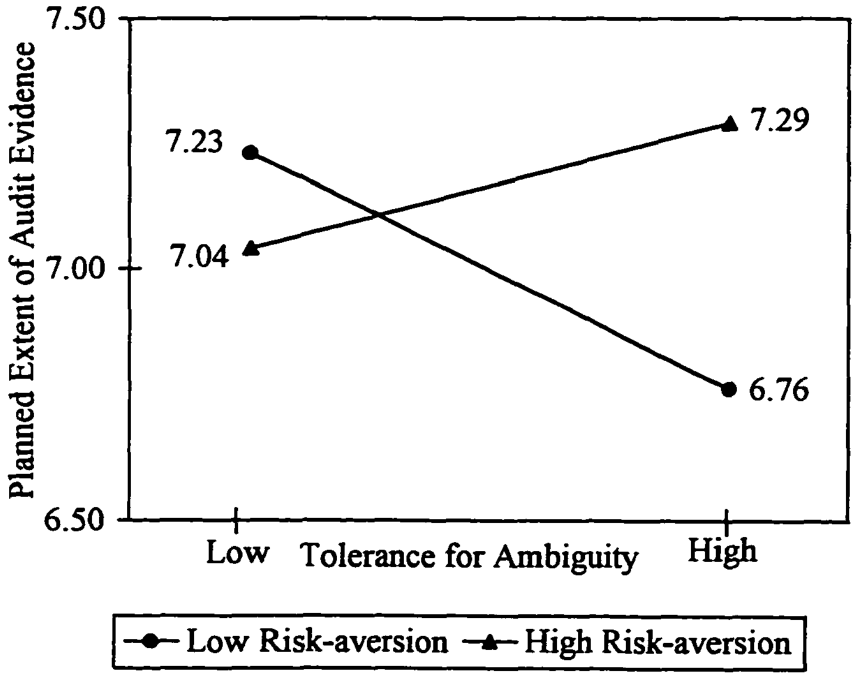
Marginal Means[a] for TA[b]*Rsk_Attu[c] Interaction At High Level of Inherent Risk

Level of TA	Level of Rsk_Attu	N	Means
Low	Low risk-averse	56	7.23
Low	High risk-averse	112	7.04
High	Low risk-averse	80	6.76
High	High risk-averse	112	7.29
Low	–	168	7.10
High	–	192	7.07
–	Low risk-averse	136	6.96
–	High risk-averse	224	7.17

[a] The planned extent of audit evidence ranges from 1 (much lower than the normal extent) to 10 (much higher than the normal extent).
[b] TA = Tolerance for ambiguity
[c] Rsk_Attu = Auditor Risk Attitude

Figure 5.25

TA, Auditor Risk Attitude and Planned Extent of Audit Evidence At High Level of Inherent Risk



Finally, Table 5.44 compares the levels of significance and the ω^2 statistics for the significant effects previously discussed in Subsection 5.4.1. The results lend support to the conclusion that auditors place significant weights on the inherent risk, control risk and auditor business risk variables in determining their planned extents of audit evidence. While both the inherent risk and auditor business risk variables receive more cue weights (an increase in more than one percent of ω^2) in the comprehensive model, the planning materiality variable becomes only marginally significant at the 0.0792 level of significance. All other effects only had minor changes in the levels of significance and ω^2 statistics after adding the three between-subjects variables to the model presented in Subsection 5.4.1. Except for the above, the previous discussions in Subsection 5.4.1 for the five within-subjects variables, i.e., Hypotheses 1 to 3 and 5 to 6, and for the three significant interactions remain relevant for an evidential planning model which includes all the three between-subjects variables. In this expanded evidential planning model, the five within-subjects variables accounts for a total of 39.28 percent of the variations in auditors' planned extent of audit evidence, compared to 37.41 percent in the model without including those between-subjects variables. This suggests that the inclusion of the between-subjects variables into the model does add explanatory value to auditors' planning decisions of the extent of audit evidence.

Table 5.44

Between-Subjects and Within-Subjects Variables: Significant Level and Omega-Squared Statistics

Variable	Excluding Between[a]		Including Between		Change in ω^2	Hypothesis
	$P_r > F$	ω^2	$P_r > F$	ω^2		
Inherent[b]	0.0001	11.98%	0.0001	13.56%	+1.58%	1
Control[c]	0.0001	13.47%	0.0001	13.16%	-0.31%	2
Desired[d]	0.0001	1.85%	0.0117	1.33%	-0.52%	3
Aud_Bus[e]	0.0001	9.86%	0.0001	11.05%	+1.19%	5
Planning[f]	0.0192	0.25%	0.0792	0.18%	-0.07%	6
Inherent*Planning	0.0268	0.12%	0.0001	0.76%	+0.64%	NA
Control*Planning	0.0008	0.21%	0.0009	0.38%	+0.17%	NA
Control*Aud_Bus	0.0046	0.15%	0.0570	0.11%	-0.04%	NA

[a] Between = the three between-subjects variables, i.e., audit structure, tolerance for ambiguity and auditor risk attitude
[b] Inherent = Inherent risk
[c] Control = Control risk
[d] Desired = Desired audit risk
[e] Aud_Bus = Auditor business risk
[f] Planning = Planning materiality

5.6 A COMPARISON WITH PRIOR STUDIES

In order to gain additional insight, Table 5.45 presents a comparison of the results of this study and those of the related prior studies. Consistent with the findings of this study, previous US studies in general reported a positive relationship between control risk and the planned extent of audit evidence. One exception was noted by Mock and Wright (1993) which found no overall relationship between control risk factors and the number of planned audit hours. One possible explanation for this difference relates to the different experimental approach being employed. Mock and Wright (1993) used archival data obtained from the auditors-in-charge. While this approach could enhance external validity, it at the same time sacrificed some degree of internal validity. The insignificant result could be due to confounding effects of some uncontrolled extraneous variables such as audit structure and individual psychological differences.

Using auditors from a structured CPA firm, Mock and Wright (1993) found that changes in planned extent of audit testing were related to changes in levels of inherent risk. This study provides further evidence that audit structure augments this positive relationship. For example, at low level of TA, auditors of structured firms plan to obtain a greater extent of audit evidence than auditors of unstructured firms. The overall findings of this study are also consistent with those of prior US inherent risk studies such as Brewer (1981) and Kaplan and Reckers (1984) which did not control for audit structure.

Table 5.45

A Comparison with Prior Studies

Study	Country	Subjects	Task	Variables	Results
This study	Hong Kong	79 auditors with an average of 6.5 years (range 3-14) auditing experience	To determine the planned extent of audit evidence for a hypothetical audit client	Inherent risk Control risk Desired audit risk Auditor business risk Planning materiality Audit structure Tolerance for Ambiguity Auditor risk attitude	There is a positive relationship between inherent risk, control risk, auditor business risk, and auditors' planned extent of audit evidence. There is a negative relationship between desired audit risk, planned detection risk, planning materiality, and auditors' planned extent of audit evidence. Structured firm auditors plan to perform more (less) audit work at high (low) auditor business risk than unstructured firm auditors. Unstructured firm auditors with low TA plan for a greater (lesser) extent of audit evidence at high (low) inherent risk than that of unstructured firm auditors with high TA. At low inherent risk, structured firm auditors with low TA plan to obtain a greater extent of audit evidence than unstructured firm auditors with low TA. At high inherent risk, low risk-averse auditors with high TA plan for a lesser extent of audit evidence than high risk-averse auditors with high TA. Auditors plan for the greatest extent of audit evidence at a level which represents high risk-aversion and low planning materiality.

Table 5.45 (continued)

Study	Country	Subjects	Task	Variables	Results
McGhee et al. (1978)	US	24 MBA students	Assess impact of TA on the information process.	Tolerance for Ambiguity	Individuals low on TA perceived ambiguous situation as sources of threat and sought more information to reduce the ambiguity.
Brewer (1981)	US	116 auditors	Assess perceived level of audit intensity	Inherent risk	Two inherent risk factors (a threat to client survival and incapable client management) affected auditors' planning of the quantity, timing, and quality of audit evidence to be gathered.
Mock and Turner (1981)	US	200 auditors	Evaluate internal controls over a company's revenue cycle and make four sample size decisions.	Control risk	Neither the strength of internal controls nor the guidance method significantly affected the audit scope decisions.
Gaumnitz et al. (1982)	US	35 auditors with a median auditing experience of 2.5 years (range 1-20)	Evaluate the strength of internal controls and estimate the planned audit hours for accounts receivables using five cues.	Control risk	When auditors rated internal control strong, they planned for a fewer number of audit hours and vice versa.
Tabor (1983)	US	109 auditors with a median auditing experience of 3 years	Evaluate the degree of reliability of internal controls and determine substantive test sample size for the revenue cycle.	Control risk	Auditors planned for more (less) substantive tests when their assessments of control risk increased (decreased).

Table 5.45 (continued)

Study	Country	Subjects	Task	Variables	Results
Kaplan and Reckers (1984)	US	60 auditors	Evaluate the likelihood of material error occurring in accounts receivable	Inherent risk Control risk	Both general practice priors (an inherent risk factor) and control consciousness (a control risk factor) have significant main effect on auditors' evaluation of the likelihood of a material error.
Libby et al. (1985)	US	12 auditors with an average of 10.1 years (range 6-14) auditing experience	Assess perceived level of internal control reliance relating to accounts payable.	Inherent risk Control risk	An increase in control risk resulted in a greater reduction in control reliance for a more susceptible process.
Clarke (1987)	US	44 auditors with an average of 2.6 years auditing experience	Make audit scope planning decisions for a hypothetical company.	Auditor risk attitude	High risk-averse auditors consistently recommended higher levels of audit procedures compared to low risk-averse auditors.
Cohen and Kida (1989)	US	50 seniors with an average of 3 years auditing experience 46 managers with an average of 6.3 years auditing experience	Modify the initial audit plan based on analytical review results and internal control reliability.	Control risk Detection risk	Auditors assigned more audit hours for a weak internal control system than for a strong system. Auditors assigned more audit hours when analytical procedures signalled errors, but they were unwilling to reduce testing when analytical procedures signalled no errors.

Table 5.45 (continued)

Study	Country	Subjects	Task	Variables	Results
Newton and Ashton (1989)	Canada	300 Canadian listed companies	Study the relationship between audit structure and audit report lags.	Audit structure	Clients of structured firms tend to experience longer audit report lags.
Eyler (1990)	US	65 auditors with an average of 11 auditing experience	Provide estimates of planning materiality for two audit client scenarios.	Planning materiality Audit structure	The most structured firm had the lowest (highest) materiality estimates for the hypothetical client constructed with a low (high) level of uncertainty.
Pincus (1991)	US	114 auditors	Evaluate the fairness of presentation of an inventory account for a hypothetical client.	Tolerance for Ambiguity	Auditors low on TA made more judgements consistent with the misstated nature of the inventory account.
Icerman and Hillison (1991)	US	49 manufacturing companies	Model evaluation materiality as a function of the relative error size and audit structure using over 1400 actual errors booked.	Audit structure Evaluation materiality	Structured firms booked a greater proportion of individual errors.

Table 5.45 (continued)

Study	Country	Subjects	Task	Variables	Results
Hermanson (1993)	US	141 auditors with an average of 6.8 years auditing experience	Evaluate sampling errors detected in accounts receivable confirmations and then to determine whether to project the errors to the population.	Audit structure Evaluation materiality	Auditors of the more structured firms projected more errors than those of the less structured firms.
Bamber et al. (1993)	US	972 US listed companies	Study audit structure and other determinants of audit report lag.	Audit structure	Clients of structured firms experienced longer total audit report lags, but experienced shorter abnormal lags.
Mock and Wright (1993)	US	159 audits of US companies	Examine the relationship between various risk factors and audit planning judgements	Inherent risk Control risk	Changes in extent of audit testing (planned audit hours) were related to changes in a limited number of account-specific inherent risks but not to engagement-wide risks. Audit programs vary little across clients and from year to year.
Tsui (1993)	New Zealand	24 bankers with an average of 27 years (range 10-40) experience	Recommend an interest rate premium for a hypothetical loan application.	Tolerance for Ambiguity	Individuals low on TA required a higher interest rate premium to compensate for the perceived greater uncertainty and risk attached to the qualified audit opinion.

Table 5.45 (continued)

Study	Country	Subjects	Task	Variables	Results
Walo (1995)	US	32 auditors with an average of 8 years auditing experience	Determine planned audit hours and the likelihood of material misstatement for accounts receivable	Auditor business risk	A weak financial condition or the presence of public ownership, both indicating higher auditor business risk, resulted in a greater planned audit hours.
Simunic and Stein (1996)	US	249 audits of US companies	Investigate the relationship between audit pricing, audit efforts, and litigation risk.	Auditor business risk	Auditors appeared to respond to higher client-specific litigation risk by increasing their audit effort levels rather than by charging a higher price premium.
Majid and Pragasam (1997)	Australia	65 auditor with an average of 4.5 years (range 1-12) auditing experience	Evaluate auditors' litigation avoidance behaviour.	Tolerance for Ambiguity Auditor business risk	Auditors low on TA demonstrated higher degrees of litigation avoidance behaviour when compared to auditors high on TA

The significant audit structure and auditor business risk interaction found in this study is consistent with the findings of previous empirical studies using audit report lags or earnings announcement lags as a surrogate for the extent of audit work. (e.g. Newton and Ashton 1989, and Bamber et al. 1993). The moderating effect of audit structure also shed additional light on the findings of prior studies such as Walo (1995) and Simunic and Stein (1996) which only considered the main effect of the auditor business risk variable.

Contrary to prior studies, such as Eyler (1990), Icerman and Hillison (1991) and Hermanson (1993) who concluded that audit structure has significant impacts on other judgmental tasks, this research study found that auditors of CPA firms with different degrees of audit structure do not interpret the same planning materiality limit differently in determining the planned extent of audit evidence. A possible explanation for this difference in results is related to cultural differences of the subjects. While prior studies used US auditors as subjects, this research study used Hong Kong auditors.

Previous studies by McGhee et al. (1978), Pincus (1991), Tsui (1993) and Majid and Pragasam (1997) found that TA is an important moderating variable for various types of subjects (auditors, bankers, and MBA students) in different cultural environments (US, Australia and New Zealand). Using Hong Kong auditors, this study found that TA was related to only some of the variables examined. Future studies should consider which aspects of the audit planning tasks are more susceptible to the influence of an auditor's level of TA.

5.7 SUMMARY

This chapter first described some descriptive statistics for the variables examined and discussed issues relating to the ANOVA assumptions. This was followed by a summary of the 15 hypotheses of this research study, labeling the eight hypotheses that were supported and the remaining seven hypotheses that were not supported. Section Four of this chapter then presented and discussed the ANOVA results of the various statistical tests for those hypotheses. The first set of significant results concluded that all five independent (all within-subjects) variables remained statistically significant at less than the 0.02 level of significance and accounted for 37.41 percent of the variations in auditors' planned extent of audit evidence. The second set of significant results provided empirical evidence to support the moderating roles of the audit structure, TA and auditor risk attitude variables (all between-subjects variables). Section Five presented the ANOVA results for the proposed comprehensive model and further discussed the moderating effects of those variables. Lastly, Section Six compared the results of this study with those of the prior studies. The next chapter will present and discuss the individual ANOVA results.

CHAPTER SIX

RESULTS AND DISCUSSION

INDIVIDUAL ANOVAS

6.1 INTRODUCTION

In order to provide additional insights about the evidential planning decisions of individual auditors, separate ANOVAs have been constructed for each auditor-subject. Section Two of this chapter evaluates the descriptive ability of these individual ANOVAs. The third section then discusses cue utilization of the within-subjects variables. This is followed by a discussion of the judgement quality variable in terms of consensus, stability and self-insight. The final section contains a summary of the chapter.

6.2 DESCRIPTIVE ABILITY

In this research study, the F-ratio and the multiple correlation coefficient (R^2) are used to determine whether the individual auditor-subjects' ANOVA models have descriptive ability for the evidential planning decisions. Table 6.1 reveals that 74 of the 79 (93.7 percent) individual ANOVA models were significant at the 0.10 level. Of these 74 models, 60 (76 percent of the total ANOVA models) were significant at the 0.01 level. Table 6.1 also shows that the mean R^2 value for all the individual ANOVA models amounted to 0.77, with a low R^2 value of 0.15 and a high R^2 value of 0.99. More than one-half of these models (41 out of 79) reported R^2 values of 0.80 or greater. The subjects' individual ANOVA models, thus, appear to have good descriptive ability.

