The compensatory and complementary influence of individual, team and firm level factors on appropriate audit support system use

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ABSTRACT: When developing an audit support system, audit firms decide the extent to which a system will be designed to control the audit process. Audit firms are constrained from designing completely restrictive audit support systems because high quality audits depend upon auditors having the freedom to exercise professional. This constrain increases the risk of a system being used inappropriately. Drawing from the Theory of Planned Behavior (Ajzen 1991) and Adaptive Structuration Theory (DeSanctis and Poole 1994), this study provides insights into how individual, team and firm level controls complement or compensate the extent of restrictiveness embedded within an audit support system and influence appropriate use of a firm's audit support system. The measurement model is refined using data from 210 auditors. The refined measurement model is validated and the structural model tested using data from an independent sample of 359 auditors. The results indicate that team consensus and an auditor's attitude are compensatory control mechanisms when restrictiveness is low. When restrictiveness is high, the audit review process is a complementary control.

Keywords: audit quality; appropriate use of audit support systems; system restrictiveness; socio-ideological and technocratic controls within audit firms.

Data Availability: Data are available from the author on request subject to ethics requirements. The data were provided on the condition of anonymity; the audit firms will not be identified.

I. INTRODUCTION

The purpose of this study is to investigate the factors that influence whether audit support systems are used in the intended manner. Audit support systems are the key technology application deployed by audit firms to control, facilitate and support audit work (Winograd et al. 2000; Manson et al. 2001; Banker et al. 2002; Dowling and Leech 2006). These systems typically include electronic work papers, decision aids, banks of audit tests and procedures, and extensive help files. When developing an audit support system, audit firms are required to make a trade-off between the extent of restrictiveness to embed within a system and the freedom users have to exercise professional judgment. The audit support systems deployed in practice indicate that audit firms have made different design choices; some firms have more restrictive systems designed to achieve firm-wide compliance with the audit methodology, and other firms have more flexible systems that enable, rather than prescribe, the audit process (Dowling and Leech 2006).

The extent of restrictiveness embedded within a system influences how users appropriate and use it (Majchrzak et al. 2000). Although some users will appropriate a less restrictive system in a functional manner, deploying a system that has a lower than maximum level of embedded restrictiveness increases the risk that the system will be used in a dysfunctional manner. Prior studies (Kachelmeier and Messier 1990; Messier et al. 2001; Bedard et al. 2005a; Bedard et al. 2005b) and anecdotal evidence from auditors indicate that auditors do not alway use technology, such as decision aids and audit support systems, in the manner audit firms intend them to be used[1]. Thus, the risk that a less restrictive audit support system will be used inappropriately is a very real risk that audit firms need to manage because of its potential to negatively affect audit

quality. Although increasing the level of restrictiveness lowers this risk, it is not necessarily the optimal solution because it in turn increases the risk that the system will be used mechanistically. Because the exercise of professional judgment is a crucial input to achieving high quality audits (Nelson and Tan 2005), and inturn, high quality financial statements, audit support systems cannot be designed to eliminate professional judgment exercised by auditors. Consequently, all audit firms are exposed to the risk that their audit support system will not be used in the manner intended. Therefore, audit firms cannot rely solely on the deployment of an audit support system to control the audit process and achieve high quality audits. It is imperative that audit firms identify and implement strategies that promote the appropriate use of their system to ensure all audits comply with the firm's audit methodology and prescribed auditing standards. In order to achieve this goal, an understanding of the way in which different formal and informal control mechanisms influence the appropriate use of audit support systems is needed. This study addresses this important issue by identifying and investigating how several factors at the auditor, audit team and audit firm level, influence whether auditors use their firm's audit support system appropriately.

A model grounded in the Theory of Planned Behavior (Ajzen 1991) and Adaptive Structuration Theory (AST) (DeSanctis and Poole 1994) is developed. The model provides a structured lens for investigating the direct and indirect influence of several factors on the appropriate use of audit support systems. Two constructs from the TPB (Ajzen 1991), perceived normative pressure[2] and perceived behavioral control, are decomposed into socio-ideological and technocratic controls hypothesized to influence the appropriate use of audit support systems. Perceived normative pressure is decomposed into two sources of socio-ideological control: audit team and audit firm

consensus on appropriate use. Perceived behavioral control is decomposed into self-efficacy and external perceived behavioral control. System restrictiveness and the perceived effectiveness of the audit review process are included as antecedents to external perceived behavioral control. Both of these are technocratic controls embedded within the technology of work and the rules enforced (Alvesson and Kärreman 2004). In contrast to most studies which investigate the extent to which the audit review process can detect errors (e.g., Trotman 1985; Bamber and Ramsay 1997; Bamber and Ramsay 2000; Owhoso et al. 2002), the current study focuses on the *ex ante* effect of perceived audit review effectiveness on auditor behavior (Otley and Pierce 1996; Brazel et al. 2004).

Data from 210 auditors at six international audit firms, the Big 4 and two international mid-tier firms, were used to refine the measurement model to ensure that the latent constructs have sufficient construct and discriminant validity. The refined measurement model was validated and the structural model tested using data from an independent sample of 359 auditors from the same six audit firms. The results indicate that although auditors perceive several factors at the individual, audit team and audit firm level influence whether they use their firm's audit support system appropriately, the factors differ based on the extent of perceived restrictiveness embedded within the audit support system. The audit review process and firm level consensus on appropriate use are important complementary control mechanisms when the level of perceived system restrictiveness is high. In contrast, the socio-ideological controls, team consensus and attitude, are important compensatory control mechanisms when the level of perceived system restrictiveness is low. This suggests that the extent of system restrictiveness embedded within the

audit support system has important implications for the types of control mechanisms audit firms need to deploy to ensure their audit support system is used appropriately.

This study contributes to the accounting literature by providing the first definition and operationalization of appropriate use of an audit support system and developing a theoretical model that explains how individual, audit team, and firm level factors jointly influence whether an auditor uses an audit support system in a manner consistent with how their audit firm intends the system to be used. Although several models investigating technology use (e.g., The Technology Acceptance Model (Davis et al. 1989) and The Unified Theory of Acceptance and Use of Technology (Venkatesh et al. 2003)), have been proposed to explain whether a technology is used, there is very limited understanding of the factors that influence *how* a technology is used. With the increasing digitization of the workplace, how a technology is used has important implications for organizational outcomes. In the audit context, how an audit support system is used can directly affect audit efficiency and/or effectiveness. A study by Bedard et al., (2005a) using data from one audit firm, provides initial insights into the influence of task and computer self-efficacy on a narrow component of how an audit support system is used (i.e., if the system is used electronically or auditors work around the system by printing workpapers). The current study significantly extends this line of research by developing a theoretical model that encompasses a broader set of antecedents at the individual, audit team and audit firm level, investigating a use measure that incorporates a broader set of usage behaviors developed to assess whether auditors use their firm's audit support system in a manner consistent with how the audit firm intends the system to be used, integrating the system usage variable into the structural model and testing the model using auditors from six international audit firms.

The remainder of this paper is structured as follows. Section II develops the theoretical model and the hypotheses are developed in section III. Section IV describes the research method. The results are presented in section V. Conclusions and future research directions are presented in section VI.

II. THEORETICAL MODEL

The inherent uncertainty of the audit environment requires audit support systems to be designed so that auditors are provided with some flexibility in how a support system is used. However, any decrease in the extent of restrictiveness embedded within a system increases the risk that the same system will be appropriated in many different ways (Orlikowski 1992). To reduce the risk of an audit support system being used dysfunctionally, formal and informal controls that promote appropriate system use need to be implemented.

AST (DeSanctis and Poole 1994) provides a theoretical lens for understanding the factors that influence how a technology is used. At the heart of AST is the notion that how a technology is appropriated is the outcome of several interacting forces: the technology itself, the organisation's environment, the perceived social/normative pressures, the task and the way structures emerge and change throughout the appropriation process (DeSanctis and Poole 1994). A key focus of AST is whether a technology is appropriated faithfully or unfaithfully in relation to the way the system is intended to be used (DeSanctis and Poole 1994). In relation to audit support systems, a faithful appropriation occurs when the audit support system is used in a manner consistent with how the audit firm intends the system to be used. This is defined as appropriate audit support

system use. Appropriate and inappropriate use of an audit support system are conceptualised as two end points of the same continuum.