Table 6.1

Significance of F-Ratios and R-Squared Values for Individual ANOVAs

	Level of Significance					
Auditor	NS	< .10	< .05	< .01	< .001	R-squared
1			1			0.6724
2					1	0.8637
3			1			0.6800
4				1		0.7778
5				1		0.7975
6					1	0.9769
7				1		0.7600
8					1	0.8728
9					1	0.8942
10					1	0.9343
11					1	0.8322
12				1		0.8095
13					1	0.8403
14					1	0.8779
15		1				0.5875
16					1	0.9074
17			1			0.7101
18					1	0.9446
19					1	0.9142
20				1		0.7917
21				1		0.8107
22					1	0.8390
23				1		0.7778
24					1	0.8977
25				1		0.7705
26					1	0.8828
27				1		0.7770
28				1		0.7875
29					1	0.8554
30				1		0.8131
31					1	0.9358
32					1	0.8791
33				1		0.7545
34			1			0.6587
35			1			0.6193
36		1				0.6124
37	1					0.5256
38			1			0.6419
39					1	0.8338
40					1	0.8639

Notes: NS = Not significant

Table 6.1 (continued)

Auditor	Level of Significance					R-squared
	NS	<.10	<.05	<.01	<.001	
41			1			0.6478
42					1	0.8700
43		1				0.5989
44				1		0.7239
45					1	0.9224
46				1		0.7795
47				1		0.7931
48		1				0.5703
49	1					0.4654
50		1				0.5950
51					1	0.8381
52					1	0.8667
53				1		0.7591
54					1	0.8605
55					1	0.9177
56					1	0.9455
57					1	0.9936
58					1	0.8788
59					1	0.8385
60					1	0.8766
61				1		0.7740
62				1		0.8241
63		1				0.6090
64	1					0.4737
65				1		0.7778
66					1	0.8338
67				1		0.8191
68				1		0.8000
69				1		0.8145
70					1	0.8994
71				1		0.7607
72					1	0.8570
73	1					0.1865
74				1		0.7590
75					1	0.8621
76				1		0.7838
77			1			0.6270
78				1		0.7986
79	1					0.1500
Total	5	6	8	26	34	
Mean						0.7738

Notes: NS = Not significant

A further analysis of the individual ANOVA models is conducted by examining the significant main effects in each individual model. As shown in Table 6.2, the results of the individual ANOVA models indicate that control risk had the highest number of significant effects on the planned extent of audit evidence. This main effect was significant at the 0.05 level for 68.35 percent (54 out of 79) of the individual ANOVA models. The next two significant effects were auditor business risk and inherent risk, which were significant at the 0.05 level for 59.49 percent (47 out of 79) and 58.23 percent (46 out of 71), respectively, of the individual ANOVA models. Another independent variable, desired audit risk, received a moderate level of support from the auditor-subjects, being significant at the 0.05 level for 51.90 percent (41 out of 79) of the individual ANOVA models. The remaining independent variable, planning materiality, was significant at the 0.05 level for only 21.52 percent (17 out of 79) of the models.

Table 6.3 then reveals that the fewest statistically significant main effects found for any auditor was zero. This was noted for two auditors; all of their ANOVAs (see Table 6.1) remained insignificant at the 0.10 level. Sixteen auditors had only one significant main effect, and in half of these 16 cases the significant main effect was control risk. This result supports the contention that this independent variable has the most significant effect on auditors' evidential planning decisions. The maximum number of significant main effects (five) was found for six auditors.

Table 6.2

Significant Main Effects by Auditor

Auditor	Aud_Bus[a]	Control[b]	Desired[c]	Inherent[d]	Planning[e]	Total
1	1		1			2
2		1	1	1	1	4
3			1		1	2
4	1		1			2
5	1		1			2
6	1	1		1	1	4
7	1		1	1		3
8	1	1		1		3
9		1	1	1	1	4
10	1	1	1	1		4
11		1		1		2
12	1	1	1	1		4
13	1	1	1	1	1	5
14	1	1	1	1	1	5
15		1				1
16	1	1	1	1	1	5
17	1	1		1		3
18	1	1	1	1	1	5
19	1	1		1	1	4
20	1	1				2
21	1	1		1		3
22	1	1	1	1		4
23	1	1		1		3
24	1	1	1	1		4
25		1	1			2
26	1	1	1	1		4
27		1		1		2
28		1		1		2
29	1	1	1			3
30	1	1				2
31	1					1
32	1			1		2
33	1	1		1		3
34			1			1
35			1			1
36			1			1
37		1				1
38	1		1			2
39		1		1		2
40	1	1		1	1	4

[a] Aud_Bus = Auditor business risk
[b] Control = Control risk
[c] Desired = Desired audit risk
[d] Inherent = Inherent risk
[e] Planning = Planning materiality

Table 6.2 (continued)

Auditor	Aud_Bus[a]	Control[b]	Desired[c]	Inherent[d]	Planning[e]	Total
41			1			1
42	1			1	1	3
43		1				1
44		1				1
45	1	1	1	1	1	5
46	1	1	1			3
47		1	1	1		3
48			1			1
49				1		1
50	1			1		2
51		1		1		2
52		1		1		2
53			1	1	1	3
54	1		1			2
55	1	1	1	1	1	5
56	1	1	1	1		4
57	1	1		1		3
58	1	1	1	1		4
59	1			1	1	3
60		1		1		2
61	1	1		1		3
62		1				1
63	1	1				2
64	1					1
65		1				1
66	1	1		1		3
67	1		1			2
68	1	1	1			3
69		1	1	1	1	4
70		1	1	1	1	4
71		1	1	1		3
72		1				1
73						0
74	1		1	1		3
75	1	1	1	1		4
76	1		1			2
77		1				1
78	1	1	1			3
79						0
Total	47	54	41	46	17	205

[a] Aud_Bus = Auditor business risk
[b] Control = Control risk
[c] Desired = Desired audit risk
[d] Inherent = Inherent risk
[e] Planning = Planning materiality

Table 6.3

Number of Significant* Main Effects by Auditor

Number of Significant Main Effects	Number of Auditors	% of All Auditors
0	2	2.5
1	16	20.3
2	21	26.6
3	19	24.0
4	15	19.0
5	6	7.6
Total	79	100.0

* At 0.05 level of significance

6.3 CUE UTILIZATION

Based on the above individual auditor-subjects' ANOVAs, ω^2 statistics were computed for each of the five main effects examined, and a summary is provided in Table 6.4. These ω^2 statistics reflected the utilization of a particular cue (see Section 4.8.2 for explanation). According to Table 6.4, the average percentage of variance explained by the five main effects amounted to approximately 67 percent, and the total ω^2 statistics ranged from a high value of 98.52 percent to a low value of less than one percent. The average ω^2 statistics of this study, i.e., 67 percent, is relatively moderate compared to previous judgement studies such as Ashton's (1974a) 80.3 percent, Joyce's (1976) 74.4%, Ashton and Brown's (1980) 71.9% and Hamilton and Wright's

(1982) 75 percent. The reminder of this section discusses individual main effects of the independent variables studied.

In this research, the auditor-subjects utilized the control risk variable to the greatest extent. The average variance explained by this effect amounted to approximately 20 percent, ranging from a high value of 67.17 percent to a low value of less than one percent. Forty-nine (62.03 percent) auditor-subjects had cue utilization coefficients greater than 10 percent, and 20 (25.32 percent) auditor-subjects had very high cue utilization coefficients (greater than 30 percent) for this effect. Table 6.5 summarizes the number of auditors with mean responses of the dependent variable on all levels of the within-subjects variables. An examination of the two levels of the control risk variable indicated that 76 of the 79 auditor-subjects responded with higher planned extents of audit evidence when the cases indicated a high level of control risk. These findings are consistent with the predicted effect of the control risk variable in the audit risk model. They lend further support to H_2 as previously discussed in Chapter Five, and to the finding that control risk has the highest number of significant effects in the individual ANOVAs, as discussed in the previous section.

Table 6.4

Significant Main Effects by Auditor (Omega-Squared Statistics)
(A blank represents a percentage less than 1)

Auditor	Aud_Bus[a]	Control[b]	Desired[c]	Inherent[d]	Planning[e]	Total
1	26.88		17.70	10.18		54.76
2	3.20	39.53	7.56	20.64	7.56	78.49
3	5.76		10.74	10.74	24.03	51.27
4	29.27	4.04	29.27	1.32	1.32	65.22
5	29.03		42.68			71.71
6	27.71	33.03		33.03	1.85	95.61
7	29.17	4.17	18.75	10.42		62.50
8	53.73	8.07	3.50	14.16		79.45
9		21.28	26.52	26.52	8.88	83.19
10	54.44	24.82	6.49	3.67		89.42
11	4.54	42.37		23.11	4.54	74.55
12	16.82	16.82	16.82	16.82	2.80	70.09
13	16.77	16.77	16.77	16.77	7.78	74.85
14	15.54	11.38	7.80	25.67	20.31	80.70
15		25.45	1.44	5.64	5.64	38.18
16	20.95	20.95	5.83	31.75	5.83	85.31
17	14.08	35.21		8.92		58.22
18	18.06	31.28	24.23	12.78	4.85	91.19
19	25.65	15.18		38.74	7.33	86.91
20	47.23	16.62		5.25		69.10
21	28.51	18.47	4.42	18.47		69.88
22	13.43	32.19	13.43	13.43	2.17	74.65
23	14.81	22.28		31.11		68.21
24	28.45	15.56	28.45	10.50		82.96
25	7.77	23.40	30.21	1.36	1.36	64.10
26	5.46	19.11	48.88	9.18		82.63
27	6.04	46.31		11.41	2.01	65.77
28	3.43	19.95		37.09	7.71	68.18
29	19.61	19.61	37.69			76.91
30	61.63	7.09		4.36		73.08
31	91.90					91.90
32	64.29		1.43	16.51		82.23
33	13.58	17.82	3.84	22.57	3.84	61.66
34	6.29	6.29	21.26	2.84	10.51	47.20
35		9.74	29.45			39.19
36		9.64	24.17	9.64		43.46
37		25.46		5.26		30.72
38	14.63	5.01	23.05	5.01		47.70
39		49.23		26.15		75.38
40	11.57	11.57	3.31	40.50	11.57	78.51

[a] Aud_Bus = Auditor business risk
[b] Control = Control risk
[c] Desired = Desired audit risk
[d] Inherent = Inherent risk
[e] Planning = Planning materiality

Table 6.4 (continued)

Auditor	Aud_Bus[a]	Control[b]	Desired[c]	Inherent[d]	Planning[e]	Total
41		11.79	18.47	6.32	11.79	48.36
42	33.92		2.63	17.65	25.16	79.35
43		33.54		2.48	6.63	42.65
44		50.35		7.97		58.32
45	13.74	41.88	3.97	18.19	9.89	87.68
46	17.10	25.58	17.10	4.78		64.56
47		19.09	11.49	39.36		69.93
48	14.49		25.74			40.24
49	2.22	5.11		21.50		28.83
50	15.30	4.14		25.40		44.85
51	3.48	35.76	3.48	28.31	3.48	74.50
52	2.17	54.41		23.45		80.03
53	8.63		12.27	21.10	21.10	63.10
54	44.50		35.78			80.28
55	13.26	9.26	17.92	23.25	23.25	86.94
56	26.56	9.21	21.41	32.25	1.90	91.33
57		5.74		92.78		98.52
58	5.65	33.45	9.50	33.45		82.04
59	11.85		5.64	48.66	8.51	74.67
60		29.99		52.14		82.13
61	12.72	40.94		12.72		66.38
62		63.22	2.64	5.49	2.64	73.98
63	25.42	15.77		2.27		43.46
64	23.81					23.81
65		55.80	5.98	5.98		67.75
66	6.54	51.74		15.42		73.69
67	10.56		57.95	2.67		71.17
68	22.55	22.55	22.55		1.96	69.61
69		39.76	10.24	10.24	10.24	70.47
70	1.77	7.96	17.70	38.94	17.70	84.07
71	7.68	25.49	20.20	11.30		64.66
72	3.34	67.17	3.34	3.34		77.20
73						
74	10.02	5.13	32.03	10.02	5.13	62.35
75	13.95	19.47	9.27	33.08	2.47	78.23
76	41.09	5.82	19.93	1.41		68.25
77	10.18	27.39	2.52		2.52	42.62
78	32.16	16.68	16.68		3.25	68.77
79						
Mean	16.01	19.75	11.55	15.61	3.79	66.71

[a] Aud_Bus = Auditor business risk
[b] Control = Control risk
[c] Desired = Desired audit risk
[d] Inherent = Inherent risk
[e] Planning = Planning materiality

Table 6.5

Number of Auditors with Means on All Within-Subjects Variable Levels

	Number of Auditors			
	Higher Planned Extent	Lower Planned Extent	Tie	Total
Auditor Business Risk				
High Level	73[a]	6[c]	0	79
Low Level	6[b]	73[d]	0	79
Control Risk				
High Level	76	1	2	79
Low Level	1	76	2	79
Desired Audit Risk				
High Level	20	56	3	79
Low Level	56	20	3	79
Inherent Risk				
High Level	77	1	1	79
Low Level	1	77	1	79
Planning Materiality				
High Level	28	44	7	79
Low Level	44	28	7	79

[a] Higher planned extent of audit evidence when compared with that of low level of risk.

[b] Higher planned extent of audit evidence when compared with that of high level of risk.

[c] Lower planned extent of audit evidence when compared with that of low level of risk.

[d] Lower planned extent of audit evidence when compared with that of high level of risk.

The next most important effect, auditor business risk, explained an average of 16 percent of the variance in the planned extent of audit evidence. This cue utilization ranged from a high value of 91.90 percent to a low value of less than one percent. Forty-five (56.96 percent) auditor-subjects were noted to have cue utilization coefficients greater than 10 percent, while ten (12.66 percent) auditors had very high coefficients (greater than 30 percent) for this effect. An examination of the two levels of the auditor business risk variable in Table 6.5 reveals that 73 of the 79 auditor-subjects, as expected, responded with higher planned extents of audit evidence when the cases indicated a high level of auditor business risk. These results provide additional evidence for the importance of the auditor business risk factor in auditors' planning decisions, and lend further support to H_5.

The cue ranking third in importance is the inherent risk variable. As can be seen, the average cue utilization coefficients for this cue is very close to that of the auditor business risk variable. Table 6.4 shows that this cue accounted for an average of 15.61 percent of the variance in the planned extent of audit evidence and that the cue utilization coefficients ranged from a high value of 92.78 percent to a low value of less than one percent. Forty-five (56.96 percent) auditor-subjects had cue utilization coefficients greater than 10 percent, and 14 (17.72 percent) of them had coefficients greater than 30 percent. Also, Table 6.5 reveals that 77 (97.47 percent) auditor-subjects, as expected, responded to the high level of the inherent risk variable with higher planned extents of audit evidence. These results, therefore, lend further support to H_1, as discussed in Chapter Five.

Further, Table 6.4 reveals that the desired audit risk variable, which ranked fourth in importance, accounts for an average of 11.55 percent of the variance in the planned extent of audit evidence. This cue showed a different pattern of cue utilization when compared with the previous three cues. Here, though the highest cue utilization coefficient amounted to 57.95 percent, 45 (56.96 percent) and 25 (31.65 percent) auditor-subjects were noted to have cue utilization coefficients of less than 10 percent and less than one percent, respectively. Nevertheless, consistent with the predicted effect of the proposed evidential planning model as well as the conventional audit risk model, 56 (70.89 percent) auditor-subjects responded to the low level of the desired audit risk variable with higher planned extents of audit evidence.

Lastly, the cue with the smallest utilization coefficient was the planning materiality variable. As indicated in Table 6.4, this cue only accounted for an average of 3.79 percent of the variance in the planned extent of audit evidence. The highest utilization coefficient amounted to only 25.16 percent, and more than half (53.16 percent) of the auditor-subjects had less than one percent cue utilization. Consistent with the hypothesized effect of H_6, 44 (55.70 percent) auditor-subjects responded to the low level of the planning materiality variable with higher planned extents of audit evidence.

In order to determine whether the auditor-subjects utilized the five main effects similarly, a Friedman's two-way ANOVA procedure was adopted. Each auditor-subject's ω^2 statistics were ranked in order of magnitude, and these rankings were then used to determine whether the auditor-subject's ω^2 statistics were identical. The null hypothesis that all populations (ω^2 statistics) within a block (auditor-subject) are identical was rejected at the 0.0001 level of significance. It is, therefore, reasonable to conclude that at least one main effect tended to yield larger values than at least one other main effect. The findings reported here are consistent with those of the prior studies reported by Solomon and Shields (1995), in which auditor-judges had statistically significant different patterns in cue usage.

In summary, the ω^2 statistics indicate that the five within-subjects variables were utilized in the following order of magnitude (from highest to lowest): (1) control risk, (2) auditor business risk, (3) inherent risk, (4) desired audit risk and (5) planning materiality. A comparison of the findings in Table 6.2, which reported the significant main effects by auditor, supports this order of cue utilization. When aggregated, the five main effects explained an average of 66.71 percent of the variance in the dependent variable, the planned extent of audit evidence. Since the results reported here suggest that there is a wide degree of variability in auditor judgement, the inter-auditor consistency (consensus) measure, which focuses on the differences in auditor judgement, is examined in the following section.

6.4 INTER-AUDITOR CONSISTENCY (CONSENSUS)

As Table 6.6 shows, the mean Pearson's correlation, which reflects the overall consensus (see Section 4.8.3 for definition), was 0.50. This degree of consensus is moderate when compared with the unweighted average consensus of 0.59 for the prior judgement-related studies reported by Solomon and Shields (1995). The mean consensus for individual auditor-subjects ranged from a high value of 0.68 to a low value of -0.57 and were all positive except for Subject 72. Table 6.7 presents the frequency distribution of the 3081 pairwise correlation coefficients, which were obtained by computing the Pearson's correlation for each pair of the 79 auditor-subjects. Thirty-eight percent of the correlations were greater than 0.60, and a total of 186 correlations (6 percent of all correlations) were negative.

An examination of the individual correlation coefficients shows that 108 of the 186 (58 percent) negative correlations were related to two auditor-subjects, i.e., Subjects 72 and 79. All the 78 correlations of Subject 72 were negative, and most of them were highly negative. Specifically, all the 40 negative correlations that were greater than -0.40, and 10 of the 12 negative correlations that were between -0.30 and -0.39 were related to Subject 72. This is consistent with the subject's mean correlation of -0.57, as shown in Table 6.6. The other auditor-subject, Subject 79, also had 31 negative correlations. If all the correlations relating to Subjects 72 and 79 were excluded from the computation of the overall mean correlation, the overall consensus would have been increased to approximately +0.54 from the current overall consensus of +0.50.

Table 6.6

**Inter-Auditor Judgement Consensus:
Mean Pearson's Correlation Coefficients By Auditor**

Auditor	Mean[a]	Auditor	Mean	Auditor	Mean
1	0.48	31	0.39	61	0.55
2	0.59	32	0.56	62	0.47
3	0.47	33	0.51	63	0.53
4	0.51	34	0.18	64	0.44
5	0.48	35	0.22	65	0.51
6	0.68	36	0.52	66	0.65
7	0.57	37	0.37	67	0.44
8	0.59	38	0.31	68	0.57
9	0.54	39	0.45	69	0.51
10	0.63	40	0.47	70	0.54
11	0.55	41	0.46	71	0.60
12	0.58	42	0.44	72	-0.57
13	0.65	43	0.35	73	0.21
14	0.49	44	0.44	74	0.55
15	0.49	45	0.56	75	0.54
16	0.68	46	0.57	76	0.57
17	0.60	47	0.57	77	0.54
18	0.63	48	0.23	78	0.55
19	0.64	49	0.41	79	0.02
20	0.59	50	0.53	Average	0.50
21	0.65	51	0.53		
22	0.66	52	0.59		
23	0.58	53	0.47		
24	0.63	54	0.45		
25	0.56	55	0.51		
26	0.58	56	0.65		
27	0.52	57	0.50		
28	0.59	58	0.65		
29	0.56	59	0.16		
30	0.50	60	0.60		

[a] The mean correlation coefficients are measures of individual correlational consensus on a pairwise basis. That is, for each subject the mean correlation is the mean of correlation coefficients with each of the other 78 subjects. Fisher's z-transformation was used in calculating the mean coefficients.

Table 6.7

**Inter-Auditor Judgement Consensus:
Frequency Distribution of Pearson's Correlation Coefficients**

Correlation Coefficients	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0.90 - 1.00	9	0.3	9	0.3
0.80 - 0.89	163	5.3	172	5.6
0.70 - 0.79	441	14.3	613	19.9
0.60 - 0.69	565	18.3	1178	38.2
0.50 - 0.59	527	17.1	1705	55.3
0.40 - 0.49	425	13.8	2130	69.1
0.30 - 0.39	291	9.4	2421	78.6
0.20 - 0.29	216	7.0	2637	85.6
0.10 - 0.19	158	5.1	2795	90.7
0.00 - 0.09	100	3.2	2895	94.0
-0.01 - -0.09	58	1.9	2953	95.8
-0.10 - -0.19	30	1.0	2983	96.8
-0.20 - -0.29	26	0.8	3009	97.7
-0.30 - -0.39	13	0.4	3022	98.1
-0.40 - -0.49	7	0.2	3029	98.3
-0.50 - -0.59	12	0.4	3041	98.7
-0.60 - -0.69	29	0.9	3070	99.6
-0.70 - -0.79	5	0.2	3075	99.8
-0.80 - -0.89	5	0.2	3080	100.0
-0.90 - -1.00	1	0.0	3081	100.0

Kendall's coefficient of concordance (W) was then used as an alternate technique to the Pearson's r. Kendall's W for the 79 auditor-subjects was calculated as 0.4552, which was large enough to reject the null hypothesis that the auditor-subjects' sets of ranking were not associated at the 0.0001 level of significance. This statistically significant result suggests that the auditor-subjects had some agreement in ranking the importance of the cues even though they had different backgrounds, thus providing support for the proposed evidential planning model of auditors as being a stable model.

A further analysis of the correlation matrix shows that the wide diversity in correlation coefficients suggested by the +0.50 moderate level of consensus was not random. A cluster analysis[1] was therefore performed to group the auditor-subjects into seven smaller but more similar groups according to their cue utilizations. Table 6.8, which provides information on the characteristics of the clusters formed, reveals the following:

1) Cluster No. 1, which consisted of eight auditor-subjects, was characterized by high usage of the auditor business risk variable and low usage of the other variables. The extremely high intra-cluster consensus of 0.96 resulted from the very high cue utilization coefficients for the

[1] A cluster analysis is a method that can be used to group items or observations based on similarities of these items or observations. Everitt (1977), Johnson and Wichern (1982), and SAS (1992) discuss the cluster analysis method in more detail.

Table 6.8

Auditor-Subjects By Cluster

Cluster Number	Auditors Number	Intra-Cluster Consensus			ω^2 Mean	Low	High
1	8, 10, 20, 30, 31 32, 63, 64	0.96	A[a]	=	52.81	23.81	91.90
			C[b]	=	9.05	0.00	24.82
			D[c]	=	1.56	0.00	6.49
			I[d]	=	5.90	0.00	16.51
			P[e]	=	0.07	0.00	0.46
2	2, 11, 15, 17, 27 37, 39, 43, 44, 45 51, 52, 58, 61, 62 65, 66, 69, 72, 77	0.94	A	=	4.34	0.00	14.08
			C	=	42.95	25.45	67.17
			D	=	2.65	0.00	10.24
			I	=	13.41	0.00	33.45
			P	=	2.80	0.00	10.24
3	25, 26, 29, 34, 35 36, 38, 41, 48, 67 74	0.82	A	=	8.18	0.00	19.61
			C	=	10.00	0.00	23.40
			D	=	31.72	18.47	57.95
			I	=	4.35	0.00	10.02
			P	=	2.71	0.00	11.79
4	6, 16, 19, 23, 28 33, 40, 47, 49, 50 57, 59, 60, 70, 75	0.85	A	=	10.92	0.00	27.71
			C	=	15.49	0.00	33.03
			D	=	3.85	0.00	17.70
			I	=	39.11	21.50	92.78
			P	=	4.45	0.00	17.70

[a] A = Auditor business risk
[b] C = Control risk
[c] D = Desired audit risk
[d] I = Inherent risk
[e] P = Planning materiality

Table 6.8 (continued)

Cluster Number	Auditors Number	Intra-Cluster Consensus			ω^2 Mean	Low	High
5	3, 14, 42, 53, 55	0.73	A[a]	=	15.42	5.76	33.92
			C[b]	=	4.15	0.00	11.38
			D[c]	=	10.27	2.63	17.92
			I[d]	=	19.68	10.74	23.25
			P[e]	=	22.77	20.31	25.16
6	1, 4, 5, 7, 24 54, 76, 78	0.89	A	=	32.57	26.88	44.50
			C	=	5.78	0.00	16.68
			D	=	26.15	16.68	42.68
			I	=	4.29	0.00	10.50
			P	=	0.68	0.00	3.25
7	9, 12, 13, 18, 21 22, 46, 56, 68, 71, 73, 79	0.48	A	=	13.96	0.00	28.51
			C	=	18.30	0.00	32.19
			D	=	15.29	0.00	26.52
			I	=	12.76	0.00	32.25
			P	=	2.68	0.00	8.88

[a] A = Auditor business risk
[b] C = Control risk
[c] D = Desired audit risk
[d] I = Inherent risk
[e] P = Planning materiality

auditor business risk variable. In particular, the ω^2 statistics amounted to an average of 52.81 percent, and ranged from a high value of 91.90 percent to a low value of 23.81 percent.

2) Cluster No. 2 consisted of 20 auditors and was characterized by high cue utilizations for the control risk variable (mean ω^2 = 42.95 percent), moderate cue utilizations for the inherent risk variable (mean ω^2 = 13.41 percent), and low cue utilizations for the other variables. The intra-cluster consensus for this cluster amounted to 0.94.

3) Cluster No. 3 consisted of 11 auditor-subjects with high cue utilizations for the desired audit risk variable. The mean ω^2 statistic was 31.72 percent, while the other variables' mean ω^2 statistics were not greater than 10.00 percent. The intra-cluster consensus for Cluster No. 3 was 0.82.

4) Cluster No. 4 consisted of 15 auditor-subjects and was characterized by high cue utilizations for the inherent risk variable, moderate cue utilizations for the control risk variable and low cue utilizations for other variables. The mean ω^2 statistics for the control risk and inherent risk variable were 39.11 percent and 15.49 percent, respectively. The intra-cluster consensus was 0.85.

5) Cluster No. 5 only had five auditor-subjects and was characterized by relatively higher cue utilizations for the inherent risk variable (mean ω^2 = 19.68 percent) and planning materiality (mean ω^2 = 22.77 percent). The cluster was also characterized by moderate cue utilizations for the auditor business risk variable (mean ω^2 = 15.42 percent). The intra-cluster consensus was 0.73.

6) In Cluster No. 6, there were eight auditor-subjects. This cluster was characterized by high cue utilizations for the auditor business risk and desired audit risk variables. The mean cue utilization coefficients for the auditor business risk variable amounted to 32.57 percent, and the lowest ω^2 statistic for this variable amounted to 26.88 percent. The mean cue utilization coefficients for the desired audit risk variable was 26.15 percent and the lowest ω^2 statistic for this variable was 16.68 percent. The intra-cluster consensus for this cluster was 0.89.

7) Cluster No. 7 consisted of 12 auditors, who utilized all the variables except for the planning materiality variable to a moderate extent. The highest ω^2 statistic for the planning materiality variable in this cluster was only 8.88 percent, and the mean ω^2 statistic was only 2.68 percent. All other variables had moderate mean cue utilizations, and the intra-cluster consensus of this cluster was the lowest, 0.48.

Table 6.9 reports the Kendall's W values computed for each of the seven clusters. The null hypothesis that no agreement exists within each cluster was rejected for all clusters. The level of significance ranged from a high value of 0.0079 to a low value of 0.0001. This finding suggests that some agreement existed among the auditor-subjects in their cue utilization coefficients.

Table 6.9

Inter-Auditor Judgement Consensus: Kendall's W

	N	Kendall's W	Significance
Cluster 1	8	0.7560	0.0001
Cluster 2	20	0.6968	0.0001
Cluster 3	11	0.6292	0.0001
Cluster 4	15	0.7301	0.0001
Cluster 5	5	0.6907	0.0079
Cluster 6	8	0.8417	0.0001
Cluster 7	12	0.4403	0.0003

In summary, this research study describes the judgement strategies of auditors by clustering them into seven more homogeneous groups based upon the similarity of their cue utilization coefficients. Five of those seven clusters displayed very high, i.e., greater than 80 percent, intra-cluster consensus, thus lending further support to the strength of agreement among different auditors from different firms. Nevertheless, the basis for the similarities of cue utilizations within a single cluster of auditor-subjects cannot be inferred without further research, even though the reasons for the clustering of the auditor-subjects are known, i.e., similar patterns of cue utilization[2],

Another approach is to group the auditors by the between-subjects variables.[3] For this purpose, Table 6.10 reveals that auditors of structured and unstructured firms exhibited different mean Pearson's correlation coefficients at the 0.05 level of significance. In particular, auditors of structured firms displayed a much higher consensus, i.e., 0.55, than that of auditors of unstructured firms, i.e., 0.45. This suggests that if judgement consensus is a good proxy for accuracy as suggested by Ashton (1985), then it would be beneficial for an unstructured firm to adopt a more structured audit approach. Of course, changing the firm's audit approach is a major matter, and the pertinent costs of time, effort, firm reputation and staff motivation need to be

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[2] Subsection 4.9.1, "The Judgement Process", provides a more general discussion of this limitation.

[3] Judgement consensus by more than one between-subjects variable are not reported here because all those interactions remain insignificant at the 0.05 level of significance.

considered. Finally, Table 6.10 also reveals that there is no difference in judgement consensus between auditors with high or low levels of tolerance for ambiguity (0.50 versus 0.53) and between auditors with high or low degrees of risk-aversion (0.51 versus 0.55). This completes the analysis of the judgement consensus. The following section discusses another measure of consistency, i.e., auditor stability.

Table 6.10

Inter-Auditor Judgement Consensus:
Mean Pearson's Correlation Coefficients By Between-Subjects Variables

Variable	Treatment Level 1		Treatment Level 2		Level of Significance
	Name	Mean Correlation Coefficients	Name	Mean Correlation Coefficients	
Aud_Stru[a]	Structured	0.55	Unstructured	0.45	0.05
TA[b]	Low	0.53	High	0.50	NS[d]
Risk[c]	Low Risk-averse	0.55	High Risk-averse	0.51	NS

[a] Aud_Stru = Audit structure
[b] TA = Tolerance for ambiguity
[c] Risk = Auditor risk attitude
[d] Not significant at the 0.05 level of significance

6.5 INTRA-AUDITOR CONSISTENCY (STABILITY)

The second consistency measure used in this research study is auditor stability (see Section 4.8.3 for definition). Table 6.11 presents a summary of the Pearson's correlation coefficients between the original and duplicate cases for all auditors. The mean Pearson's correlation coefficients of all auditor-subjects was 0.58. The stability correlations ranged from a high of 1.00 (six auditors) to a low of -0.97 (one auditor). A total of three auditor-subjects had highly negative measures of stability, which suggests that their responses to the duplicate cases were strongly, but inversely, related to their responses to the same original cases. These highly negative correlations in some way account for the low degree of stability reported in this research study when compared to the unweighted average stability of 0.86 reported by Solomon and Shields (1995). While the stability measure is relatively lower than those of the prior studies, an examination of Table 6.11 reveals that about 65 percent of the auditors' stability correlations were at a level of 0.50 or greater, suggesting that at least a moderate degree of stability does exist in the evidential planning decisions of auditors.

Table 6.11

Auditor Stability:
Frequency Distribution of Correlation Coefficients

Correlation Coefficients: Class Interval	Pearson's (r) Number of Auditors	Pearson's (r) Percent	Spearman's (r_s) Number of Auditors	Spearman's (r_s) Percent
0.90 - 1.00	14	18.92	16	21.62
0.80 - 0.89	10	13.52	12	16.22
0.70 - 0.79	9	12.17	5	6.76
0.60 - 0.69	7	9.46	2	2.70
0.50 - 0.59	8	10.81	11	14.87
0.40 - 0.49	3	4.05	3	4.05
0.30 - 0.39	3	4.05	4	5.41
0.20 - 0.29	4	5.41	7	9.46
0.10 - 0.19	2	2.70	0	0.00
0.00 - 0.09	4	5.41	4	5.41
-0.00 - -0.09	1	1.35	1	1.35
-0.10 - -0.19	1	1.35	1	1.35
-0.20 - -0.29	0	0.00	1	1.35
-0.30 - -0.39	2	2.70	3	4.05
-0.40 - -0.49	1	1.35	1	1.35
-0.50 - -0.59	2	2.70	0	0.00
-0.60 - -0.69	0	0.00	0	0.00
-0.70 - -0.79	0	0.00	0	0.00
-0.80 - -0.89	2	2.70	2	2.70
-0.90 - -1.00	1	1.35	1	1.35
Total	74[a]	100.00	74	100.00

[a] Five subjects' correlations could not be determined because they indicated the same response scale for all four cases.

Table 6.11 also summarizes the Spearman's rank-order correlation coefficients between the original and duplicate cases for all auditors. The mean Spearman's correlations of all auditor-subjects was 0.49. These correlations ranged from a high of 1.00 (ten auditors) to a low of -0.95 (one auditor). Similar to the reported Pearson's correlations, a total of three auditor-subjects had highly negative measures of stability and about 62 percent of the auditors' stability correlations were at a level of 0.50 or greater.

Further, Table 6.12 presents the results of auditor stability by the three between-subjects variables. Unlike judgement consensus, auditors of structured and unstructured firms did not differ in degrees of stability. Table 6.12 also reveals that there exist no difference in stability between auditors with high or low levels of tolerance for ambiguity or between auditors with high or low degrees of risk-aversion.

Table 6.12

Intra-Auditor Judgement Stability:
Mean Pearson's Correlation Coefficients By Between-Subjects Variables

Variable	Treatment Level 1		Treatment Level 2		Level of Significance
	Name	Mean Correlation Coefficients	Name	Mean Correlation Coefficients	
Aud_Stru[a]	Structured	0.55	Unstructured	0.61	NS[d]
TA[b]	Low	0.68	High	0.51	NS
Risk[c]	Low Risk-averse	0.49	High Risk-averse	0.64	NS

[a] Aud_Stru = Audit structure
[b] TA = Tolerance for ambiguity
[c] Risk = Auditor risk attitude
[d] Not significant at the 0.05 level of significance

The final measure of auditors' judgement stability is the number of deviations of response scale categories for each auditor-subject's duplicate responses. These deviations are summarized in Table 6.13, which shows that the 316 possible pairs of responses (4 cases per each of the 79 auditor-subjects), 125 were identical while an additional 126 differed by only a single category. In summary, about 80 percent (251 of 316) and 91 percent (287 of 316) of the possible pairs of responses differed by no more than one and two categories, respectively. This finding lends further support to the conclusion that at least a moderate degree of stability exists in auditors' planning decisions.