Although AST was developed to investigate the technology appropriation process, this study argues that the constructs which influenced and/or were shaped by the appropriation process, continue to reinforce how an established technology is used. The focus of this study is on understanding how different factors influence how an auditor uses an established audit support system. This study uses the TPB (Ajzen 1991) as a lens to investigate how key AST constructs influence technology use when the individual is the unit of analysis. Investigating the factors that influence individual use is important because audit support systems, like most technologies, are ultimately used by individuals.

TPB posits that an individual's behavior is a function of their motivation and the presence or absence of resources enabling or restricting their behavior (Ajzen 1991). As depicted in Figure 1, an individual's behavior is a function of their intended behavior, which in turn is influenced by an individual's attitude toward the behavior, their perception of normative pressure from "important others" to behave in a manner consistent with the target behavior, and resources and/or constraints the individual perceives enable or restrict them from performing in a manner consistent with the target behavior. Resources and constraints are captured within perceived behavioral control and encompass an individual's perception of their self-efficacy to perform the behavior and other external factors, such as controls within the environment. In addition to influencing an individual's intention, perceived behavioral control also influences an individual's behavior directly.

(Insert Figure 1)

To investigate the target behavior of interest, appropriate audit support system use, the TPB (as presented in Figure 1) is contextualized and extended to include individual, audit team and audit firm factors expected to influence whether audit support systems are used appropriately. The extended model (Figure 2) includes the TPB constructs, intention, attitude, perceived normative pressure and perceived behavioral control. In Figure 1, perceived behavioral control is comprised of internal and external sources of control (Ajzen 1991). However, a distinction can be drawn between these two sources (Terry and O'Leary 1995; Armitage et al. 1999; Armitage and Conner 2001; Hagger et al. 2001). In relation to understanding the factors influencing appropriate audit support system use, it is important to investigate the influence of these two sources separately because different interventions are required by audit firms to address these factors. Therefore, in the extended model (Figure 2, presented below), perceived behavioral control is separated into its external and internal elements. External resources or constraints that an individual perceives will assist or hinder their ability to perform the target behavior are captured within the construct external perceived behavioral control. Internal elements are captured within the construct self-efficacy. Self-efficacy is an individual's assessment of their perceived ability to perform the target behavior. Prior research has identified self-efficacy as an important variable associated with whether an individual will use a technology (Compeau and Higgins 1995; Venkatesh 2000). Furthermore, Bedard et al., (2003) show that audit firms can increase an auditor's computer self-efficacy through training which in turn increases an auditor's acceptance of an audit support system.

To understand the factors that influence appropriate audit support system use, the model in Figure 1 is further decomposed to include antecedents expected to be the source of normative pressure auditors perceive to use their firm's audit support system appropriately and the controls that are expected to influence an auditor's perception of external behavioral control. The antecedents of perceived normative pressure and external perceived behavioral control are discussed below.

The antecedents of perceived normative pressure

AST proposes that an organisation's environment and social pressures are important factors that influence how a technology is appropriated (DeSanctis and Poole 1994). The TPB encompasses these factors within perceived normative pressure. Traditionally, TPB studies have focused on an individual's superiors, peers and subordinates as sources of normative pressure (e.g., Taylor and Todd 1995). In the audit environment these sources are the other auditors within the audit team. Because the audit team is the basic operating unit that performs an audit (Rudolph and Welker 1998), audit teams must develop a shared understanding of how an audit support system should be used. Therefore, the audit team[3] is expected to be an important source of normative pressure regarding how an audit support system should be used. This is consistent with audit firms relying on team based controls to achieve audit quality (Pierce and Sweeney 2005). However, because the audit firm is the level at which the audit support system is developed and deployed, firm level normative controls are also expected to influence how audit support systems are used.

When audit support systems are deployed, senior audit personnel and developers have expectations regarding how a system should be used (Nado et al. 1996). These expectations are

communicated to users via training sessions, manuals, and the firm's audit methodology (Winograd et al. 2000; Bedard et al. 2003). During the appropriation process, new social rules and structures emerge that users draw upon in determining how a system should be used (DeSanctis and Poole 1994). In AST, an observable outcome of the appropriation process is the degree of consensus regarding how a system should be used. Consensus on appropriation is defined as the "extent to which group participants perceive that they have agreed on how to adopt and use a technology" (Sailsbury et al. 2002:91). The consensus reached is not determined by the properties of the technology alone, but is an outcome of the user's interaction with the technology and their interaction with other users (Sailsbury et al. 2002).

Consensus can develop at multiple levels within an organisation. In an audit firm, the audit team and firm are the two key levels where consensus on appropriation is expected to develop. To achieve consistency of application in how an audit support system is used across an audit firm it is important that consensus is reached at the firm level. However, the uniqueness of each team means that each team will be influenced differently by firm level sources regarding how an audit support system should be used. This means that the consensus which develops at the audit team level may conflict with or reinforce firm level norms[4]. Therefore, both team and firm level consensus on appropriation are modeled as antecedents to perceived normative pressure in the extended model (Figure 2, presented below).

The antecedents of external perceived behavioral control

In addition to the firm's social and organizational environment, AST proposes that the technology and the task environment influence how a technology is appropriated (DeSanctis and

Poole 1994). Therefore, it is also important to investigate the effect of constructs representing these sources on how an audit support system is used.

In terms of technology, the extent of system restrictiveness embedded within a system is a structural feature that enables and/or constrains how individuals interact with a system (DeSanctis and Poole 1994). The audit support systems deployed within five large international audit firms indicate that these firms have made different design choices regarding the extent of restrictiveness embedded within their systems (Dowling and Leech 2006). These differences indicate that the extent of system restrictiveness to embed is not clear cut and is likely driven by other factors related to the firm, such as the extent to which a firm has a structured audit approach. System restrictiveness is viewed in the extended model as an antecedent to perceived behavioral control because it is a structural feature of the system that can be directly controlled by audit firms to influence how an audit support system is used.

In terms of the generic task of conducting an audit, the audit review process is an important quality control mechanism (Trotman 1985; Trotman and Yetton 1985; Solomon 1987; Ramsay 1994; Asare and McDaniel 1996; Bamber and Ramsay 1997; Reimers and Fennema 1999; Bamber and Ramsay 2000; Tan and Jamal 2001). As an interpersonal process, the audit review process is conditioned by an individual's expectations of the other parties (Gibbins and Trotman 2002). The use of information obtained during the audit review process to appraise subordinates' performance (Tan and Jamal 2001) creates an incentive for auditors to manage how their superiors perceive them during the review process (Pierce and Sweeney 2005). Thus an auditor's behavior is impacted by their perceptions of the forthcoming review (Otley and Pierce 1996)[5].

Auditors who perceive the review process to be more effective are less likely to engage in dysfunctional behaviors (Otley and Pierce 1996). Because the audit review is conducted using the firm's audit support system (Bedard et al. 2005a), the review process provides an opportunity to identify and correct inappropriate use of an audit support system. As such, the perceived effectiveness of the review process is expected to influence whether an auditor feels they are working in a highly controlled environment. Therefore, perceived effectiveness of the review process is modeled as an antecedent to external perceived behavioral control.

The extended model specified to fit the audit environment and consistent with the discussion presented in this section is depicted in Figure 2. The hypotheses for the structural paths are developed in section III.