Table 6.13

Auditor Stability:
Deviations of Auditor-Subject Responses
to the Planned Extent of Audit Evidence

Number of Categories	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0	125	39.6	125	39.6
1	126	39.9	251	79.4
2	36	11.4	287	90.8
3	14	4.4	301	95.3
4	11	3.5	312	98.7
5	1	0.3	313	99.1
6	2	0.6	315	99.7
7	1	0.3	316	100.0

In conclusion, the auditor-subjects, with at least a moderate degree of stability in their planning decisions, were consistent in answering the detailed questions of the questionnaire of the field experiment. This finding lends support to the validity of the proposed evidential planning model because the model is likely to be independent of differences in time. Besides consensus and stability, this research study also evaluates judgement quality in terms of self-insight. The next section presents and discusses the results of the self-insight measure.

6.6 AUDITOR SELF-INSIGHT

Table 6.14 presents a summary of auditors' self-insight indices (see Section 4.8.3 for definition). The mean Pearson's correlations of all auditor-subjects was 0.64. The self-insight correlations were widely distributed, ranging from a high value of 1.00 to a low value of -0.86. Only one auditor-subject had a negative self-insight that was greater than -0.50, and approximately 61 percent of the auditors had self-insight indices that were at a level of 0.60 or greater. Although the degree of self-insight reported here is lower than the unweighted average of 0.73 in the seven studies reported by Solomon and Shields (1995), it still remains inside the range of self-sight of those studies, i.e. from 0.53 to 0.89.

Table 6.14

**Auditor Self-Insight:
Frequency Distribution of Correlation Coefficients**

Correlation Coefficients: Class Interval	Pearson's (r) Number of Auditors	Pearson's (r) Percent	Spearman's (r_s) Number of Auditors	Spearman's (r_s) Percent
0.90 - 1.00	12	15.79	11	14.47
0.80 - 0.89	8	10.53	12	15.79
0.70 - 0.79	16	21.05	10	13.16
0.60 - 0.69	10	13.16	9	11.84
0.50 - 0.59	3	3.95	4	5.26
0.40 - 0.49	2	2.63	4	5.26
0.30 - 0.39	1	1.32	5	6.58
0.20 - 0.29	4	5.26	3	3.95
0.10 - 0.19	5	6.58	0	0.00
0.00 - 0.09	2	2.63	3	3.95
-0.00 - -0.09	2	2.63	3	3.95
-0.10 - -0.19	3	3.95	2	2.63
-0.20 - -0.29	2	2.63	3	3.95
-0.30 - -0.39	2	2.63	3	3.95
-0.40 - -0.49	3	3.95	1	1.32
-0.50 - -0.59	0	0.00	2	2.63
-0.60 - -0.69	0	0.00	0	0.00
-0.70 - -0.79	0	0.00	0	0.00
-0.80 - -0.89	1	1.32	1	1.32
-0.90 - -1.00	0	0.00	0	0.00
Total	76[a]	100.00	76	100.00

[a] Three subjects' correlations could not be determined because they allocated same points to the five within-subjects variables or their ω^2 statistics for the five within-subjects variables were the same.

It, thus, appears that a moderate degree of self-insight exist in the evidential planning decisions of auditors. This result further lends support to the validity of the proposed evidential planning model because the input data to the model were likely reasonably accurate as the auditor-subjects knew and understood what they were responding to when confronted by the detailed questions of the questionnaire of the field experiment.

Table 6.14 also provides a summary of the auditor self-insight variable using Spearman's rank order correlation coefficients. The mean Spearman's correlations of all auditor-subjects was 0.47. These correlations was also widely distributed, ranging from a high of 1.00 to a low of -0.82. One auditor-subject had a highly negative Spearman's correlation of -0.82 and this was the same subject who had a highly negative Pearson's correlation. More than 55 percent of the auditors' self-insight indices were at a level of 0.60 or greater. These findings, therefore, support the results of the parametric Pearson's r.

Finally, Table 6.15 presents the results of the auditor self-insight variable by between-subjects variables. The table reveals that auditors of the structured firms had a slightly higher mean self-sight of 0.65 than that of auditors from unstructured firms, i.e. 0.63, but this difference remained insignificant at the 0.05 level. Also, auditors with a low level of tolerance of ambiguity displayed higher mean self-sight than auditors with a high level of tolerance of ambiguity, but the difference, i.e. 0.06, was insignificant at the 0.05 level. Further, auditors with high degrees of risk-aversion exhibited similar mean self-insight when compared with auditors with low degrees of risk-averse (0.68 versus 0.66). These results add strength to the proposed evidential planning model because the reasonably good quality of input data to the model, as suggested earlier, is likely to be independent of differences in subjects' levels of tolerance for ambiguity and risk-aversion and in CPA firms' levels of audit structure.

Table 6.15

Auditor Self-Insight:
Mean Pearson's Correlation Coefficients By Between-Subjects Variables

Variable	Treatment Level 1		Treatment Level 2		Level of Significance
	Name	Mean Correlation Coefficients	Name	Mean Correlation Coefficients	
Aud_Stru[a]	Structured	0.65	Unstructured	0.63	NS[d]
TA[b]	Low	0.67	High	0.61	NS
Risk[c]	Low Risk-averse	0.66	High Risk-averse	0.68	NS

[a] Aud_Stru = Audit structure
[b] TA = Tolerance for ambiguity
[c] Risk = Auditor risk attitude
[d] Not significant at the 0.05 level of significance

6.7 A COMPARISON WITH PRIOR STUDIES

In order to shed additional light on the results of this study, Table 6.16 presents a comparison of this study and related prior studies. Previous US studies by Ashton (1974a, 1974b), Ashton and Brown (1980), and Gaumnitz et al. (1982) reported much higher judgement consensus, stability and self-insight in their studies relating to evaluation of the effectiveness of a system of internal controls (i.e., control risk), while other researchers such as Joyce (1976) and Strawser (1985) reported lower consensus and self-insight. Trotman and Yetton (1985) in an Australian study reported judgement consensus of 0.70 and 0.79, respectively, for the audit supervisor and manager groups in their study of evaluating internal control effectiveness. One possible explanation for these differences relates to the different nature of the judgement tasks being studied. Studies relating to evaluation of the effectiveness of a system of internal controls reported relatively higher levels of consistency indices than studies relating to audit planning. It should be noted that evaluation of internal controls is a more well-defined, i.e., a less complex, audit task than making decisions on the extent of audit testing. It is relatively easier for auditors to agree on the strength of internal controls of a subsystem, but they might disagree on how much audit work should be performed. In addition, the professional standards allow the auditors to exercise a great deal of professional judgements in designing an appropriate audit strategy to obtain sufficient competent audit evidence to support their opinions. As the results of a cluster analysis in Section 6.4 indicate, auditors appear to give different emphases on the pertinent factors (cues) in determining their audit scope decisions. Grouping the auditors by their cue usages resulted in much higher consensus than those reported in prior studies.

This study provides further evidence that auditors of structured firms display higher judgement consensus than auditors of unstructured firms in an audit planning task involving planning materiality and various risk factors. This finding is consistent with English (1989), but not with King (1988). One possible explanation relates to the experimental task employed in King's (1988) study. In particular, auditors may not be too diverse in their judgements on estimating planned materiality thresholds under three different income levels since a sizable portion of prior studies have already shown that the income effect is the most significant factor in determining the evaluation materiality threshold. None of King (1988) and English (1989) examined judgement stability and self-insight. This study provides evidence that auditors of structured and unstructured firms did not differ in judgement stability and self-insight. Unlike prior studies, this research also evaluated the relationships between judgement consistency and auditors' personality types, and have found no statistically significant relationship.

Table 6.16

Judgement Consistency
A Comparison with Prior Studies

Study	Country	Subjects	Task	Variables	Results
This study	Hong Kong	79 auditors with an average of 6.5 years (range 3-14) auditing experience	To determine the planned extent of audit evidence for a hypothetical audit client	Inherent risk Control risk Desired audit risk Auditor business risk Planning materiality Audit structure Tolerance for Ambiguity Auditor risk attitude	Consensus: Overall = 0.50 Structured firms = 0.55 Unstructured firms = 0.45 Low TA = 0.53 High TA = 0.50 Low risk-averse = 0.55 High risk-averse = 0.51 Stability: Overall = 0.58 Structured firms = 0.55 Unstructured firms = 0.61 Low TA = 0.68 High TA = 0.51 Low risk-averse = 0.49 High risk-averse = 0.64 Self-insight: Overall = 0.64 Structured firms = 0.65 Unstructured firms = 0.63 Low TA = 0.67 High TA = 0.61 Low risk-averse = 0.66 High risk-averse = 0.68

Table 6.16 (continued)

Study	Country	Subjects	Task	Variables	Results
Ashton (1974a, 1974b)	US	63 auditors with 2-3 years of auditing experience	Evaluate the strength of a payroll system based on six control cues.	Control risk	Average consensus = 0.70 Average stability = 0.81 Average self-insight = 0.89 Total ω^2 for six main effects = 80.2% Total ω^2 for the two separation of duties cues = 51.4%
Joyce (1976)	US	35 auditors with an average of 6.7 years (range 3-25) auditing experience	Estimate planned audit hours for accounts receivable using five cues.	Control risk	Average consensus = 0.37 Average stability = 0.86 Average self-insight = 0.53 Total ω^2 for five main effects = 74.7% Total ω^2 for the two separation of duties cues = 28.1% Auditors planned to perform more audit work at high control risk than at low control risk.
Ashton and Brown (1980)	US	31 auditors with 1-3 years of auditing experience	Extend Ashton (1974a) payroll internal control task by adding two new internal control cues.	Control risk	Average consensus = 0.67 Average stability = 0.91 Average self-insight = 0.86 Total ω^2 for eight main effects = 71.9% Total ω^2 for the three separation of duties cues = 50.9%
Gaumnitz et al. (1982)	US	35 auditors with a median auditing experience of 2.5 years (range 1-20)	Evaluate the strength of internal controls and estimate the planned audit hours for accounts receivable using five cues.	Control risk	Internal control consensus = 0.70 Audit hours consensus = 0.62

Table 6.16 (continued)

Study	Country	Subjects	Task	Variables	Results
Messier (1983)	US	29 audit partners	Make materiality and disclosure judgements using five financial cues.	Evaluation materiality	Consensus: Materiality judgements = 0.67 Disclosure judgements = 0.67 Self-insight: Materiality judgements = 0.86 Disclosure judgements = 0.85
Strawser (1985)	US	48 auditors with an average of 7 years auditing experience	Assess perceived level of audit risk and estimate planned audit hours for a payroll system.	Algorithmic audit risk Combination of risk model components	Average consensus = 0.45 Average stability = 0.62 Average self-insight = 0.50 Total ω^2 for four main effects = 59.8%
Trotman and Yetton (1985)	Australia	51 seniors and supervisors with an average of 4.6 years auditing experience 24 managers with an average of 8 years auditing experience	Evaluate internal control effectiveness of a computerized payroll system.	Control risk	Consensus: Managers = 0.79 Supervisors = 0.70

Table 6.16 (continued)

Study	Country	Subjects	Task	Variables	Results
King (1988)	US	64 audit managers and partners	Provide estimate of planning materiality using three different income levels.	Planning materiality Audit structure	No statistically significant difference existed in consensus between auditors of structured and unstructured firms
English (1989)	US	69 auditors with an average of 4.3 years (range 3-9) auditing experience	Formulate a materiality threshold (in dollars) for an obsolete inventory problem.	Evaluation materiality Audit structure	Auditors of structured firms exhibited greater judgement consensus under high time pressure than auditors of unstructured firms.

6.8 SUMMARY

This chapter first evaluated the descriptive ability of the individual ANOVAs of auditors. It then discussed the cue utilization of the five within-subjects variables, noting that their main effects accounted for approximately 67 percent of the variance in auditors' planning decisions. The control risk, auditor business risk and inherent risk variables were also noted to have much higher ω^2 values than the remaining two variables. The chapter then evaluated judgement quality in terms of consensus, stability and self-insight. The overall consensus was found to be moderate, and the results suggested that auditors had some agreement in ranking the importance of the cues. In addition, the results of a cluster analysis revealed that five of the seven clusters formed displayed very high, i.e., greater than 80 percent, intra-cluster consensus. Further, auditors of structured and unstructured firms differed in their judgement consensus. There existed no statistically significant difference in consensus between auditors with a high or low tolerance for ambiguity, or between auditors with a high or low degree of risk-aversion. Regarding stability and self-insight, the findings suggested that a moderate degree of consistency exists in the evidential planning decisions of auditors. No differences in consensus, stability and self-insight were noted when the auditors were grouped by audit structure, tolerance for ambiguity or auditor risk attitude. Finally, the results were compared with those of prior studies to provide additional insights. The next chapter will present the conclusion of this research study.

CHAPTER SEVEN

CONCLUSION

7.1 INTRODUCTION

This last chapter presents the conclusions of the findings of this research study. The second section of this chapter summarizes the objectives, motivations and hypotheses of the study originally set forth in Chapters One and Three. Section Three then summarizes the major findings and contributions, and is followed by a presentation of the implications of this research. The fifth section presents suggestions for future research, and the sixth and final section contains a summary of this chapter.

7.2 SUMMARY OF OBJECTIVES, MOTIVATIONS AND HYPOTHESES

The primary objectives of this research study were to determine which significant factors entered into auditors' audit planning decisions, and to explain the reasons for the extent or degree of those decisions. In addition, this study also evaluated the quality of the judgements made in the evidential planning decisions of auditors. Two considerations have motivated this study, the first being the importance of audit planning and the need to understand and evaluate auditors' evidential planning decisions where clearly judgement, rather than adhering to rules, plays a major role. Audit planning is a very important aspect of the audit process, and proper audit planning is essential to enable auditors to obtain sufficient competent audit evidence to support their opinions, to allow them to remain competitive by keeping their audit costs reasonable, and to assure them that there will not be any misunderstanding with clients. Since most of prior studies were conducted in the US and UK, the evidence reported here constituted a useful addition to the auditing literature, particularly in terms of the international aspects of auditing practice and the implementation of international auditing standards.

Since the evaluation of auditors' planning decisions would be incomplete without an examination of the quality of judgement, the second motivation of this study was the need to evaluate the quality of auditor judgements in arriving at those decisions. In auditing, there exist no precise guidelines for information collection and evaluation, and therefore professional judgement plays an extremely important and pervasive role in audit planning. Also, assessment of the quality of audit judgement is important because the quality of these judgements greatly affects the extent and quality of the planning decisions. In addition to general auditing theory, such an assessment is an important contribution to the Hong Kong and regional literature since no prior study has rigorously and comprehensively evaluated the quality of audit judgements of Hong Kong auditors.

To achieve the above objectives, this research study developed a comprehensive and integrated evidential planning model to portray the auditing processes of auditors. This behavioral and testable model , as depicted in Figure 2.3, was composed of five independent and three moderating variables. The independent variables, i.e., inherent risk, control risk, desired audit risk, auditor business risk and planning materiality, were predicted to exert direct influences on the degree of auditors' evidential planning decisions, which was operationalized as the dependent variable, the planned extent of audit evidence. The moderating variables, i.e., audit structure, TA and auditor risk attitude, were predicted to moderate the relationships between the independent variables and the evidential planning decisions of auditors. Fifteen hypotheses were then developed to empirically test the predictability of this behavioral model. Additionally, this research study described and evaluated the relative importance of these variables in terms of their cue utilization. Further, this study examined three types of judgement consistency, i.e., consensus, stability and self-insight, as measures of judgement quality.

7.3 SUMMARY OF MAJOR FINDINGS AND CONTRIBUTIONS

Using a sample of 79 Hong Kong auditors from Big Six CPA firms answering specific questions, 15 hypotheses were tested by an overall ANOVA model; eight of these hypotheses remained statistically significant at less than the 0.05 level of significance. The first set of significant results concluded that the five independent (all within-subjects) variables were important factors in explaining the evidential planning decisions of auditors, and had the following order of magnitude (from highest to lowest): control risk, inherent risk, auditor business risk, desired audit risk and planning materiality. These variables accounted for about 37 percent of the variations in the evidential planning decisions of auditors. The planned detection risk variable, which is a function of the control risk, inherent risk and desired audit risk variables, also remained significant at the 0.01 level of significance and its ω^2 statistic amounted to 31 percent, lending further support to the predictability of the proposed evidential planning model of this study, as well as the conventional audit risk model.

The second set of significant results related to the indirect effects of the three moderating (all between-subjects) variables, the audit structure, TA and auditor risk attitude variables. Prior studies have not studied the moderating effects of these variables on auditors' evidential planning decisions. The research findings herein reported suggested that the relationship between the auditor business risk variable and auditors' planned extent of audit evidence depended upon the audit structure variable, and that the relationship between the planning materiality variable and auditors' planned extent of audit evidence depended upon the risk attitude of the auditor. The prior research studies also have not examined the joint effects of these three between-subjects variables. The findings of this study showed some interesting results. In particular, the inherent risk variable interacted with the TA and audit structure variables to affect auditors' planning decisions. Similarly the inherent risk variable interacted with the TA and auditor risk attitude variables to affect auditors' planning decisions. The results, thus, provide empirical evidence to support the moderating roles of these factors in the evidential planning decisions of auditors.

Further, in order to provide additional support for the proposed evidential planning model of auditors, individual ANOVAs were also constructed for each auditor-subject. This research study described the relative importance of the five within-subjects variables in terms of their cue utilization, and found that the auditor-subjects, on average, utilized these factors in the following order of magnitude (from highest to lowest): control risk, auditor business risk, inherent risk, desired audit risk and planning materiality. When aggregated, those factors explained an average of about 67 percent of the variance in auditors' planned extent of audit evidence. The cue utilization ranking order of the individual ANOVAs lends further support to the validity of the overall ANOVA model because this order of magnitude is similar to that of the overall model. The only difference is that the rankings for the auditor business risk variable and the inherent risk variable were swapped, i.e., the auditor business risk variable was ranked third in the overall model rather than second as in the individual models, and the inherent risk variable was ranked second in the overall model rather than third as in the individual models. However, the impact of this difference in ranking was minimal because the ω^2 statistics of these two variables only had minor differences.

In summary, this study contributed to the literature by developing a comprehensive and integrated behavioral model that provided a more inclusive and realistic characterization of the evidential planning decisions of auditors. The model made several unique contributions to the literature. It expanded the currently accepted audit risk model by explicitly considering the effects of auditor business risk, and considered both the various risks (inherent risk, control risk, desired audit risk and auditor business risk) and the planning materiality variable in an expanded and integrated model explaining the planning decisions of auditors. Prior studies have only examined one or two variables and their effects on auditors' evidential planning. Also, the behavioral model explicitly considered the moderating effects of a CPA firm's audit structure and the personality of its auditor (TA and attitude to risk) on the evidential planning decisions of auditors by incorporating three new variables.

As mentioned, three aspects of judgement consistency, or judgement quality were examined and evaluated. Regarding judgement consensus, the first evaluation criterion of judgement quality, the overall consensus measure was moderate (mean Pearson's correlations = 0.50), suggesting that auditors had some agreement in ranking the importance of the variables or cues even though they had different backgrounds. A cluster analysis, based on the subjects' cue utilization patterns, was also performed, and the results revealed that five of the seven clusters displayed very high, i.e., greater than 80 percent, intra-cluster consensus, thus lending further support to the strength of agreement among different auditors from different firms. The degree of consensus was also found not to depend upon the personality of the auditor because the findings indicate that auditors with high or low levels of TA or risk-aversion did not differ in judgement consensus. Further, even though auditors of structured firms, on average, had a higher degree of consensus (0.55) than that of unstructured firm auditors (0.45), the degree of both of these consensus measures was still at least moderate.

With respect to stability, the second evaluation criterion of judgement quality, the mean Pearson's correlation coefficients of all auditor-subjects was 0.58, suggesting that a moderate degree of stability existed in the evidential planning decisions of auditors and would not likely change over time. Lending further support to this calculated level of stability is the fact that about 80 percent and 91 percent of the possible deviations of the response scale categories for each subject's duplicate responses differed by no more than one category and two categories, respectively. Also, no difference in stability was noted when auditors were grouped by audit structure, TA or auditor risk attitude. People frequently change their minds, but this did not likely apply to the auditor-subjects of this study because they were consistent in answering the questions of the field experiment. These results further lend support to the validity of the proposed evidential planning model because the model is likely to be independent of differences in time.

Referring to self-insight, the third and final criterion of judgement quality for this study, the mean Pearson's correlations of all subjects was 0.64, and about 61 percent of these correlations were at a level of 0.60 or greater. Therefore, it appears that a moderate degree of self-insight exists in the evidential planning decisions of auditors. This also adds strength to the proposed evidential planning model because the input data to the model were likely to be reasonably accurate as the auditor-subjects knew and understood what they were responding to when confronted by the detailed questions of the questionnaire of the field experiment.

In conclusion, the moderate degrees of judgement consensus, stability and self-insight lend additional support to the validity of the proposed auditors' evidential planning model. Therefore, besides contributing to the understanding of auditing practice generally, the research findings also contributed to the literature regionally by providing knowledge about the judgement quality of Hong Kong auditors, which is important because until now there has existed a lack of a rigorous and comprehensive study examining the quality of audit judgement of Hong Kong auditors. Also, additional results and their implications are discussed in the next section.

7.4 IMPLICATIONS

This research has found that auditors considered auditor business risk as an important independent, and not a moderating, variable that alone had a significant impact on their evidential planning decisions. It is reasonable to infer, therefore, that in addition to considering the component risks of the audit risk model and materiality that are required by Hong Kong professional standards, auditors also consider auditor business risk when determining the extent of audit evidence needed to be performed to satisfactorily complete a particular audit. This finding suggests that auditors are likely to be more prudent (conservative) by performing more audit work when a litigious environment exists. In fact, one policy inference from this study is that it would be beneficial for a CPA firm to establish specific policies or quantitative guidelines to ensure that its partner(s) and audit staff explicitly consider the auditor business risk variable in the audit planning process. Partners realize that their reputation and personal assets can be attached for mistakes committed by themselves or other colleagues under the principles of joint and several liability and unlimited liability, and the audit staff members as well know that their reputations and careers will be at stake if they commit any mistake that can lead to litigation, sanction and/or impaired professional reputation against their CPA firms. The research presented in this study has demonstrated that auditors implicitly consider external business risk as a significant factor determining the extent (cost) of the audit to be conducted. So one important policy outcome of this study is that explicit business risk costs, including the opportunity cost of lost business revenue and personal income, should be assigned to each client in order to more effectively delineate the planned audit costs.

Another policy implication of this study results from the overwhelming significance of the inherent risk, control risk and desired audit risk variables in both the overall and individual ANOVAs. The results not only provide empirical evidence to support the predicted effects of these variables in the evidential planning model developed in this research, but also provide evidence to substantiate the utilization of the conventional audit risk model by auditors in Hong Kong. This conclusion has significant implications for CPA firms and their clients.

Regarding planning materiality, an examination of the individual ANOVAs revealed that this variable was statistically significant in only 17 of the 79 auditor-subjects' ANOVAs, and that it only explained 3.79 percent of the variance in the evidential planning decisions of auditors. This variable's ω^2 value of less than one percent in the overall ANOVA further supports the low cue utilization of the variable by auditors. In spite of professional requirements, which require auditors to consider both audit risk and materiality in planning the audit and in evaluating the results of the audit, the research findings reported here imply that auditors place significantly less emphasis on the planning materiality variable, when compared to the audit risk components (inherent risk and control risk) in the audit planning process. Therefore, it appears that auditors apply the materiality concept mainly during the reporting stage of an audit, i.e., in terms of evaluation materiality, because prior studies do support the significance of the evaluation materiality. One important policy inference from this research finding is that policy makers of CPA firms and/or professional bodies such as the AICPA and the HKSA should provide more specific guidance for and/or educational training to auditors about the concept and application of the planning materiality variable in audit planning if they wish the auditors to assign a more important weight to materiality in their evidential planning decisions.

Also, because this research found that the main effects of audit structure, TA and auditor risk attitude remained statistically insignificant at the 0.05 level, the inference that can be drawn is that these variables should be considered moderating variables. The moderating role of these variables is complex. In some situations, one variable alone will exert a statistically significant moderating influence, as when audit structure alone moderates the relationship between auditor business risk and auditors' planned extent of audit evidence. In other situations, two moderating variables together exert statistically significant impacts, as when TA and audit structure interact to influence the effect of inherent risk on the evidential planning decisions of auditors. Future research should take note of the complex moderating roles of these variables.

This research also evaluated the quality of auditors' judgements and found that auditors of structured and unstructured firms were significantly different in their scores for the judgement consensus measure. In particular, auditors of structured firms exhibited a much higher consensus measure, i.e., 0.55, than that of auditors of unstructured firms, i.e., 0.45. These research findings have a policy implication for unstructured CPA firms. Assuming that judgement consensus is a good proxy for accuracy, as suggested by Libby (1985), it would be beneficial for an unstructured firm to adopt a more structured approach in planning the audit of its clients since it is likely to increase accuracy. However, the costs of such a change in a firm's policies have to be more than offset by the perceived/actual benefits of the change.

The final implication of this research results from the lack of statistically significant difference in judgement consensus, stability and self-insight between auditors (1) with high and low levels of TA, or (2) with high and low degrees of risk-aversion. The implication is that if auditors, under the above circumstances, do not differ in terms of their abilities to reach similar decisions or conclusions regarding the performance of the same task over time (as an indicator of a stable auditor), and regarding their abilities to explain their decision processes to others (as an indication of communication skill), then a CPA firm can accommodate audit staff of different levels of TA or risk-attitude without affecting the level of judgement quality.

7.5 SUGGESTIONS FOR FUTURE RESEARCH

The research study has focused on certain personality attributes of the auditor, but the impact of other individual differences variables such as cognitive style and locus of control could also be evaluated. In addition, the joint effects of the TA and audit structure variables and of the TA and risk attitude variables on other tasks could be investigated in future studies.

Strengthening the corporate governance functions is likely to reduce control risk and thus the planned extent (cost) of audit evidence. Because the Stock Exchange of Hong Kong has increased its governance requirements in some areas and encouraged changes in others, future research testing the impact of such changes on the planned extent of evidence by CPA firms would be useful, particularly since it is also a public policy problem. Also, this research study found three statistically significant interactions between (1) inherent risk and planning materiality, (2) control risk and planning materiality and (3) control risk and auditor business risk. Future studies are needed to substantiate the validity of these interactions.

Because the tested sample was composed of Hong Kong Auditors, another direction of future research relates to culture. The proposed evidential planning model could be extended to include the judgements of auditors with different cultural backgrounds. Since Hong Kong auditors have a heavy UK orientation, it would be useful to explore whether auditors in other regions of the PRC or in other countries such as the US behave in a similar pattern, and to analyze and explain any different rankings of cue utilization. Lastly, this research has examined three types of judgement consistencies, i.e., consensus, stability and self insight, as measures of judgement quality. Future studies could usefully utilize these criteria to evaluate the quality of judgement of other audit tasks, such as different judgement determinations of sample size for a particular audit area.

7.6 SUMMARY

This chapter began with a summary of the objectives, motivations and hypotheses of the research study. The summary of major findings were presented along with a determination of the contributions of this research. This was followed by a discussion of the implications of this study for the auditing profession and policy makers. Lastly, the fifth section presented some suggestions for future research.

BIBLIOGRAPHY

Abdel-Khalik, A. R., D. A. Snowball, and J. H. Wragge. 1983. The Effects of Certain Internal Audit Variables on the Planning of External Audit Programs. *The Accounting Review* 58, no. 2: 215-227.

Akresh, Loebbecke, and Scott. 1988. Audit Approaches and Techniques. In *Research Opportunities in Auditing: The Second Decade*, edited by A. R. Abdel-Khalik and I. Solomon. Sarasota, FL: AAA.

Ameen, E. C., and J. R. Strawser. 1994. Investigating the Use of Analytical Procedures: An Update and Extension. *Auditing: A Journal of Practice and Theory* (Fall): 69-76.

American Institute of Certified Public Accountants. 1981. *Statement on Auditing Standards No.31: Evidential Matter*. AICPA.

__________. 1981. *Statement on Auditing Standards No. 39: Audit Sampling.* AICPA.

__________. 1983. *Statement on Auditing Standards No.47: Audit Risk and Materiality in Conducting an Audit.* AICPA.

__________. 1995. *Codification of Statements on Auditing Standards.* AICPA.

Arens, A., and J. Loebbecke. 1994. *Auditing: An Integrated Approach.* Englewood Cliffs, New Jersey: Prentice Hall.

Aston, A. H. 1985. Does Consensus Imply Accuracy In Accounting Studies of Decision Making? *The Accounting Review* (April): 173-185.

Ashton, R. H. 1974a. An Experimental Study of Internal Control Judgement. *Journal of Accounting Research* (Spring): 143-157.

__________. 1974b. Cue Utilization and Expert Judgements: A Comparison of Independent Auditors with Other Judges. *Journal of Applied Psychology* (August): 437-444.

__________. 1982. *Human Information Processing In Accounting: Studies in Accounting Research.* AAA.

__________. 1983. *Research in Audit Decision Making: Rationale, Evidence, and Implications.* Research Monograph No.6. Vancouver: Canadian Certified General Accountants Research Foundation.

__________, and A. H. Ashton. 1995. *Judgement and Decision-Making Research in Accounting and Auditing.* Cambridge University Press.

__________, and P. R. Brown. 1980. Descriptive Modeling of Auditors' Internal Control Judgements: Replication and Extension. *Journal of Accounting Research* (Spring): 269-277.

__________, and S. S. Kramer. 1980. Students as Surrogates in Behavioral Research: Some Evidence. *Journal of Accounting Research* 18: 1-15.

Bamber, E. M., L. M. Bamber, and M. Schoderbek. 1993. Audit Structure and other Determinants of Audit Report Lag: An Empirical Analysis. *Auditing: A Journal of Practice and Theory* (Spring): 1-23.

__________, and D. Snowball. 1988. An Experimental Study of the Effect of Audit Structure in Uncertain Task Environments. *The Accounting Review* (July): 490-504.

__________, __________, and R. M. Tubbs. 1989. Audit Structure and Its Relation to Role Conflict and Role Ambiguity: An Empirical Investigation. *The Accounting Review* (April): 285-299.

Bedard, J. C. 1989. An Archival Investigation of Audit Program Planning. *Auditing: A Journal of Practice and Theory* (Spring): 57-71.

Biggs, S. F., and T. J. Mock. 1983. An Investigation of Auditor Decision Processes in the Evaluation of Internal Controls and Audit Scope Decisions. *Journal of Accounting Research* (Spring): 234-255.

Blocher, E., R. S. Esposito, and J. J. Willingham. 1983. Auditors' Analytical Review Judgements for Payroll Expense. *Auditing: A Journal of Practice and Theory* (Fall): 75-91.

Boatsman, J. R., and J. C. Robertson. 1974. Policy-Capturing on Selected Materiality Judgements. *The Accounting Review* (April): 342-352.

Bonner, S. E., and N. Pennington. 1991. Cognitive Processes and Knowledge As Determinants of Auditor Expertise. *Journal of Accounting Literature* 10: 1-50.

Bourgeois, L. J. 1985. Strategic Goals, Perceived Uncertainty, and Economic Performance in Volatile Environments. *Academy of Management Journal* (September): 548-573.

Brewer, C. W. 1981. The Nature of Audit Risk Indicators and Their Effect on the Intensity of Audit Work Performed. Ph.D. Dissertation, University of Houston.

Brown, C. E. 1983. Effects of Dynamic Task Environment on the Learning of Standard Cost Variance Significance. *Journal of Accounting Research* 21: 413-431.

__________, and I. Solomon. 1990. Auditor Configural Information Processing in Control Risk Assessment. *Auditing: A Journal of Practice and Theory* (Fall): 17-38.

__________, and __________. 1991. Configural Information Processing in Auditing: The Role of Domain-Specific Knowledge. *The Accounting Review* 66:100-119.

Brumfield, C. A., R. K. Elliott, and P. D. Jacobson. 1983. Business Risk and the Audit Process. *Journal of Accountancy* (April): 60-68.

Budner, S. 1962. Intolerance of Ambiguity as a Personality Variable. *Journal of Personality* (March): 29-50.

Calder, B. J., L. W. Phillips, and A. M. Tybout. 1981. Designing Research for Application. *Journal of Consumer Research* (September): 197-207.

Campbell, D. T., and J. C. Stanley. 1963. *Experimental and Quasi-Experimental Design for Research.* Rand McNally.

Canadian Institute of Chartered Accountants. 1980. *Extent of Audit Testing.* CICA.

Carlston, D., and J. Cohen. 1980. A Closer Examination of Subject Roles. *Journal of Personality and Social Psychology* (June): 857-70.

Chewning, G., K. Pany, and S. Wheeler. 1989. Auditor Reporting Decisions Involving Accounting Principle Changes: Some Evidence On Materiality Thresholds. *Journal of Accounting Research* 27, no. 1: 78-96.

Christ, M. Y. 1993. Evidence on the Nature of Audit Planning Problem Representations: An Examination of Auditor Free Recalls. *The Accounting Review* 68: 304-322.

Clarke, D. A. 1987. An Examination of the Impact of Individual Risk Attitudes and Perceptions on Audit Risk Assessment. Ph.D. Dissertation, University of Wisconsin.

Cochran, W. G., and G. M. Cox. 1992. *Experimental Designs*. John Wiley & Sons.

Cody, R. P., and J. K. Smith. 1987. *Applied Statistics and the SAS Programming Language*. North-Holland.

Cohen, J., and T. Kida. 1989. The Impact of Analytical Review Results, Internal Control Reliability, and Experience on Auditors' Use of Analytical Review. *Journal of Accounting Research* (Autumn): 263-276.