(Insert Figure 2)

III. HYPOTHESIS DEVELOPMENT

In the TPB, intention is a primary determinant of an individual's behavior (e.g., Hartwick and Barki 1994; Taylor and Todd 1995; Hanno and Violette 1996; Karahanna and Straub 1999; Terry et al. 1999; Armitage and Conner 2001; Donald and Cooper 2001; Perugini and Bagozzi 2001; Sheeran et al. 2002; Bobek and Hatfield 2003). The quality of an audit is determined by the proper processes being followed (Otley and Pierce 1996). Output and behavioural controls are of limited use in an audit setting because of the high level of uncertainty and complexity of audit work. Consequently, audit firms rely upon personnel and social controls (Otley and Pierce 1996),

including the recruitment, selection and training of appropriate staff, and self-control mechanisms. In an environment reliant on self-control mechanisms, an auditor's intention is expected to be a primary determinant of their behaviour. Although several factors may influence an auditor's intention to use a system appropriately, the TPB posits that auditors need to form the intention to use the system appropriately before they will use the system in such a manner. Therefore, the following hypothesis is proposed:

> H_1: *Intention to use the audit support system appropriately is positively related to using the audit support system appropriately.*

Attitude is an individual's overall behavioral belief that performing the target behavior is good or bad (Hanno and Violette 1996). Auditors who believe using the audit support system appropriately will lead to outcomes they value are more likely to have a positive attitude to using the system appropriately. Auditors with a positive attitude to using the system appropriately are more likely to form a behavioral intention consistent with appropriate use. This leads to the following hypothesis:

> H_2: *A positive attitude toward using the audit support system appropriately is positively related to intention to use the audit support system appropriately.*

In the TPB, perceived normative pressure indirectly influences an individual's behavior through intention (Ajzen 1991). In relation to using an audit support system, perceived normative pressure is the social pressure an auditor perceives as to how they should be using the audit support system. Social controls are an important form of control in accounting firms (Otley and Pierce 1996; Pierce and Sweeney 2005). In an audit firm, social controls operate at both the audit team and firm level. In relation to appropriate use of an audit support system, consensus on appropriation is an important social control in influencing how a technology is used. Consensus on appropriation emerges from the technology appropriation process of a new technology

(Sailsbury et al. 2002). Consensus of appropriation is the shared understanding a group of users have regarding the accepted use of a technology (DeSanctis and Poole 1994). A high level of consensus will reduce uncertainty regarding how the system should be used. In the audit environment, consensus can emerge at many different levels. For the reasons discussed in section II, it is expected that the audit team and the audit firm are the two key groups from which consensus regarding how an audit support system should be used is likely to emerge and be of recognised importance by an auditor. When an auditor is aware that their audit team has reached a consensus regarding how the audit support system should be used, the auditor is likely to feel pressure to use the system in a manner consistent with the team's consensus. However, for the system to be used appropriately, the type of norm that develops is important. A team may have a high level of consensus to use the system inappropriately. For team consensus to influence appropriate use, audit teams need to have reached a consensus that is consistent with how the audit firm intends the system to be used. The stronger the consensus on appropriate use, the more likely an auditor will perceive pressure to use the audit support system appropriately. When audit teams develop consensus on appropriation, it is not done in a vacuum. Firm level sources influence team level appropriation. If these sources are consistent and reinforced across the audit firm, then there likely will be similarities across audit teams in terms of the norms that develop. When this is the case, there will likely be a high degree of consensus across the firm regarding the appropriate use of a firm's audit support system. The higher the consensus across the firm, the more likely an auditor will perceive pressure to use the audit support system in a manner consistent with the firm's consensus. The above discussion leads to the following three hypotheses:

> H_3: *Perceived normative pressure to use the audit support system appropriately is positively related to intention to use the audit support system appropriately.*

H_4: *Perceived team consensus on appropriate use is positively related to perceived normative pressure to use the audit support system appropriately.*

H_5: *Perceived firm consensus on appropriate audit support system use is positively related to perceived normative pressure to use the audit support system appropriately.*

Individuals with high self-efficacy are more likely to be motivated to use an audit support system appropriately and are more likely to form behavioral intentions consistent with this motivation (Ajzen 1991). Thus, an auditor with a high level of self-efficacy to use the audit support system appropriately is more likely to intend to use the system appropriately. This leads to the following hypothesis:

H_6: *Perceived self-efficacy to use the audit support system appropriately is positively related to intention to use the audit support system appropriately.*

If an auditor perceives that resources are available to use the audit support system appropriately and there are no environmental obstacles inhibiting their ability to do so, the TPB predicts that they are likely to form an intention to use the audit support system appropriately (Ajzen 1991). This leads to the following hypothesis:

H_7: *External perceived behavioral control to use the audit support system appropriately is positively related to intention to use the audit support system appropriately.*

Perceived behavioral control also directly affects actual behavior (Ajzen 1991; Armitage and Conner 2001). This direct relationship is based on the recognition that although an auditor may form an intention to behave in an inappropriate way, effective controls will constrain an auditor from acting in a manner consistent with their intention. This leads to the following hypothesis:

H_8: *External perceived behavioral control to use the audit support system appropriately is positively related to using the audit support system appropriately.*

A high level of restrictiveness embedded within an audit support system limits the extent to which an auditor is free to choose how the audit is performed and make certain judgments, such as choosing which audit tests to perform. A more restrictive system is more likely to ensure the firm's processes are followed. Consistent with auditors in highly structured firms perceiving their audit tasks to be more analysable and routine (Bamber et al. 1989), auditors who perceive an audit support system to be more restrictive are expected to be more likely to perceive they are working in a highly controlled environment. This leads to the following hypothesis:

> H_9: *Perceived system restrictiveness is positively related to external perceived behavioral control to use the audit support system appropriately.*

Auditors who perceive the audit review process to be effective and capable of holding them accountable for their actions (Gibbins and Newton 1994) are more likely to feel constrained. These auditors are less likely to engage in dysfunctional behavior, such as premature sign-off because they perceive a higher risk of being caught if they do not behave appropriately (Otley and Pierce 1996). Auditors who perceive a high level of behavioral constraint will feel that their behavior is not entirely under their volitional control, thus they are more likely to perceive a high level of external perceived behavioral control. This leads to the following hypothesis:

> H_{10}: *Perceived effectiveness of the audit review process is positively related to external perceived behavioral control to use the audit support system appropriately.*

IV. METHOD

The theoretical model (Figure 2) was tested using data obtained from auditors at six international audit firms. The measurement model was refined using confirmatory factor analysis. Structural equation modeling was used to test the theoretical model.

Data collection

Instruments were administered to auditors at six international audit firms; the Big 4 and two mid-tier firms. Audit support systems are designed to be used by auditors of all ranks. To maximise the generalisability of the findings, the instruments were administered to auditors of all ranks except partners. Partners were excluded because appropriate use is defined in terms of a principal-agent relationship and partners, as principals in the audit firm, have the potential to influence the meaning of appropriate use.

Because the model is grounded in the TPB a prospective research design was used. This design requires obtaining measures of intended behaviour and its hypothesized antecedents at a point in time, and then sometime later, actual behaviour is measured (Ajzen 2002). In prior studies the temporal gap between obtaining measures of intention and behaviour has varied from weeks (Terry and O'Leary 1995; Armitage et al. 1999) to months (McCaul et al. 1993). In the current study, "intention" and its hypothesized antecedents were collected before the 'busy' part of the audit season (instrument one). "Appropriate use" was collected 3 to 4 months later at the end of the 'busy' season (instrument two).

The instruments were sent directly to auditors using a list of names provided by the firm or were sent to a contact in the office who then distributed the surveys. Instruments were returned in sealed envelopes directly to the researcher or via an administrative assistant in the smaller offices. The method of distribution and collection of the instruments was determined by the audit partners at each firm and beyond the control of the researcher. In all cases, partners choose a method of distribution and collection they believed would maximise response rates. Partners within each audit firm also encouraged their staff to complete the instrument and prizes were offered[6].

Reminder emails were sent two to three weeks before the closing date printed on the survey. Non-response bias was assessed by conducting a multivariate analysis of variance on the responses obtained from early and late respondents[7]. The results are not significant, indicating that to the extent non-response bias can be assessed it is not a significant issue.

Instrument one was successfully[8] sent to 1917 auditors across six audit firms. 569 usable responses were obtained (a response rate of 29.68%[9]). Instrument two was sent to the 569 respondents. 359 usable responses were obtained (a response rate of 63.88%). The responses were divided into two groups. Data from the 210 auditors who responded to instrument one but did not respond to instrument two were used to refine the measurement model. Data from the 359 auditors who responded to both instruments were used to independently validate the refined measurement model and test the structural paths.

The descriptive statistics of both groups are presented in Table 1. The percentage of auditors in the sample from each firm is reflective of the size of the audit firms; the majority of auditors are from the largest audit firms (Firms A to D). The sample includes auditors of various rank who normally work on audit teams of various sizes. In both groups, over 60% of the auditors normally work on audit teams that have 4 to 10 members and the majority of auditors are seniors, which equates to approximately four to five years experience. Both samples include a nearly equal share of male and female auditors; thus the results are unlikely to be gender driven. There is a large amount of variance in the days the auditors have received training on their firm's audit support system. The most frequent period of training received for auditors in both groups is four to ten days. Overall, the results reported in Table 1 indicate that the data analysed in this study is

from auditors from various audit firms, who hold various team positions and have different levels of experience. The diversity of the auditors included in the sample provides assurance that the results have high external validity.

Table 1: Descriptive Statistics of Respondents

Development of Measures

When empirically testing a model grounded in the TPB, the items measuring the constructs need to be tailored to the target behavior (Ajzen 2002). Because the current study is the first to investigate appropriate audit support system use, no pre-validated scales were available. Based on a review of the literature, where appropriate, existing scales were adapted, otherwise initial scales were developed. The scales used to measure intention, perceived normative pressure, attitude, self-efficacy and perceived behavioral control were adapted from prior studies using the TPB (e.g., McCaul et al. 1993; Terry and O'Leary 1995; Finlay et al. 1997; Terry et al. 1999; Perugini and Bagozzi 2001; Trafimow et al. 2004). Appropriate use was adapted using three of the items in the faithfulness of appropriation measure (Chin et al. 1997). A pre-validated scale for measuring system restrictiveness was not available. Therefore, a scale was initially developed based on a review of studies that discussed and defined system restrictiveness (Silver 1988; Silver 1990; DeSanctis and Poole 1994; Wheeler and Valacich 1996; Lynch and Gomaa 2003) and discussions with audit partners and staff regarding their firm's audit support systems. The objective was to identify attributes which influence users' perceptions of system restrictiveness in relation to the target behavior, appropriate use. A perceived measure of system restrictiveness was obtained rather than an objective measure because a user's perception of system

restrictiveness is more influential on how they use the system compared with the actual level of system restrictiveness (Silver 1988; Silver 1990; Majchrzak et al. 2000). Perceived effectiveness of the audit review process is measured using three items, one of which is adapted from the single item used by Otley and Pierce (1996).

The scales were further developed and refined iteratively. After feedback was obtained at each stage, the items were adjusted and further feedback obtained. Feedback was obtained (in order) from 10 academics with expertise in accounting, auditing and/or information systems; two senior auditors from a Big 4 audit firm; 14 auditors from a mid-tier international accounting firm; 10 academics and doctoral students; 8 audit partners and managers from the participating audit firms; and a final pilot test with 7 auditors from another mid-tier audit firm. The final sample does not include any individuals who participated in the development and refinement of the measures. The items and the item codes for each construct are provided in Appendix A.

V. RESULTS

Initial refinement of the measurement model

Structural equation modeling (SEM), using robust maximum likelihood (ML) estimation was used to analyse the data[10]. Although, the distribution of the data is not multivariate normal, the sample size in the current study is not sufficient to use a distribution free (ADF) estimator. Therefore, the best alternative is to use robust ML estimation (i.e., ML estimation corrected using the Satorra-Bentler (1994) scaled statistic) (Bentler and Dudgeon 1996; Byrne 1998; Kline 2005). The Satorra-Bentler adjustment uses the observed levels of kurtosis and skewness in the asymptotic covariance matrix to adjust the inflated χ^2 values and the standard error estimates

(Satorra and Bentler 1994). Simulation studies have shown that this adjusted statistic performs better than unadjusted ML and ADF statistics in smaller sample sizes when the normality assumption is violated (Satorra and Bentler 1994; Bentler and Dudgeon 1996).

The data from the auditors who replied to instrument one, but not instrument two (n=210) were used to refine the measurement model. Using the data from these auditors is valid because they are drawn from the same population as the auditors who responded to both instruments. Furthermore, a multivariate analysis of the responses from the two groups of auditors reported in Table 1 supports the similarity of their responses to instrument one (Wilk's Lambda=0.824, $F_{(86,486)}$=1.249; p=0.104). This provides additional support for using the n=210 sub-sample to refine the measurement model.

The objective of this phase of the analysis was to obtain a parsimonious measurement model using valid and reliable scales before testing the structural model. The initial refinement involved assessing the convergent validity of one factor congeneric models. Based on these analyses, 6 items were eliminated due to low standardized loadings, poor reliability and/or poor model fit[11].

A confirmatory factor analysis was conducted on the remaining items to assess discriminant validity. A χ^2 difference test conducted on the latent constructs identified a problem between system restrictiveness and the following three latent variables: team consensus, firm consensus and self-efficacy. A review of the standardized residuals identified that the inclusion of SR1 (see appendix A) was the main cause of this problem. When SR1 was deleted, the correlations between these three pairs of constructs are below the recommended level of 0.85 (Kline 2005)

and the change in χ^2 when each correlation is constrained to 1.00 is significant, indicating that when SR1 is excluded, the items are capturing different constructs. The complete 9 factor model was re-run with SR1 excluded. The fit indices support the validity of the model (χ^2=276.039, *df*=240, *p*=0.0549; RMSEA=0.0268; SRMR=0.0449; GFI=0.832; AGFI=0.772; CFI=0.998).

Independent validation of measurement model refinement

The data from the auditors who replied to both instruments (*n*=359) were used to independently cross-validate the refined measurement model and test the structural model. The validation was completed in two steps. First, one factor congeneric models were run. Second, confirmatory factor analysis was used to assess the convergent and discriminant validity of the ten latent variables.

The one factor models for perceived normative pressure, team consensus and firm consensus are all within acceptable levels, and all standardized loadings are high and significant, supporting the convergent validity of these items. The model fit for system restrictiveness is less than acceptable. Although the loadings for SR6 and SR7 are acceptable, the loading for SR4 is not significant (*t*-value=0.79), indicating that SR4 is not contributing information to the measurement of system restrictiveness; it is therefore eliminated[12]. In addition, a one factor model was run to assess the convergent validity of appropriate use. The loading of all three items is high and significant, indicating good convergent validity.

To assess the discriminant validity of the latent factors, a 10 factor model was run in which all latent factors were free to covary with the other latent factors. Overall, the model fit indices

indicate reasonable model fit (χ^2=357.556, *df*=280, p=0.00117; RMSEA=0.0278; SRMR=0.0441; GFI=0.876; AGFI=0.833; NFI=0.984; NNFI=0.996; IFI=0.996; CFI=0.996)[13]. The factor loadings and reliability scores for the latent constructs estimated using both the *n*=210 and the *n*=359 samples are reported in Table 2[14]. All indicator items reported in Table 2 (panel A) are statistically significant, supporting the convergent validity of the latent variables[15]. All correlations between the constructs are well below 0.85, indicating that the measurement model is capturing ten distinct constructs (Kline 2005). The composite reliability and average variance extracted measures (Table 2, panel B) further support the validity of the refined measurement model.

Insert Table 2 – Factor Loadings and reliability scores

Common method bias was assessed by comparing the χ^2 of the original model with the χ^2 of an alternative model (as per Bamber and Iyer 2002). Because the data were collected in two instruments, the χ^2 of the original model is compared with two alternative models. Alternative model 1 is a two factor model in which all variables collected in instrument one are measured as a single common variable and the indicator variables captured from instrument two form the other latent factor. Alternative model 2 is a one factor model in which all data are captured by a common factor. The change in χ^2 for alternative model 1 is $1175.112_{(44)}$ and it is $1426.584_{(45)}$ for alternative model 2, indicating that common method bias is not of concern.

Structural Model

The goodness of fit statistics for the structural model indicate acceptable model fit (χ^2=434.685, *df*=300, p<0.001; Normed χ^2=1.45; RMSEA=0.0354; RMSEA (90% confidence interval)=0.0278-0.0425; SRMR=0.0615; GFI=0.856; AGFI=0.818; CFI=0.994; NNFI=0.993). The parameter estimates for the structural paths are reported in Table 3. Because the data are not normally distributed, the model was also estimated in PLS[16]. The standardized estimates for the structural paths estimated in PLS are presented in Figure 3.