Colbert, J. 1988. Inherent Risk: An Investigation of Auditors' Judgements. *Accounting, Organizations and Society* 13: 111-121.

Cook, T., and D. Campbell. 1979. *Quasi-Experimentation: Design and Analysis Issues for Field Settings*. Boston: Hughton Mifflin.

Cushing, B. E., and L. K. Loebbecke. 1983. Analytical Approaches to Audit Risk: A Survey and Analysis. *Auditing: A Journal of Practice and Theory* (Fall): 23-41.

___________, and ___________. 1986. *Comparison of Audit Methodologies of Large Accounting Firms: Accounting Research Study No.26*. AAA.

Daniel, S. J. 1988. Some Empirical Evidence about the Assessment of Audit Risk in Practice. *Auditing: A Journal of Practice and Theory* (Spring): 174-181.

Dermer, J. D. 1973. Cognitive Characteristics and the Perceived Importance of Information. *The Accounting Review* (July): 511-519.

Dirsmith, M. W., and M. E. Haskins. 1991. Inherent Risk Assessment and Audit Firm Technology: A Contrast in World Theories. *Accounting, Organizations and Society* 16, no.1: 61-90.

___________, and J. P. McAllister. 1982a. The Organic vs. the Mechanistic Audit: Problems and Pitfalls (Part I). *Journal of Accounting, Auditing and Finance* (Spring): 214-228.

___________, and ___________. 1982b. The Organic vs. the Mechanistic Audit: Problems and Pitfalls (Part II). *Journal of Accounting, Auditing and Finance* (Fall): 60-74.

Edwards, W. 1993. Discussion of A Review of the Audit Judgement Symposium: 1983-1992. *Auditing: A Journal of Practice and Theory* (Supplement): 17-20.

Einhorn, H. 1972. Expert Measurement and Mechanical Combination. *Organizational Behaviour and Human Performance* (February): 86-106.

Ekehammar, B. 1974. Interactionism in Personality From A Historical Perspective. *Psychological Bulletin* 81, no.12: 1026-1048.

Elliott, R. K., and J. R. Rogers. 1972. Relating Statistical Sampling to Audit Objectives. *Journal of Accountancy* (July): 46-55.

Emby, C. 1994. Framing and Presentation Mode Effects in Professional Judgement: Auditors' Internal Control Judgements and Substantive Testing Decisions. *Auditing: A Journal of Practice and Theory* (Supplement): 102-115.

English, D. M. 1989. The Influence of Time Pressure, Firm Methodology, and Client Size on Auditors' Materiality Judgements: An Information Acquisition Approach. Ph.D. Dissertation, Indiana University.

Everitt, B. 1977. *Cluster Analysis.* London: Heinemann Education Books.

Eyler, K. S. 1990. An Examination of the Effects of Audit Structure and Group Task Setting on the Materiality Judgements of Auditors. Ph.D. Dissertation, Georgia State University.

Faircloth, A. W., and D. N. Ricchiute. 1981. Ambiguity Intolerance and Financial Reporting Alternatives. *Accounting Organizations and Society* 6, no.1: 53-68.

Farmer, T. A. 1993. Testing the Effect of Risk Attitude on Auditor Judgements Using Multiattribute Utility Theory. *Journal of Accounting, Auditing and Finance* (Winter): 91-100.

Farquhar, P. 1984. Utility Assessment Methods. *Management Science* (November): 1283-1300.

Felix, Jr., W. R., and M. S. Niles. 1988. Research in Internal Control Evaluation. *Auditing: A Journal of Practice and Theory* (Spring): 43-60.

Firth, M. 1979. Consensus Views and Judgement Models in Materiality Decisions. *Accounting, Organizations and Society* 4, no.4: 283-295.

Friedberg, A. H., J. R. Strawser, and J. H. Cassidy. 1989. Factors Affecting Materiality Judgements: A Comparison of Big Eight Accounting Firms' Materiality Views with the Results of Empirical Research. *Advances in Accounting*: 187-201.

Gaumnitz, B. R., T. R. Nunamaker, J. J. Surdick, and M. F. Thomas. 1982. Auditor Consensus in Internal Control Evaluation and Audit Program Planning. *Journal of Accounting Research* (Part II, Autumn): 745-755.

_________, and F. M. Wolf. 1982. Auditors' Subjective Decision Environment: The Case of A Normal External Audit. *The Accounting Review* (January): 105-124.

Gist, W. E. 1994. Empirical Evidence on the Effect of Audit Structure on Audit Pricing. *Auditing: A Journal of Practice and Theory* (Fall): 25-40.

Goldberg, L. R. 1970. Man Versus Model of Man: A Rationale, Plus Some Evidence, For a Method of Improving on Clinical Inferences. *Psychological Bulletin* (June): 422-432.

Grobstein, M., and P. W. Craig. 1984. A Risk Analysis Approach to Auditing. *Auditing: A Journal of Practice and Theory* (Spring): 1-16.

Gul, F. A. 1984. The Joint and Moderating Role of Personality and Cognitive Style on Decision Making. *The Accounting Review* (April): 264-277.

___________. 1986. Tolerance for Ambiguity, Auditors' Opinion, and Their Effects on Decision Making. *Accounting and Business Research* (Spring): 99-106.

___________. 1989. Bankers' Perceptions of Factors Affecting Auditor Independence. *Accounting, Auditing and Accountability Journal*, no.3: 40-51.

___________. 1993. The Interacting Effects of Ambiguity Intolerance and Uncertainty on Subjects' Audit Opinion Preferences. Unpublished Paper, School of Accountancy, The Chinese University of Hong Kong.

___________, and J. S. L. Tsui. 1994. Perceptions of Auditor Independence: The Moderating Role of Personality. *Corporate Governance* (October): 203-210.

___________, and C. A. Windsor. 1994. The Effects of Demand Characteristics in Auditor Independence Studies. *Asia-Pacific Journal of Accounting* (December): 133-146.

Hamilton, R. E., and W. F. Wright. 1982. Internal Control Judgements and Effects of Experience: Replications and Extensions. *Journal of Accounting Research* (Part II, Autumn): 756-765.

Hays, W. L. 1988. *Statistics*. Holt, Rinehart and Winston.

Harsha, P. D., and M. C. Knapp. 1990. The Use of Within- and Between-Subjects: A Methodological Note. *Behavioral Research in Accounting* 2: 50-62.

Haskins, M. E. 1987. Client Control Environments: An Examination of Auditors' Perceptions. *The Accounting Review* (July): 542-563.

Hermanson, H. M. 1993. The Impact of Control Risk and Business Risk on Sample Evidence Evaluation. Ph.D. Dissertation, University of Wisconsin-Madison.

Hicks, E. L. 1974. Standards for the Attest Function. *Journal of Accountancy* 138, no. 2 : 39-45.

Ho, J. L., and W. Rodgers. 1993. A Review of Accounting Research on Cognitive Characteristics. *Journal of Accounting Literature* 12: 101-130.

Hoffman, P. J., P. Slovic, and L. G. Rorer. 1968. An Analysis of Variance Model for the Assessment of Configural Cue-Utilization in Clinical Judgement. *Psychological Bulletin* (May): 338-349.

Hong Kong Society of Accountants. 1995. Briefing Paper - Incorporation of CPA Practices. HKSA .

___________. 1996. *Members' Handbook*. HKSA.

Houghton, C., and J. Fogarty. 1991. Inherent Risk. *Auditing: A Journal of Practice and Theory* (Spring): 1-21.

Huang, A. R. 1992. An Integrated Human Information Processing Study of Managers' and Auditors' Decisions on Foreign Currency Translation Methods. Ph.D. Dissertation, Griffith University.

Huber, G. 1980. *Managerial Decision Making*. Scott Foresman.

Hylas, R. E., and A. H. Ashton. 1982. Audit Detection of Financial Statement Errors. *The Accounting Review* (October): 751-765.

Icerman, R. C., and W. A. Hillison. 1990. Distribution of Audit-Detected Errors Partitioned by Internal Control. *Journal of Accounting, Auditing and Finance* (Fall): 527-544.

___________, and ___________. 1991. Disposition of Audit-Detected Errors: Some Evidence on Evaluative Materiality. *Auditing: A Journal of Practice and Theory* (Spring): 22-34.

Jiambalvo, J., and W. Waller. 1984. Decomposition and Assessments of Audit Risk. *Auditing: A Journal of Practice and Theory* (Spring): 80-88.

Joyce, E. J. 1976. Expert Judgement in Audit Program Planning. *Journal of Accounting Research* (Supplement): 29-60.

________, and R. Libby. 1982. Behavioral Research in Audit Decision Making. *Journal of Accounting Literature* (Spring): 103-123.

Kahneman, D., and A. Tversky. 1979. Prospect Theory: An Analysis of Decision Under Risk. *Econometrica* 47 (March): 263-91.

Kaplan, S. 1985. An Examination of the Effects of Environment and Explicit Internal Control on Planned Audit Hours. *Auditing: A Journal of Practice and Theory* (Fall): 12-25.

__________, K. Menon, and D. D. Williams. 1990. The Effect of Audit Structure on the Audit Market. *Journal of Accounting and Policy* 9: 197-215.

__________, and P. J. Reckers. 1984. An Empirical Examination of Auditors' Initial Planning Processes. *Auditing: A Journal of Practice and Theory* (Fall): 1-19.

Keppel, G. 1991. *Design and Analysis: A Researcher's Handbook.* Englewood Cliffs, New Jersey: Prentice Hall.

Kerlinger, F. N. 1986. *Foundations of Behavioral Research.* Holt, Rinehart and Winston.

Khalifa, Z. M. 1992. The Impact of the Financial Condition of the Firm on Auditors' Materiality/ Disclosure Judgements: An Experimental Study. Ph.D. Dissertation, Rutgers The State University of New Jersey.

Kim, D. C. 1992. Risk Preferences in Participative Budgeting. *The Accounting Review* 67 (April): 303-18.

King, J. B. 1988. Individual and Team Planning Materiality Judgements in Structured and Unstructured Accounting Firms. Ph.D. Dissertation, Indiana University.

Kinney, W. R. 1979. Integrating Audit Tests: Regression Analysis and Partitioned Dollar Unit Sampling. *Journal of Accounting Research* (Autumn): 456-476.

___________. 1983. A Note on Compounding Probabilities in Auditing. *Auditing: A Journal of Practice and Theory* (Spring): 13-22.

___________. 1986. Audit Technology and Preferences for Auditing Standards. *Journal of Accounting and Economics* (March): 73-89.

Kreutzfeldt, R., and W. Wallace. 1986. Error Characteristics in Audit Populations: Their Profile and Relationship to Environmental Factors. *Auditing: A Journal of Practice and Theory* (Fall): 20-43.

__________, and __________. 1990. Control Risk Assessments: Do They Relate To Errors? *Auditing: A Journal of Practice and Theory* (Supplement): 1-48.

Krogstad, I. L., R. T. Ettenson, and J. Shanteau. 1984. Context and Experience in Auditors' Materiality Judgements. *Auditing: A Journal of Practice and Theory* (Fall): 54-73.

Libby, R. 1979. The Impact of Uncertainty Reporting on the Loan Decision. *Journal of Accounting Research* (Supplement): 35-57.

________. 1981. *Accounting and Human Information Processing: Theory and Applications*. Englewood Cliffs, New Jersey: Prentice-Hall, Inc.

________, J. Artman and J. Willingham. 1985. Process Susceptibility, Control Risk, and Audit Planning. *The Accounting Review* (April): 212-230.

________, and P. A. Libby. 1989. Expert Measurement and Mechanical Combination in Control Reliance Decisions. *The Accounting Review* (October): 729-747.

Lopes, L. 1984. Risk and Distributional Inequality. *Journal of Experimental Psychology: Human Perception and Performance* 10 (August): 465-85.

Lyness, K., and R. Cornelius. 1982. A Comparison of Holistic and Decomposed Judgement Strategies in a Performance Rating Simulation. *Organizational Behaviour and Human Performance* (February): 21-38.

MacDonald, Jr., A. P. 1970. Revised Scale for Ambiguity Tolerance: Reliability and Validity. *Psychological Reports* 26: 791-798.

Majid, A., and J. Pragasam. 1997. A Note on The Interacting Effects of Ambiguity Intolerance and Contingent Liabilities on Auditors' Litigation Avoidance Behaviour. Unpublished Paper, School of Accountancy, The Chinese University of Hong Kong.

Maletta, M., and A. Wright. 1996. Audit Evidence Planning: An Examination of Industry Error Characteristics. *Auditing: A Journal of Practice and Theory* (Spring): 71-86.

Mautz, R., and H. Sharaf. 1961. *The Philosophy of Auditing*. Sarasota, FL: AAA.

Mayper, A. G. 1982. Consensus of Auditors' Materiality Judgements of Internal Accounting Control Weaknesses. *Journal of Accounting Research* 20: 773-783.

________, M. S. Doucet, and C. S. Warren. 1989. Auditors' Materiality Judgements of Internal Accounting Control Weaknesses. *Auditing: A Journal of Practice and Theory* (Fall): 72-86.

McGhee, W., M. Shields, and J. Birnberg. 1978. The Effect of Personality on a Subject's Information Processing. *The Accounting Review* (July): 681-697.

Meixner, W. F., and R. B. Welker. 1988. Judgement Consensus and Auditor Experience: An Examination of Organizational Relations. *The Accounting Review* 63: 505-513.

Messier, W. F. 1983. The Effect of Experience and Firm Type on Materiality/Disclosure Judgements. *Journal of Accounting Research* (Autumn): 611-618.

Mock, T., and J. L. Turner. 1981. *Internal Accounting Control Evaluation and Auditor Judgement*. Auditing Research Monograph, No. 3, New York: AICPA.

________, and J. J. Willingham. 1983. An Improved Method of Documenting and Evaluating a System of Internal Accounting Controls. *Auditing: A Journal of Practice and Theory* (Spring): 91-99.

________, and M. T. Washington. 1989. Risk Concepts and Risk Assessment in Auditing. *Advances in Accounting* (Supplement): 105-118.

________, and A. Wright. 1993. An Exploratory Study of Auditors' Evidential Planning Judgements. *Auditing: A Journal of Practice and Theory* (Fall): 39-61.

Moriarity, S., and F. H. Barron. 1976. Modeling the Materiality Judgements of Audit Partners. *Journal of Accounting Research* 14, no.2: 320-341.

________, and ________. 1979. A Judgement-Based Definition of Materiality. *Journal of Accounting Research* (Supplement): 14-35.

Morris, M. H., and W. D. Nichols. 1988. Consistency Exceptions: Materiality Judgements and Audit Firm Structure. *The Accounting Review* (April): 237-254.

________, ________, and J. W. Pattillo. 1984. Capitalization of Interest, Materiality Judgement Divergence and Users' Information Needs. *Journal of Business Finance and Accounting* 11, no.4: 547-555.

Newton, J., and R. Ashton. 1989. The Association Between Audit Technology and Audit Delay. *Auditing: A Journal of Practice and Theory* (Supplement): 22-37.

Oliver, J., and E. Flamholtz. 1978. Human Resources Replacement Cost Numbers, Cognitive Information Processing and Personnel Decisions: A Laboratory Experiment. *Journal of Business Finance and Accounting* (Summer): 137-157.

O'Malley, S. F. 1993. Legal Liability is Having a Chilling Effect on the Auditor's Role. *Accounting Horizons* (June):82-87.

Palmrose, Z. V. 1987. Litigation and Independent Auditors: The Role of Business Failures and Management Fraud. *Auditing: A Journal of Practice and Theory* (Spring): 90-103.

__________. 1991. An Analysis of Auditor Litigation Disclosures. *Auditing: A Journal of Practice and Theory* (Supplement): 54-71.

Pany, K., and P. M. J. Reckers. 1987. Within- vs. Between-Subjects Experimental Designs: A Study of Demand Effects. *Auditing: A Journal of Theory and Practice* (Fall): 39-53.

Petty, R., and J. Cacioppo. 1986. The Elaboration Likelihood Model of Persuasion. In *Advances in Experimental Social Psychology*, Vol. 19, edited by L. Berkowitz. New York: Academic Press. 124-205.

Pincus, K. V. 1991. Audit Judgement Confidence. *Behavioral Research in Accounting* 3: 39-65.

Pratt, J. 1980. The Effects of Personality on a Subject's Information Processing: A Comment. *The Accounting Review* (July): 501-506.

__________, and J. D. Stice. 1994. The Effects of Client Characteristics on Auditor Litigation Risk Judgements, Required Audit Evidence, and Recommended Audit Fees. *The Accounting Review* (October): 639-656.

Raiffa, H. 1968. *Decision Analysis*. Addison Wesley.

Read, W. J., J. E. Mitchell, and A. D. Akresh. 1987. Planning Materiality and SAS No.47. *Journal of Accountancy* 164, no.6: 72-79.

Reckers, P. M. J., D. C. Kneer, and M. M. Jennings. 1984. Concepts of Materiality and Disclosure. *CPA Journal* 54, no.12: 20-31.

__________, and M. E. Taylor. 1979. Consistency in Auditors' Evaluations of Internal Accounting Controls. *Journal of Accounting, Auditing and Finance* (Fall): 42-55.