Insert Table 3: Structural Path Estimates of the Theoretical Model

Insert Figure 3 – PLS structural path estimates

The results reported in Table 3 and Figure 3 support all hypotheses, except H_7 and H_9[17]. The results in Table 3 indicate that individuals with an intention to use the audit support system appropriately are more likely to use the system appropriately; this supports H_1 (p<0.05). Individuals with a positive attitude to using the audit support system appropriately are more likely to form an intention to use the audit support system appropriately; this supports H_2 (p<0.01). Individuals who perceive a higher level of team consensus and firm consensus are more likely to perceive normative pressure to use the audit support system appropriately and are more likely to form an intention to use the system appropriately; this supports H_3 (p<0.05), H_4 (p<0.01) and H_5 (p<0.05). Individuals with a higher level of self-efficacy are more likely to form an intention to use the audit support system appropriately; this supports H_6 (p<0.05). Individuals who perceive a higher level of external perceived behavioral control to use the audit support system appropriately are more likely to use the audit support system appropriately, which

supports H_8 ($p<0.01$). However, higher levels of perceived behavioral control are not associated with intention to use an audit support system appropriately. Therefore, H_7 is not supported ($p>0.05$).

The non-significance of H_7 indicates that individuals in strong external perceived behavioral control environments do not internalize the external control mechanisms used in their audit firm to the extent that these mechanisms influence an individual's intention. For audit firms relying on the extent of system restrictiveness embedded in their system and the audit review process to ensure auditors use their firm's audit support system appropriately, this finding highlights a potential cause for alarm. If these controls are not present (e.g., use of the system is not mandatory or an auditor is able to partially work around the system), the results suggest that it is unclear how these auditors will behave because they do not internalise the external control mechanisms.

The absolute standardized parameter estimates of the paths from system restrictiveness and perceived audit review effectiveness to perceived behavioral control reported in Table 3 are both greater than 1.00. This is due to a positive interaction between system restrictiveness and the perceived effectiveness of the audit review process (t=2.052, p=0.041, 2-tailed)[18]. This indicates that the effectiveness of the audit review process and high levels of system restrictiveness are complementary, not compensatory, control mechanisms. More restrictive systems appear to influence the perceived effectiveness of the review process. Restrictive audit support systems may structure the review process in such a way that the review process is perceived to be more effective. Interviews conducted with audit partners and managers at the participating audit firms

indicate that the systems deployed in these firms varied in the extent of assistance provided during the review process. More restrictive systems contain sophisticated red-flags and other tools for assessing the extent to which the audit-work is completed (e.g., in terms of the appropriate sign-offs and tests undertaken). The results suggest that audit firms who encourage detailed reviews are more likely to deploy restrictive systems.

Additional Analyses

To assess the effect of the positive interaction between system restrictiveness and the perceived effectiveness of the audit review process on the other latent variables, a multi-group SEM was run. System restrictiveness rather than audit review effectiveness is selected as the grouping variable because differences in the extent of system restrictiveness embedded within audit support systems have been documented across audit firms (Dowling and Leech 2006). Thus, comparing the effect of different levels of system restrictiveness is more reflective of, and informative to, practice.

Respondents were allocated into either a low or high system restrictiveness group based on whether their responses for the single indicator variable (created from the weighted factor scores of SR6 and SR7) were above or below the median response. 172 respondents were allocated into the low restrictiveness group and 187 respondents were allocated into the high restrictiveness group. The model fit for both models is moderate. For the low (high) restrictiveness group the key model fit indices when the models are run separately are: χ^2=333.137, *df*=257, *p*=0.0009; RMSEA=0.042; CFI=0.991; NFI=0.964; NNFI=0.990; GFI=0.780 (χ^2=320.105, *df*=257, *p*=0.0045; RMSEA=0.0363; CFI=0.994; NFI=0.970; GFI=0.775). When comparing models, the

incremental fit indices are important. In both models, CFI and NFI are above 0.90, indicating acceptable fit. The parameter estimates for the structural paths are reported in Table 4.

Insert table 4

The interaction between system restrictiveness and perceived effectiveness of the audit review process is further supported by the SEM results reported in Table 4. The path estimates and *t*-values for the path from perceived effectiveness of the audit review process to perceived behavioral control are significantly different across these two groups[19]. However, this is not the only path that differs. Interestingly, the paths from attitude to intention and from perceived normative pressure to intention are only significant for the low restrictiveness group. The non-significance of attitude to intention in the high restrictiveness group suggests that these individuals do not internalize the control mechanisms. Internalisation of control mechanisms is important for giving meaning to the mechanism and improving its effect on their behavior (Morris and Empson 1998). Furthermore, the path from firm consensus to perceived normative pressure is only significant for the high system restrictiveness group. A comparison of the differences in the significance of the paths across the groups, suggests that socio-ideological normative controls (Alvesson and Kärreman 2004) (from the audit team and the individual's attitude) are used as compensatory control mechanisms when audit support systems with lower levels of system restrictiveness are used. In contrast, when audit support systems with higher levels of system restrictiveness are used, formal technocratic control mechanisms (Alvesson and Kärreman 2004) dominate and explain how auditors use their firm's audit support system. In both cases the control mechanisms positively influence appropriate audit support system use.

The differences in structural paths suggest that different types of controls are more important influences on appropriate use depending upon the extent of system restrictiveness embedded within an audit support system[20].

Sensitivity Analysis

In the analyses reported above, intention was measured with a single item (IUSE13). Because multiple indicators are required to remove measurement error, the results reported above are potentially affected by random measurement error in IUSE13. To assess this, the structural model[21] was re-run several times with the error component of IUSE13 arbitrarily set to a different level. The error component is calculated by multiplying the variance of IUSE13 by one minus its estimated reliability (Terry and O'Leary 1995; Kline 2005). Because there is no *a priori* guidance as to the expected error component of IUSE13, the model was re-run 9 times with reliability alternative set at 95, 90, 85, 80, 75, 70, 65, 50 and 25 percent. The significance of the structural paths did not differ substantially from the results reported previously when reliability is set at 95, 90, 80, 75 and 70 percent. However, when the reliability of intention is set at 65%, the path from perceived behavioral control to appropriate use is not significant (p>0.05, 1-tailed). Except for this path and the path from perceived behavioural control to intention (which is not significant in any of the models), all paths remained significant when reliability is set as low as 25%. For parsimony, the structural path estimates for 4 of the 9 models are presented in Table 5. Overall, the composite reliability of the other latent variables in the study is very high (see Table 2, panel B). Intention is measured using a single item which is similar to one of the three items used to measure appropriate use of the system. The composite reliability of appropriate use is 89.1% and Cronbach's alpha is 80.2%. Using these as the upper and lower bounds of reliability

for intention, the results in Table 5 can be interpreted as indicating that the conclusions drawn earlier are robust to intention being measured using a single indicator.

Insert Table 5

VI. CONCLUSION

The aim of this study was to identify and investigate the antecedents of appropriate audit support system use. Appropriate use was defined as use of the audit support system in a manner consistent with how the audit firm intends the system to be used. A theoretical model grounded in the TPB (Ajzen 1991) and AST (DeSanctis and Poole 1994) was developed. The model was tested empirically using data collected from auditors and analysed using SEM. The data obtained from 210 auditors who replied to instrument one, but did not reply to instrument two were used to refine the measurement component of the model. Data from 359 auditors who replied to both instruments were used to independently validate the refined measurement model and test the structural paths of the theoretical model.

The study identified that a complex set of antecedents influence whether auditors use their firm's audit support system appropriately. Consistent with the TPB, an individual's intention to use the audit support system appropriately was found to significantly influence whether an auditor uses their firm's audit support system appropriately. Attitude, self-efficacy and perceived normative pressure were found to be direct antecedents to an auditor's intention to use the audit support system appropriately. Perceived behavioral control was identified as a direct antecedent to appropriate audit support system use. Perceived audit team and firm consensus on appropriate

use were found to be important antecedents to perceived normative pressure to use the audit support system appropriately. Perceived audit review effectiveness and perceived system restrictiveness were found to have an interactive effect on perceived behavioral control.