Rosnow, R., B. Goodstadt, J. Suls, and A. Gitter. 1973. More on the Social Psychology of the Experiment: When Compliance Turns to Self Defense. *Journal of Personality and Social Psychology* (September): 337-43.

Royston, J. P. 1982. An Extension of Shapiro and Wilk's W Test for Normality to Large Samples. *Applied Statistics* 31: 115-124.

SAS Institute Inc. 1992. *SAS/STAT User's Guide*. SAS.

Schepanski, A., R. M. Tubbs, and R. A. Grimlund. 1992. Issues of Concern Regarding Within-and Between-Subjects Designs in Behavioral Accounting Research. *Journal of Accounting Literature*: 121-149.

Schneider, A. 1984. Modeling External Auditors' Evaluations of Internal Auditing. *Journal of Accounting Research* 22: 657-678.

__________. 1985. The Reliance of External Auditors on the Internal Audit Function. *Journal of Accounting Research* 23: 911-919.

Schoemaker, P. 1982. *Experiments on Decision Making Under Risk: The Expected Utility Hypothesis*. Martinus Nijhoff Publishing, Boston, Massachusetts.

Sekaran, U. 1992. *Research Methods For Business*. John Wiley & Sons, Inc.

Shapiro, S. S. and M. B. Wilk. 1965. An Analysis of Variance Test for Normality. *Biometrika* 52: 591-611.

Shimp, T., E. Hyatt, and D. Snyder. 1991. A Critical Appraisal of Demand Artifacts in Consumer Research. *Journal of Consumer Research* (December): 273-83.

Silverman, I. 1968. Role-Related Behavior of Subjects in Laboratory Studies of Attitude Change. *Journal of Personality and Social Psychology* (April):343-48.

Solomon, I., and M. D. Shields. 1995. Judgement and Decision-Making Research in Auditing. In *Judgement and Decision-making Research in Accounting and Auditing*, edited by R. H. Ashton and A. H. Ashton, Cambridge University Press.

Srinidhi, B. N., and M. A. Vasarhelyi. 1986. Auditor Judgement Concerning Establishment of Substantive Tests Based on Internal Control Reliability. *Auditing: A Journal of Practice and Theory* 5: 64-76.

Stice, J. D. 1991. Using Financial and Market Information to Identify Pre-Engagement Factors Associated with Lawsuits Against Auditors. *The Accounting Review* (July): 516-533.

________. 1993. Assessing the Risk of Litigation in Audit Engagements. *The National Public Accountant* (March): 22-25.

Stone, D. N., and W. N. Dilla. 1994. When Numbers are Better Than Words: The Joint Effects of Response Representation and Experience on Inherent Risk Judgements. *Auditing: A Journal of Practice and Theory* (Supplement): 1-19.

Strawser, J. R. 1985. An Empirical Investigation of Auditor Judgement: Factors Affecting Perceived Audit Risk. Ph.D. Dissertation, Texas A&M University.

__________. 1990. Human Information Processing and the Consistency of Audit Risk Judgements. *Accounting and Business Research* (Winter): 67-75.

__________. 1991. Examination of the Effect of Risk Model Components on Perceived Audit Risk. *Auditing: A Journal of Practice and Theory* (Spring): 126-135.

Tabor, R. H. 1983. Internal Control Evaluations and Audit Program Revisions: Some Additional Evidence. *Journal of Accounting Research* (Spring): 348-354.

Trompeter, G. 1994. The Effect of Partner Compensation Schemes and Generally Accepted Accounting Principles on Audit Partner Judgement. *Auditing: A Journal of Practice and Theory* (Fall): 56-68.

Trotman, K. 1990. The Effect of the Distribution of Cases on Judgemental Consensus. *Accounting and Finance* (May): 39-49.

Tsui, J. S. L. 1993. Tolerance for Ambiguity, Uncertainty Audit Qualifications and Bankers' Perceptions. *Psychological Reports* 72: 915-919.

Tuntiwongpiboon, N., and M. T. Dugan. 1994. An Empirical Investigation of the Relationship between Audit Structure and Client Attributes. *Journal of Accounting, Auditing & Finance* (Spring): 225-247.

Wallace, W., and R. W. Kreutzfeldt. 1995. The Relation of Inherent and Control Risk to Audit Adjustments. *Journal of Accounting, Auditing & Finance* (Summer): 459-483.

Waller, W. 1988. Slack in Participative Budgeting: The Joint Effect of a Truth-Inducing Pay Scheme and Risk Preferences. *Accounting, Organizations and Society* 13 (February): 87-98.

Walo, J. C. 1995. The Effects of Client Characteristics on Audit Scope. *Auditing: A Journal of Practice and Theory* (Spring): 115-124.

Weber, S., and T. Cook. 1972. Subject Effects in Laboratory Research: An Examination of Subject Roles, Demand Characteristics, and Valid Inference. *Psychological Bulletin* (April): 273-95.

Williams, D. D., and M. Dirsmith. 1988. The Effects of Audit Technology on Audit Efficiency: Auditing and the Timeliness of Client Earnings Announcements. *Accounting, Organizations and Society* 13, no.5: 487-508.

Willis, R., and J. Levine. 1976. Interpersonal Influence and Conformity. In *Social Psychology*, edited by B. Seidenberg and A. Snadowsky. New York: Free Press, 133-75.

Winer, B. J., D. R. Brown, and K. M. Michels. 1991. *Statistical Principles in Experimental Design*. McGraw-Hill.

Wyer, R. 1974. Cognitive Organization and Change: An Information Processing Approach. New York: John Wiley.

Young, M. 1985. Participative Budgeting: The Effects of Risk Aversion and Asymmetric Information on Budgetary Slack. *Journal of Accounting Research* 23 (Autumn): 829-42.

Zebda, A. 1991. The Problem of Ambiguity and Vagueness in Accounting. *Behavioral Research in Accounting* 3: 117-145.

APPENDIX A

MAIN AND TWO-FACTOR INTERACTION EFFECTS OF COCHRAN & COX'S PLAN NO. 6A.3 FOR A ONE-HALF REPLICATION OF A 2^5 FACTORIAL DESIGN

This appendix describes how to estimate the main and two-factor interaction effects of Cochran & Cox's Plan No. 6A.3 for a one-half replication of a 2^5 factorial design. It starts with an illustration of a 2^5 full factorial design. While Table 1 lists all the possible treatment combinations in a 2^5 full factorial design, Table 2 and 3 illustrate how to estimate the main and two-factor interaction effects of the full factorial design. Table 4 then lists the 16 treatment combinations of Cochran & Cox's Plan No. 6A.3, which are the same treatment combinations as reported in Table 4.2 of Chapter Four. Finally, Table 5 and 6, respectively, illustrate the main and two-factor interaction effects of Cochran & Cox's one-half replicate.

Table One
All possible combinations of a 2^5 full factorial design

Treatment Number	Treatment Combination	A	B	C	D	E
1	abcde	+	+	+	+	+
2	abcd	+	+	+	+	-
3	abce	+	+	+	-	+
4	abc	+	+	+	-	-
5	abde	+	+	-	+	+
6	abd	+	+	-	+	-
7	abe	+	+	-	-	+
8	ab	+	+	-	-	-
9	acde	+	-	+	+	+
10	acd	+	-	+	+	-
11	ace	+	-	+	-	+
12	ac	+	-	+	-	-
13	ade	+	-	-	+	+
14	ad	+	-	-	+	-
15	ae	+	-	-	-	+
16	a	+	-	-	-	-
17	bcde	-	+	+	+	+
18	bcd	-	+	+	+	-
19	bce	-	+	+	-	+
20	bc	-	+	+	-	-
21	bde	-	+	-	+	+
22	bd	-	+	-	+	-
23	be	-	+	-	-	+
24	b	-	+	-	-	-
25	cde	-	-	+	+	+
26	cd	-	-	+	+	-
27	ce	-	-	+	-	+
28	c	-	-	+	-	-
29	de	-	-	-	+	+
30	d	-	-	-	+	-
31	e	-	-	-	-	+
32	(1)	-	-	-	-	-

Table Two
Main effect of factor A in a 2^5 full factorial design

Factor	Level	Treatment Number	Treatment Combination
A	+	1	a b c d e
		2	a b c d
		3	a b c e
		4	a b c
		5	a b d e
		6	a b d
		7	a b e
		8	a b
		9	a c d e
		10	a c d
		11	a c e
		12	a c
		13	a d e
		14	a d
		15	a e
		16	a
	-	17	b c d e
		18	b c d
		19	b c e
		20	b c
		21	b d e
		22	b d
		23	b e
		24	b
		25	c d e
		26	c d
		27	c e
		28	c
		29	d e
		30	d
		31	e
		32	(1)

Note: Factor A has two levels:

Level	Factor A	Treatment Number
1	+	1-16
2	-	17-32

One can estimate the independent effect of factor A by comparing the treatment effects of the treatment combinations at the above two levels.

Table Three
Two-way interaction effects of factors A and B in a 2^5 full factorial design

Factor	B				
	Level	+		-	
		Treatment Number	Treatment Combination	Treatment Number	Treatment Combination
		1	a b c d e	9	a c d e
		2	a b c d	10	a c d
		3	a b c e	11	a c e
	+	4	a b c	12	a c
		5	a b d e	13	a d e
		6	a b d	14	a d
		7	a b e	15	a e
A		8	a b	16	a
		17	b c d e	25	c d e
		18	b c d	26	c d
		19	b c e	27	c e
	-	20	b c	28	c
		21	b d e	29	d e
		22	b d	30	d
		23	b e	31	e
		24	b	32	(1)

Note: There are four levels in the A and B interaction:

Level	Factor A	Factor B	Treatment Number
1	+	+	1-8
2	+	-	9-16
3	-	+	17-24
4	-	-	25-32

Kerlinger (1986, p.230) states that an interaction occurs when an independent variable, e.g., factor A, has different effects on a dependent variable at different levels of another independent variable, e.g., high and low levels of factor B. Therefore, one can estimate the two-way interaction effect of factors A and B after comparing the treatment effects of the treatment combinations at the above four levels of the A and B interaction.

Table Four
One-half replicate of a 2^5 factorial design
Cochran and Cox (1992, p.261) Plan No. 6A.3

Treatment Number	Treatment Combination	A	B	C	D	E
1	abcde	+	+	+	+	+
4	abc	+	+	+	-	-
6	abd	+	+	-	+	-
7	abe	+	+	-	-	+
10	acd	+	-	+	+	-
11	ace	+	-	+	-	+
13	ade	+	-	-	+	+
16	a	+	-	-	-	-
18	bcd	-	+	+	+	-
19	bce	-	+	+	-	+
21	bde	-	+	-	+	+
24	b	-	+	-	-	-
25	cde	-	-	+	+	+
28	c	-	-	+	-	-
30	d	-	-	-	+	-
31	e	-	-	-	-	+

Note: Treatment numbers are the same as the 2^5 full factorial design in Table One.

Table Five
Main effect of factor A in Cochran and Cox's one-half replicate

Factor	Level	Treatment Number	Treatment Combination
A	+	1	a b c d e
		4	a b c
		6	a b d
		7	a b e
		10	a c d
		11	a c e
		13	a d e
		16	a
	-	18	b c d
		19	b c e
		21	b d e
		24	b
		25	c d e
		28	c
		30	d
		31	e

Note: Factor A has two levels:

Level	Factor A	Treatment Number
1	+	1, 4, 6, 7, 10, 11, 13, 16
2	-	18, 19, 21, 24, 25, 28, 30, 31

One can estimate the independent effect of factor A by comparing the treatment effects of the treatment combinations at the above two levels.

Table Six
Two-way interaction effects of factors A and B in Cochran and Cox's one-half replicate

<table>
<tr><td>Factor</td><td colspan="5">B</td></tr>
<tr><td rowspan="11">A</td><td>Level</td><td colspan="2">+</td><td colspan="2">-</td></tr>
<tr><td></td><td>Treatment Number</td><td>Treatment Combination</td><td>Treatment Number</td><td>Treatment Combination</td></tr>
<tr><td rowspan="4">+</td><td>1</td><td>a b c d e</td><td>10</td><td>a c d</td></tr>
<tr><td>4</td><td>a b c</td><td>11</td><td>a c e</td></tr>
<tr><td>6</td><td>a b d</td><td>13</td><td>a d e</td></tr>
<tr><td>7</td><td>a b e</td><td>16</td><td>a</td></tr>
<tr><td rowspan="4">-</td><td>18</td><td>b c d</td><td>25</td><td>c d e</td></tr>
<tr><td>19</td><td>b c e</td><td>28</td><td>c</td></tr>
<tr><td>21</td><td>b d e</td><td>30</td><td>d</td></tr>
<tr><td>24</td><td>b</td><td>31</td><td>e</td></tr>
</table>

Note: There are four levels in the A and B interaction:

Level	Factor A	Factor B	Treatment Number
1	+	+	1, 4, 6, 7
2	+	-	10, 11, 13, 16
3	-	+	18, 19, 21, 24
4	-	-	25, 28, 30, 31

Kerlinger (1986, p.230) states that an interaction occurs when an independent variable, e.g., factor A, has different effects on a dependent variable at different levels of another independent variable, e.g., high and low levels of factor B. Therefore, one can estimate the two-way interaction effect of factors A and B after comparing the treatment effects of the treatment combinations at the above four levels of the A and B interaction.

APPENDIX B:

THE RESEARCH INSTRUMENT

INTRODUCTION

The objective of this research is to evaluate and understand auditors' perceptions of factors which could affect their evidential planning decisions in an audit examination. Evidential planning decisions are examined in terms of the extent of audit evidence that is to be collected in order to satisfactorily complete the various audit tasks. More specifically, this research is concerned with your perceptions of the extent of planned audit evidence that is to be collected to satisfactorily complete the audit of a new client called Leadtex Ltd.

Your tasks will be to review selected information and assumptions concerning the audit assignment of Leadtex Ltd. You are requested to respond to several combinations of additional information variables, which were used to develop several variations of the circumstances relating to the audit examination. You will be asked to indicate the extent of audit evidence that you estimate is necessary to satisfactorily complete the audit assignment for each variation of the case.

Your responses will, of course, be kept strictly confidential throughout the research process. In reporting the results of the study, all individuals and their affiliations will remain totally anonymous. There are no correct or incorrect responses in the tasks to be performed. This study is concerned with, and only with, your opinions. I will be happy to provide you with a copy of the summary results, if you wish.

AUDIT INFORMATION

In this research, you are to assume that you are an audit partner of your CPA firm and are responsible for the audit of a hypothetical company called Leadtex Ltd. Leadtex is a large-sized textile company listed on the Stock Exchange of Hong Kong. It is a well established company and has been in existence for several years. Leadtex was previously audited by other CPA firms and this is the first year your firm audits the company. The principal activity of the company is the manufacture of garments which are sold locally and to markets in North America and Europe. The projected turnover and total assets for the current year (consisting of 9 months actual plus 3 months forecast) are HK$400 million and HK$250 million respectively.

ASSUMPTIONS

The following assumptions are to be held throughout the audit planning tasks you are requested to perform:

1. The auditor in-charge for the audit of Leadtex is an audit supervisor. With the assistance of several audit seniors and juniors, the auditor in-charge is responsible for carrying out all the field work.

2. Characteristics of the account balances (e.g., location of the stocks) and the accounting and internal control systems (e.g., strength of the internal controls) will be varied from case to case and are described in more detail by the following five information variables.

INFORMATION VARIABLES

In this research, five information variables will be varied in combination from case to case. These variables will be pre-answered in terms of either **high level** or **low level**.

1. **Inherent risk assessment**
   This variable reflects the auditor's estimate of the susceptibility of an account balance (e.g., stocks and debtors) or class of transactions to a material misstatement assuming that there were no related internal controls. In this study inherent risk assessment is assumed to be at either **high level** or **low level**. In the high level, it is assumed that:
   - **a.** Leadtex's financial condition is relatively weak: **(i)** relatively high gearing ratio when compared with the industry average; and **(ii)** deteriorating operating results in terms of no growth in sales with declining profit over the past three years.
   - **b.** Besides the manufacturing facilities in Hong Kong, Leadtex has a sizeable manufacturing facility in the PRC.

   In the low level, it is assumed that:
   - **a.** Leadtex's financial condition is relatively strong: **(i)** relatively low gearing ratio when compared with the industry average; and **(ii)** a modest but steady growth pattern for sales and profit over the past three years.
   - **b.** Leadtex only has manufacturing facilities in Hong Kong.

2. **Control risk assessment**
   This variable reflects the auditor's estimate of the probability that a material misstatement that could occur in an account balance (e.g., stocks) or class of transactions will not be prevented or detected on a timely basis by the entity's (Leadtex's) system of internal control. This probability is an assessment made by the auditor after reviewing and ascertaining Leadtex's accounting and internal control systems. In this study, control risk assessment is assumed to be at either **high level** or **low level**.

3. **Desired audit risk**
   This variable reflects the auditor's desired level of audit risk. Audit risk is defined as the probability that the auditor gives an inappropriate audit opinion on financial statements that are materially misstated. The auditor's desired level of audit risk indicates his preference for the tolerable level of audit risk when issuing an opinion. In this study, the auditor's desired audit risk is assumed to be at either **high level** or **low level** and in making this risk assessment the auditor business risk (to be described below) is not considered.

4. **Auditor business risk**
   This variable reflects the auditor's assessment of the auditor business risk in relation to the audit of Leadtex. Auditor business risk refers to the probability that an auditor will suffer a loss or injury to his professional practice. This risk arises from decisions made by users relying on the audited financial statements and includes factors such as litigation risk and cost, and potential loss of client and/or reputation due to adverse publicity. In this study, auditor business risk is assumed to be at either **high level** or **low level**.

5. **Planning materiality**
   This variable reflects the auditor's preliminary materiality level which is determined early in the audit for planning purposes. This materiality level is the maximum amount by which the auditor believes the financial statements could be misstated and still not affect the economic decisions of reasonable users. When the auditor chooses a higher (lower) planning materiality, he can tolerate a higher (lower) amount of monetary error. In this study, planning materiality is assumed to be at either **high level** or **low level**.

TASK 1 SPECIFIC INSTRUCTIONS

You are to assume the role of an audit partner who is planning for Leadtex Ltd's current year audit. In performing this task, you will be asked to:

1. Familiarise yourself with the descriptions of the five information variables to be presented in each case.

2. Indicate, for each audit assignment (case), the extent of audit evidence that is to be collected in order to satisfactorily complete the audit of Leadtex. A ten point scale ranging from **much lower than normal** to **much higher than normal** extent of audit evidence is provided to record your response for each case.

You may use the audit information, assumptions, information variable descriptions, and instructions throughout your performance of this task. Please complete each case in the order that it is presented. **DO NOT RETURN TO A CASE ONCE YOU HAVE COMPLETED IT**. Use only the information provided above and in each particular case to make your judgement. Assume that all other potential factors which may be relevant in your decision are the same for all the cases.

NOTE: **The presentation order of a total of 20 cases, representing the 16 original and 4 duplicate cases as previously described in Chapter Four, "Research Methodology", as well as the variables within each case are completely randomized such that each subject is given a unique presentation order of the cases. A sample of the 20 cases is presented below:**

Sample Case

Auditor business risk	----	high level
inherent risk assessment	----	high level
Control risk assessment	----	low level
Planning materiality	----	high level
Desired audit risk	----	low level

Please state how much audit evidence you plan to collect in order to satisfactorily complete the audit of Leadtex by circling the appropriate number.

much lower than normal 1---2---3---4---5---6---7---8---9---10 much higher than normal

TASK 2 EXTENT OF AUDIT EVIDENCE

Now that you have completed your evaluations of the cases, please allocate **a total of 100 points over the five information variables listed below.** This allocation should be made in order to indicate the relative importance you placed on each variable in your evaluation of the **planned extent of audit evidence**. Variables perceived as more important in your judgement process of the amount of audit evidence in an audit situation should receive a greater allotment of the 100 total points than those variables perceived as less important.

FACTOR	POINTS
1. **Auditor business risk**	________
2. **Inherent risk assessment**	________
3. **Control risk assessment**	________
4. **Desired audit risk**	________
5. **Planning materiality**	________
TOTAL	**100**

TASK 3 PERSONALITY CHARACTERISTICS TEST

For each of the following statements, please circle **true** or **false**. Be sure to answer every question. There are no right or wrong answers.

	Statement	Answer	
1.	A problem has little attraction for me if I don't think it has a solution.	**True**	**False**
2.	I am just a little uncomfortable with people unless I feel that I can understand their behavior.	**True**	**False**
3.	There's a right way and a wrong way to do almost everything.	**True**	**False**
4.	I would rather bet 1 to 6 on a long shot than 3 to 1 on a probable winner.	**True**	**False**
5.	The way to understand complex problems is to be concerned with their larger aspects instead of breaking them into smaller pieces.	**True**	**False**
6.	I get pretty anxious when I'm in a social situation over which I have no control.	**True**	**False**
7.	Practically every problem has a solution.	**True**	**False**
8.	It bothers me when I am unable to follow another person's train of thought.	**True**	**False**
9.	I have always felt that there is a clear difference between right and wrong.	**True**	**False**
10.	It bothers me when I don't know how other people react to me.	**True**	**False**
11.	Nothing gets accomplished in this world unless you stick to some basic rules.	**True**	**False**
12.	If I were a doctor, I would prefer the uncertainties of a psychiatrist to the clear and definite work of someone like a surgeon of X-ray specialist.	**True**	**False**
13.	Vague and impressionistic pictures really have little appeal for me.	**True**	**False**
14.	If I were a scientist, it would bother me that my work would never be completed (because science will always make new discoveries).	**True**	**False**
15.	Before an examination, I feel much less anxious if I know how many questions there will be.	**True**	**False**
16.	The best part of working a jigsaw puzzle is putting in that last piece.	**True**	**False**
17.	Sometimes I rather enjoy going against the rules and doing things I'm not supposed to do.	**True**	**False**
18.	I don't like to work on a problem unless there is a possibility of coming out with a clear-cut and unambiguous answer.	**True**	**False**
19.	I like to fool around with new ideas, even if they turn out later to be a total waste of time.	**True**	**False**
20.	Perfect balance is the essence of all good composition.	**True**	**False**

TASK 4 AUDIT STRUCTURE QUESTIONNAIRE

Please state to what extent you agree with each of the following statements regarding planning the audit of a typical client of your firm. Your response to each statement should be made independently. Please circle your choice on the 100 point scale provided.

1. The tolerable level of audit risk is a matter of judgement by the partners in the circumstances for each client.

   strongly disagree 0 – 10 – 20 – 30 – 40 – 50 – 60 – 70 – 80 – 90 – 100 strongly agree

2. Standard form is used to document the desired level of audit risk for each client.

   strongly disagree 0 – 10 – 20 – 30 – 40 – 50 – 60 – 70 – 80 – 90 – 100 strongly agree

3. Specific quantitative criteria and standard form are used to determine and document the inherent risk for each client.

   strongly disagree 0 – 10 – 20 – 30 – 40 – 50 – 60 – 70 – 80 – 90 – 100 strongly agree

4. Specific quantitative criteria are used to determine the control risk and the planned reliance on internal controls for each client.

   strongly disagree 0 – 10 – 20 – 30 – 40 – 50 – 60 – 70 – 80 – 90 – 100 strongly agree

5. Standard forms are used to document the control risk assessment and the decision relating to planned reliance on internal controls for each client.

   strongly disagree 0 – 10 – 20 – 30 – 40 – 50 – 60 – 70 – 80 – 90 – 100 strongly agree

6. Specific quantitative criteria and standard form are used to determine and document the planning materiality decision for each client.

   strongly disagree 0 – 10 – 20 – 30 – 40 – 50 – 60 – 70 – 80 – 90 – 100 strongly agree

7. Materiality guidelines are set for all audit areas including high-dollar cut-offs, and minimum procedures.

   strongly disagree 0 – 10 – 20 – 30 – 40 – 50 – 60 – 70 – 80 – 90 – 100 strongly agree

8. Standard format supplemented with a memo is used to document the final audit strategy.

   strongly disagree 0 – 10 – 20 – 30 – 40 – 50 – 60 – 70 – 80 – 90 – 100 strongly agree

9. Standard audit programmes are used for each client.

   strongly disagree 0 – 10 – 20 – 30 – 40 – 50 – 60 – 70 – 80 – 90 – 100 strongly agree

10. Specific guidelines are used to determine the sample sizes of the statistical and judgmental samples.

    strongly disagree 0 – 10 – 20 – 30 – 40 – 50 – 60 – 70 – 80 – 90 – 100 strongly agree

TASK 5 <Clarke's Risk Attitude Test>

For each of the following **10** independent situations, you are asked to make a choice between two alternatives. Please indicate your preference by ticking the box before the alternative.

1. I would prefer (tick one)

☐ **A.** 70% probability of winning $2,000 **and** 30% probability of losing $1,000.

☐ **B.** 100% probability of winning $750.

2. I would prefer (tick one)

☐ **A.** 50% probability of winning $1,000 **and** 50% probability of winning nothing.

☐ **B.** 100% probability of winning $400.

3. I would prefer (tick one)

☐ **A.** 80% probability of winning $5,000 **and** 20% probability of losing $20,000.

☐ **B.** 100% probability of winning $1,000.

4. I would prefer (tick one)

☐ **A.** 60% probability of winning $2,000 **and** 40% probability of losing $1,000.

☐ **B.** 100% probability of winning $800.

5. I would prefer (tick one)

☐ **A.** 20% probability of winning $2,000 **and** 80% probability of losing $500.

☐ **B.** 100% probability of losing $100.

6. I would prefer (tick one)

☐ **A.** 20% probability of winning $10,000 **and** 80% probability of winning $250.

☐ **B.** 100% probability of winning $2,000.

7. I would prefer (tick one)

☐ **A.** 50% probability of winning $2,500 **and** 50% probability of winning nothing.

☐ **B.** 100% probability of winning $1,000.

8. I would prefer (tick one)

☐ **A.** 70% probability of winning $2,000 **and** 30% probability of losing $1,500.

☐ **B.** 100% probability of winning $1,000.

9. I would prefer (tick one)

☐ **A.** 20% probability of winning $5,000 **and** 80% probability of losing $1,000.

☐ **B.** 100% probability of losing $250.

10. I would prefer (tick one)

☐ **A.** 80% probability of winning $2,000 **and** 20% probability of losing $5,000.

☐ **B.** 100% probability of winning $750.

DEBRIEFING QUESTIONNAIRE

1. Gender: Male ____________ Female ____________

2. Circle any of the following certificates you have earned?
   CPA FHKSA AHKSA ACCA FCCA CA ACA

3. Do you have a degree? Yes ____________ No ____________

4. Circle the job title that most accurately describes your position:
   Partner Manager Supervisor Senior Junior

5. Number of years of auditing experience ____________ years

6. How would you evaluate your familiarity with audit planning of manufacturing companies?

Little or no familiarity 0 – 10 – 20 – 30 – 40 – 50 – 60 – 70 – 80 – 90 – 100 High level of familiarity

7. How would you evaluate your familiarity with auditing textile companies?

Little or no familiarity 0 – 10 – 20 – 30 – 40 – 50 – 60 – 70 – 80 – 90 – 100 High level of familiarity

8. How interesting did you find answering this questionnaire?
   Of no interest 0 – 10 – 20 – 30 – 40 – 50 – 60 – 70 – 80 – 90 – 100 Very interesting

9. In total, how long did it take you to complete these tasks? __________ minutes

10. If you like a copy of the results of this study, please provide either the following mailing information or attach a business card.

Name ________________________________

Company ________________________________

Address ________________________________

____

____

THANK YOU FOR YOUR PARTICIPATION

PLEASE REMEMBER THAT YOUR RESPONSES IN THIS PROJECT WILL BE KEPT STRICTLY CONFIDENTIAL.

NO MENTION WILL BE MADE OF YOUR NAME OR YOUR AFFILIATION.

APPENDIX C

CLARKE'S STANDARD GAMBLES

AND

KIM'S TYPICAL PARTICIPATIVE BUDGETING PROBLEM

Using Kahneman and Tversky's (1979) notation of choice problems, Kim (1992, p.307) presented the following typical participative budgeting problem:

Alternative A (M1, p ; M4, 1 - p)

Alternative B (M2, 1 ; M3, 0)

where

M_1 = the outcome if a tight budget is chosen and achieved

M_2 = the outcome if a safe budget is chosen and achieved

M_3 = the outcome if a safe budget is chosen but not met

M_4 = the outcome if a tight budget is chosen but not met

p = the probability that a subordinate will achieve a tight budget

1-p = the probability that a subordinate will not achieve a tight budget.

As pointed out by Kim (1992), budgeted performance in alternative A represents a risky choice, whereas budgeted performance in alternative B represents a riskless choice with a certain outcome. Further, alternative A (i.e., a tight budget) has a greater outcome variance than alternative B (i.e., a safe budget). Under this structure, the rewards for achieving a tight budget is greater than achieving a safe budget, i.e., $M_1 > M_2$, and the rewards for failing a tight budget is less than that of achieving a safe budget, i.e., $M_4 < M_2$. The relationships among M_1, M_2 and M_4, i.e., $M_1 > M_2 > M_4$, are critical and should be maintained in order to structure alternative A as a more risky choice and alternative B as a less risky choice.

Using Kahneman and Tversky's (1979) notation of choice problems and Kim's (1992) presentation format, Clarke's standard gambles can be represented as follows:

Alternative A $(M_1,\ p\ ;\ M_4,\ 1 - p)$

Alternative B $(M_2,\ 1\ ;\ M_3,\ 0)$

For example, the first standard gamble can be represented as follows:

Alternative A $(2000,\ 0.7\ ;\ -1000,\ 0.3)$

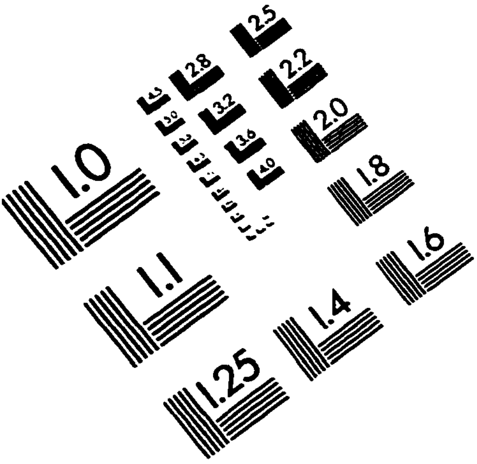
Alternative B $(750,\ 1\ ;\ M_3,\ 0)$

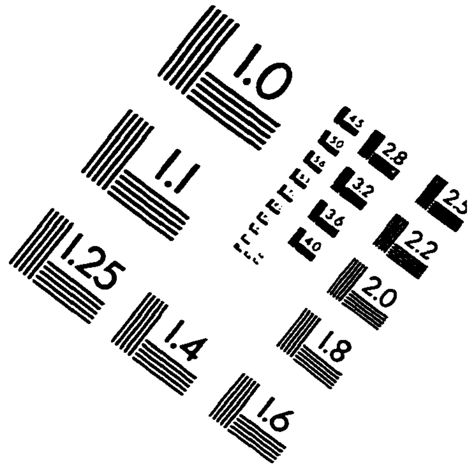
Similar to Kim's (1992) typical participative budgeting problem, alternative A represents a risky choice, whereas alternative B represents a riskless choice with a certain outcome. Each of Clarke's 10 standard gambles can be represented using the above format and satisfies the critical relationships among M_1, M_2 and M_4., $M_1 > M_2 > M_4$.

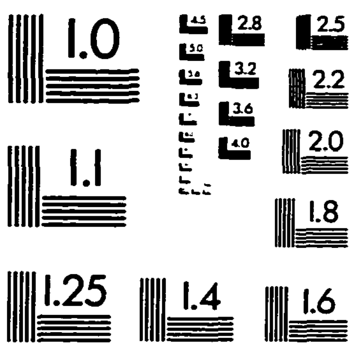
Young (1985) and Waller (1988) consider risk preference as a latent and invariant attribute of personality. With such a view, Kim (1992) argues that high risk-averse subjects would always prefer safe budgets to tight budgets, whereas low risk-averse subjects would always prefer tight budgets to safe budgets. Kim (1992) found that high risk-averse subjects displayed stronger preference for the riskless choice when compared with low risk-averse subjects.

It can then be argued that a high risk-averse subject would select the certain outcome and a low risk-averse subject would select the gamble in each of the 10 different scenarios in standard-gamble format.

IMAGE EVALUATION TEST TARGET (QA-3)







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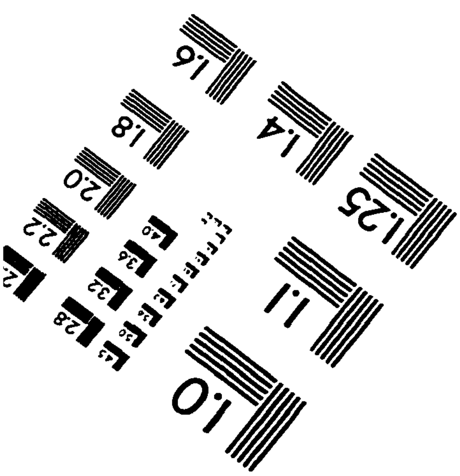

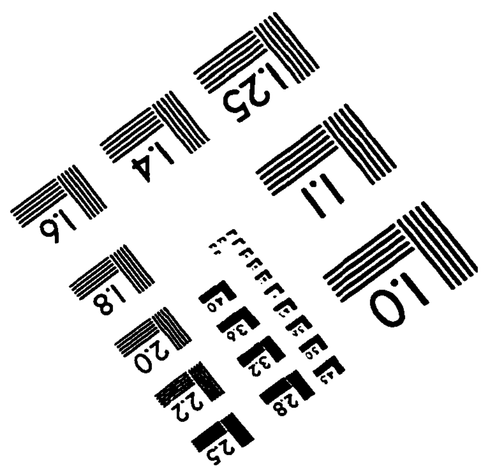

APPLIED IMAGE, Inc
1653 East Main Street
Rochester, NY 14609 USA
Phone: 716/482-0300
Fax: 716/288-5989