The extent of system restrictiveness embedded within a firm's audit support system was found to be associated with different types of control mechanisms influencing how auditors use their firm's audit support system. Auditors using a less restrictive audit support system were more likely to be influenced by normative control mechanisms originating at the audit team level. Audit team consensus indirectly influenced these auditors' intention through perceived normative pressure. Attitude was also identified as an important antecedent for these auditors. In contrast, attitude and perceived normative pressure were not significant determinants of whether auditors using a more restrictive system intended to use the audit support system appropriately. Instead, firm level consensus and technocratic controls, like the audit review process, were important determinants of whether these auditors used their firm's audit support system appropriately. For both groups of auditors, perceived behavioral control influenced their use of the audit support system directly, but did not influence their intended use. These findings have important implications for audit firms, in that they provide important insights into the types of controls audit firms should be promoting depending upon the extent of restrictiveness they choose to embed within their firm's audit support system.

As with any study, the current study has limitations that should be recognized when interpreting the results. The measurement of system restrictiveness was problematic. Only two of the seven items included in instrument one to measure system restrictiveness were used in the final

measure. Although these two items are aligned with the theoretical definition of system restrictiveness used in the current study, they only capture a narrow component of the breadth of system restrictiveness discussed in the prior literature (e.g., Silver 1988; Silver 1990; Wheeler and Valacich 1996). Therefore, the results need to be interpreted in light of this. Future research is needed to further refine and develop a measure of system restrictiveness that captures the theoretical breadth of this construct.

Furthermore, the current study focused on the effect of perceived system restrictiveness. However, perceived system restrictiveness can vary across time and does not necessarily reflect an objective measure of system restrictiveness (Majchrzak et al. 2000). The current study identified the extent of perceived system restrictiveness as an important construct in whether formal or informal control mechanisms indirectly influence appropriate audit support system use. Future research using an objective measure of system restrictiveness will provide an important extension of this study.

The sample included auditors from all of the Big 4 audit firms and two international mid-tier firms. Prior studies have identified differences between Big 4 and non-Big 4 audit firms (see Francis (2004) for a recent review). This suggests that there may be differences across the audit firms participating in the current study which have not been controlled for in the analyses. Separate analyses are unable to be reported for auditors employed at Big 4 audit firms for confidentiality reasons; several Big 4 firms agreed to participate on the condition that audit firms from both the Big 4 and the non-Big 4 participated. Furthermore, the sample does not contain a sufficient number of auditors from each firm to enable the model to be run on a firm by firm

basis. Therefore, firm and audit tier specific differences may possibly influence the demand for formal versus normative controls that are not controlled for in the current study. Future research is needed to investigate this issue.

Despite these caveats, this study significantly contributes to the accounting literature by developing and testing a model grounded in strong *a priori* theory that explains how a complex set of interrelated antecedents influence whether an auditor uses their audit firm's audit support system appropriately. By incorporating several factors related to the individual, audit team, audit firm, audit support system and the audit review process, the model provides a structured lens for investigating how several technocratic and socio-ideological control mechanisms influence auditor behavior. Understanding how control mechanisms jointly influence auditor behavior is important because effective audits are characterised by the successful interplay of socio-ideological and technocratic control mechanisms (Gupta et al. 1994; Pierce and Sweeney 2005). Although the theoretical model proposed in the current study is grounded in the specific behavior of appropriate audit support system use, the model can be tailored to investigate other control mechanisms, the effect of other antecedents, different auditor behavior or different technological tools. As such, the theoretical model developed and tested in this study can be further developed to provide important insights into other behaviors of interest to accounting researchers.

[1] Examples of inappropriate use include deleting recommended/mandatory audit steps to avoid work, adding irrelevant steps, working around the system (Bedard et al. 2005a; Bedard et al. 2005b), changing inputs after approval has been obtained, unauthorized signing off (i.e., preparers logging on as reviewers), not using sampling software correctly (e.g., working backwards (Kachelmeier and Messier 1990; Messier et al. 2001), closing review points down before they have been addressed, handwriting review notes (Bedard et al. 2005a; Bedard et al. 2005b), answering review notes in a review note instead of adding additional information to a workpaper, and backdating workpapers.

[2] The term perceived normative pressure is used instead of the more generic term, subjective norm. Subjective norms are an individual's evaluation of the likelihood an important referent individual will approve or disapprove of an individual's behavior (Ajzen 1991). Perceived normative pressure refers to the context specific subjective norm of using an audit support system in a manner consistent with how the audit firm intends the system to be used.

[3] The term "audit team" normally refers to the set of auditors working on a specific audit engagement (Solomon 1987; Rich et al. 1997b). Because auditors often work together on multiple engagements (Asare and McDaniel 1996), the "audit team" an auditor identifies with can extend beyond a specific audit engagement. Consistent with this, "audit team" is defined broadly as the social clan of auditors an auditor works with on a regular basis (i.e., the clan exists as a team across several audit engagements).

[4] A classic example is the Hawthorne study of the late 1920's, which found that "some groups enforced norms about work behavior that were consistent with company policies, but others did the opposite" (Hackman 1992,200).

[5] For example, preparers may purposefully stylize how working papers are presented in attempts to influence reviewers (Rich et al. 1997a), subordinates are more likely to reach decisions that are consistent with the views of their superiors (Wilks 2002), and auditors expecting a face-to-face review are more likely to be more effective during the audit than auditors expecting the review to be conducted electronically (Brazel et al. 2004).

[6] For instrument 1, respondents were entered into a draw for the chance of wining 1 of 4 prizes, each valued at $149. For instrument 2, respondents were entered into a draw to win a prize valued at $449.

[7] The analysis was conducted for each group at two levels: the last 5% of respondents and the last 10% of respondents were compared against the early respondents. The results for the n=210 group are: Wilk's Lambda=0.814, $F_{(57,152)}$=0.610; p=0.983 (late=5% of respondents); Wilk's Lambda=0.698, $F_{(57,152)}$=1.154; p=0.244

(late=10% of respondents). The results for the n=359 group are: Wilk's Lambda=0.795, $F_{(72,86)}$=1.025; p=0.433 (late=5% of respondents); Wilk's Lambda=0.784, $F_{(72,86)}$=1.095; p=0.299 (late=10% of respondents).

[8] 93 of the 2010 instruments initially sent were returned because they could not be delivered.

[9] This response rate is reasonable considering that instrument 1 is 12 pages long. Pilot testing indicated that it took approximately 15-20 minutes to complete.

[10] LISREL 8.72 was used.

[11] FCON3 was eliminated because the error term was correlated with FCON4 and resulted in poor model fit in the one factor model. In the initial run using the 7 indicator items measuring system restrictiveness, the theta-delta matrix was not positive definite and the preliminary solution indicated poor model fit. An analysis of the standardized residuals indicated that the primary determinants of the fit problem are with SR2, SR3 and SR5. These items were therefore eliminated. ATT2 was eliminated because its standardized loading was 0.457 and Cronbach's alpha, which is 0.665 when ATT2 is included, increases to 0.860 when it is excluded. The initial one factor model for perceived behavioral control did not converge. The preliminary solution and additional analyses in SPSS indicated that PBC1 did not have communality with the other two items; PB1 was therefore eliminated.

[12] The elimination of SR4 can be theoretically justified on the basis that it captures the extent of customisation within the audit support system, whereas SR6 and SR7 capture the extent of flexibility within the system (i.e., the extent to which the system constrains user behavior). Of the different aspects of system restrictiveness included in the original seven items, SR6 and SR7 are the most aligned with the theoretical definition of system restrictiveness used in the current study. Therefore, measuring system restrictiveness using these two items does not limit the conclusions that can be drawn regarding the aspect of system restrictiveness of interest in the current study.

[13] The model fit indices are comparable to those reported for other complex models in the literature, which have been deemed to have acceptable fit. For example, the following model indices for an 8 factor model were reported by Bamber and Iyer (2002:30): χ^2=549.28, df=196, p<0.01; RMSEA=0.08; SRMR=0.06; GFI=0.87; AGFI=0.79; NFI=0.87; NNFI=0.88; IFI=0.91; CFI=0.91.

[14] Both Cronbach's alpha and a composite reliability measure calculated in PLS are provided because the item loadings are not tau-equivalent. In these circumstances, Cronbach's alpha represents the lower bound of reliability (Bacon et al. 1995; Sailsbury et al. 2002). Composite reliability, which incorporates the loading weights of the items, is a more reliable estimate (Bacon et al. 1995).

[15] The smallest *t*-value is 4.01 for the *n*=210 sample, and 9.85 for the *n*=359 sample. Potential cross loadings were also assessed by reviewing the LISREL output and by conducting an exploratory factor analysis using maximum likelihood estimation and oblimin rotation in SPSS. TCON2 and PBC3 were both identified as cross loading on firm consensus. The cross loadings are 0.398 and 0.336 respectively. Because the cross-loadings are relatively low and there is no theoretical reason to do so, the structural paths are estimated without the cross-loadings.

[16] PLS does not have stringent sample size or data distribution requirements, and thus running the model in PLS provides additional support for the estimates produced by LISREL with robust ML.

[17] In Table 3, the standardized parameter estimates for H_9 and H_{10} are greater than one. Therefore, they cannot be used to accept or reject H_9 or H_{10}. Subsequent analyses indicate that the parameter estimates for the other hypotheses are robust to the data problem associated with H_9 and H_{10}. Additionally, when the model is estimated using PLS-Graph 3.0 (Figure 3), all standardized parameters are within acceptable range. The standardized parameters (*t*-values) estimated in PLS for H_9 and H_{10} are 0.049 (0.872) and 0.418 (6.9511).

[18] The multiple indicators for each latent variable were combined into a single continuous item using the factor weights of each indicator variable obtained by running one factor congeneric models. A multiple regression was estimated with perceived behavioral control as the dependent variable, and system restrictiveness, audit review effectiveness and the product term of these two constructs as the independent variables.

[19] A χ^2 difference test was conducted by fixing the value of the path from audit effectiveness to perceived behavioral control in the low restrictiveness model to 1.448 (i.e., equal to the parameter estimate in the high group). The difference in χ^2 is significant ($\chi^2_{(1)}$=4.241; p<0.05).

[20] Dowling and Leech (2006) describe five of the six participating audit firms' audit support systems. Using these descriptions and a description of the sixth firm's system provided by a partner at the audit firm, the participating audit firms were coded as having high or low restrictive systems. Four firms are classified as having a low restrictive system, and two firms are classified as having a high restrictive system. The correlation between this coding and the perceived level of system restrictiveness coding is significant (r=0.230, p<0.001). This supports the assertion that splitting responses based upon perceived level of system restrictiveness is correlated with specific differences in the six firms' audit support systems. The results reported here suggest that audit firms chose complementary control mechanisms based on the extent of system restrictiveness. Furthermore, the significant correlation between the coding based on an objective understanding of the audit support systems deployed across all audit firms and the level of perceived system restrictiveness supports the validity of SR6 and SR7 as measures of system restrictiveness.

[21] Because the positive interaction between system restrictiveness and audit review effectiveness leads to an estimation problem between these two constructs, system restrictiveness is excluded form the model. Since the main effect of system restrictiveness is not significant, excluding it does not result in omitted variable bias, which could be the case if audit review effectiveness is excluded.

References

Ajzen, I. 1991. The Theory of Planned Behavior. *Organizational Behavior and Human Decision Processes* 50: 179-211.

_____,. 2002. *Constructing a Tpb Questionnaire: Conceptual and Methodological Considerations*. Working Paper.

Alvesson, M., and D. Kärreman. 2004. Interfaces of Control. Technocratic and Socio-Ideological Control in a Global Management Consultancy Firm. *Accounting, Organizations and Society* 29: 423-444.

Armitage, C. J., and M. Conner. 2001. Efficacy of the Theory of Planned Behavior: A Meta-Analytic Review. *British Journal of Social Psychology* 40: 471-499.

Armitage, C. J., M. Conner, J. Loach, and D. Willets. 1999. Different Perceptions of Control: Applying an Extended Theory of Planned Behavior to Legal and Illegal Drug Use. *Basic and Applied Psychology* 21 (4): 301-316.

Asare, S. K., and L. S. McDaniel. 1996. The Effects of Familiarity with the Preparer and Task Complexity on the Effectiveness of the Audit Review Process. *The Accounting Review* 71 (2): 139-159.

Bacon, D. R., P. L. Sauer, and M. Young. 1995. Composite Reliability in Structural Equation Modeling. *Educational and Psychological Measurement* 55 (3): 394-406.

Bamber, M. E., and V. M. Iyer. 2002. Big 5 Auditors' Professional and Organizational Identification: Consistency or Conflict. *Auditing: A Journal of Practice & Theory* 21 (2): 21-36.

Bamber, M. E., and R. J. Ramsay. 1997. An Investigation of the Effects of Specialisation in Audit Workpaper Review. *Contemporary Accounting Research* 14 (3): 501-513.

_____,. 2000. The Effects of Specialization in Audit Workpaper Review on Review Efficiency and Reviewers' Confidence. *Auditing: A Journal of Practice & Theory* 19 (2): 147-157.

Bamber, M. E., D. Snowball, and R. M. Tubbs. 1989. Audit Structure and Its Relation to Role Conflict and Role Ambiguity: An Empirical Investigation. *The Accounting Review* 64 (2): 285-299.

Banker, R. D., H. Chang, and Y. Kao. 2002. Impact of Information Technology on Public Accounting Firm Productivity. *Journal of Information Systems* 16 (2): 209-222.

Bedard, J. C., M. L. Ettredge, C. Jackson, and K. M. Johnstone. 2005a. *Electronic Media in the Audit Work Process: Perceptions, Intentions and Use*. Working Paper, Northeastern University, Boston.

Bedard, J. C., M. L. Ettredge, and K. M. Johnstone. 2005b. *Adopting Electronic Workpaper Systems: Task Analysis, Transition and Learning Issues, and Auditor Resistance*. Working paper, Northeastern University, Boston.

Bedard, J. C., C. Jackson, M. L. Ettredge, and K. M. Johnstone. 2003. The Effect of Training on Auditors' Acceptance of an Electronic Work System. *International Journal of Accounting Information Systems* 4 (4): 227-250.

Bentler, P. M., and P. Dudgeon. 1996. Covariance Structure Analysis: Statistical Practice, Theory and Directions. *Annual Review of Psychology* 47: 563-592.

Bobek, D. D., and R. C. Hatfield. 2003. An Investigation of the Theory of Planned Behavior and the Role of Moral Obligation in Tax Compliance. *Behavioral Research In Accounting* 15: 13-38.

Brazel, J. F., C. P. Agoglia, and R. C. Hatfield. 2004. Electronic Versus Face-to-Face Review: The Effects of Alternative Forms of Review on Auditors' Performance. *The Accounting Review* 79 (4): 949-966.

Byrne, B. M. 1998. *Structural Equation Modeling with Lisrel, Prelis and Simplis: Basic Concepts, Applications, and Programming*. Mahwah, New Jersey, Lawrence Erlbaum Associates.

Chin, W. W., A. Gopal, and W. D. Sailsbury. 1997. Advancing the Theory of Adaptive Structuration: The Development of a Scale to Measure Faithfulness of Appropriation. *Information Systems Research* 8 (4): 342-367.

Compeau, D. R., and C. A. Higgins. 1995. Computer Self-Efficacy: Development of a Measure and Initial Test. *MIS Quarterly* 19 (2): 189-211.

Davis, F. D., R. P. Bagozzi, and P. R. Warshaw. 1989. User Acceptance of Information Technology: A Comparison of Two Theoretical Models. *Management Science* 35 (8): 982-1003.

DeSanctis, G., and M. S. Poole. 1994. Capturing the Complexity in Advanced Technology Use: Adaptive Structuration Theory. *Organization Science*` 5 (2): 121-147.

Dillman, D. A. 2000. *Mail and Internet Surveys. The Tailored Design Method*. United States of America, John Wiley & Sons Inc.

Donald, I., and S. R. Cooper. 2001. A Facet Approach to Extending the Normative Component of the Theory of Reasoned Action. *British Journal of Social Psychology* 40: 599-621.

Dowling, C., and S. A. Leech. 2006. An Investigation of Decision Aids in Audit Firms: Current Practice and Opportunities for Future Research. Annual Meeting of the American Accounting Association (August), Washington, DC.

Finlay, K. A., D. Trafimow, and D. Jones. 1997. Predicting Health Behaviours from Attitudes and Subjective Norms: Between-Subjects and within-Subjects Analyses. *Journal of Applied Psychology* 27 (22): 2015-2031.

Francis, J. R. 2004. What Do We Know About Audit Quality? *The British Accounting Review* 36: 345-368.

Gibbins, M., and J. D. Newton. 1994. An Empirical Exploration of Complex Accountability in Public Accounting. *Journal of Accounting Research* 32 (2): 165-186.

Gibbins, M., and K. T. Trotman. 2002. Audit Review: Managers' Interpersonal Expectations and Conduct of the Review. *Contemporary Accounting Research* 19 (3): 411-444.

Gupta, P. P., M. W. Dirsmith, and T. J. Fogarty. 1994. Coordination and Control in a Government Agency: Contingency and Institutional Theory Perspectives on Gao Audits. *Administrative Science Quarterly* 39 (2): 264-284.

Hackman, J. R. 1992. Group Influences on Individuals in Organizations. *Handbook of Industrial and Organizational Psychology*. M. D. Dunnette and L. M. Hough. California, Consulting Psychologists Press, Inc. 3**:** 199-267.

Hagger, M. S., N. Chatzisarantis, and S. J. H. Biddle. 2001. The Influence of Self-Efficacy and Past Behavior on the Physical Activity Intentions of Young People. *Journal of Sports Science* 19: 711-725.

Hanno, D. M., and G. R. Violette. 1996. An Analysis of Moral and Social Influences on Taxpayer Behavior. *Behavioral Research In Accounting* 8 (Supplement): 57-75.

Hartwick, J., and H. Barki. 1994. Explaining the Role of User Participation in Information System Use. *Management Science* 40 (4): 440-465.

Kachelmeier, S. J., and W. F. Messier. 1990. An Investigation of the Influence of a Nonstatistical Decision Aid on Auditor Sample Size Decisions. *The Accounting Review* 65 (1): 209-226.

Karahanna, E., and D. W. Straub. 1999. The Psychological Origins of Perceived Usefulness and Ease-of-Use. *Information & Management* 35: 237-250.

Kline, R. B. 2005. *Principles and Practice of Structural Equation Modeling*. New York, USA, The Guilford Press.

Lynch, A., and M. Gomaa. 2003. Understanding the Potential Impact of Information Technology on the Susceptibility of Organizations to Fraudulent Employee Behavior. *International Journal of Accounting Information Systems* 4: 295-308.

Majchrzak, A., R. E. Rice, A. Malhorta, and N. King. 2000. Technology Adaption: The Case of a Computer-Supported Inter-Organizational Virtual Team. *MIS Quarterly* 24 (4): 569-600.

Manson, S., S. McCartney, and M. Sherer. 2001. Audit Automation as Control within Audit Firms. *Accounting, Auditing & Accountability Journal* 14 (1): 109-130.

McCaul, K. D., A. K. Sandgren, H. K. O'Neill, and V. B. Hinsz. 1993. The Value of the Theory of Planned Behavior, Perceived Control, and Self-Efficacy Expectations for Predicting Health-Protective Behaviours. *Basic and Applied Psychology* 14 (2): 231-252.

Messier, W. F., S. J. Kachelmeier, and K. L. Jensen. 2001. An Experimental Assessment of Recent Professional Developments in Nonstatistical Audit Sampling Guidance. *Auditing: A Journal of Practice & Theory* 20 (1): 81-96.

Morris, T., and L. Empson. 1998. Organization and Expertise: An Exploration of Knowledge Bases and the Management of Accounting and Consulting Firms. *Accounting, Organizations and Society* 23 (5/6): 609-624.

Nado, R., M. Chams, J. Delisio, and W. Hamscher. 1996. Comet: An Application of Model-Based Reasoning to Accounting Systems. Proceedings of the Eigth Innovative Applications of Artificial Intelligence Conference, American Association for Artificial Intelligence, California.

Nelson, M. W., and H.-T. Tan. 2005. Judgment and Decision Making Research in Auditing: A Task, Person, and Interpersonal Interaction Perspective. *Auditing: A Journal of Practice & Theory* 24 (Supplement): 41-71.

Orlikowski, W. 1992. The Duality of Technology: Rethinking the Concept of Technology in Organizations. *Organization Science* 3 (3): 398-427.

Otley, D. T., and B. J. Pierce. 1996. The Operation of Control Systems in Large Audit Firms. *Auditing: A Journal of Practice & Theory* 15 (2): 65-87.

Owhoso, V. E., W. F. Messier, and J. G. Lynch. 2002. Error Detection by Industry-Specialized Teams During Sequential Audit Review. *Journal of Accounting Research* 40: 883-900.

Perugini, M., and R. P. Bagozzi. 2001. The Role of Desires and Anticipated Emotions in Goal-Directed Behaviours: Broadening and Deepening the Theory of Planned Behavior. *British Journal of Social Psychology* 40: 79-98.

Pierce, B., and B. Sweeney. 2005. Management Control in Audit Firms - Partners' Perspectives. *Management Accounting Research* 16: 340-370.

Ramsay, R. J. 1994. Senior/Manager Differences in Audit Workpaper Review Performance. *Journal of Accounting Research* 32 (1): 127-135.

Reimers, J. L., and M. G. Fennema. 1999. The Audit Review Process and Sensitivity to Information Source Objectivity. *Auditing: A Journal of Practice & Theory* 18 (1): 117-123.

Rich, J. S., I. Solomon, and K. T. Trotman. 1997a. The Audit Review Process: A Characterization from the Persuasion Perspective. *Accounting, Organizations and Society* 22 (5): 481-505.

_____,. 1997b. Multi-Auditor Judgment/Decision Making Research: A Decade Later. *Journal of Accounting Literature* 16: 86-126.

Rudolph, H. R., and R. B. Welker. 1998. The Effects of Organizational Structure on Communication within Audit Teams. *Auditing: A Journal of Practice & Theory* 17 (2): 1-14.

Sailsbury, W. D., W. W. Chin, A. Gopal, and P. R. Newsted. 2002. Research Report: Better Theory through Measurement - Developing a Scale to Capture Consensus on Appropriation. *Information Systems Research* 13 (1): 91-103.

Satorra, A., and P. M. Bentler. 1994. Corrections to Test Statistics and Standard Errors in Covariance Structure Analysis. *Latent Variables Analysis: Applications for Developmental Research*. A. von Eye and C. C. Clogg. California, Sage Publications Inc**:** 399-419.

Sheeran, P., D. Trafimow, K. A. Finaly, and P. Norman. 2002. Evidence That the Type of Person Affects the Strength of the Perceived Behavioral Control-Intention Relationship. *The British Journal of Social Psychology* 41: 253-270.

Silver, M. S. 1988. User Perceptions of Decision Support System Restrictiveness: An Experiment. *Journal of Management Information Systems* 5 (1): 51-65.

_____,. 1990. Decision Support Systems: Directed and Nondirected Change. *Information Systems Research* 1 (1): 47-70.

Solomon, I. 1987. Multi-Auditor Judgment/Decision Making Research. *Journal of Accounting Literature* 6: 1-25.

Tan, H.-T., and K. Jamal. 2001. Do Auditors Objectively Evaluate Their Subordinates' Work? *The Accounting Review* 76 (1): 99-110.

Taylor, S., and P. A. Todd. 1995. Understanding Information Technology Usage: A Test of Competing Models. *Information Systems Research* 6 (2): 144-176.

Terry, D. J., M. A. Hogg, and K. M. White. 1999. The Theory of Planned Behavior: Self-Identify, Social Identity and Group Norms. *British Journal of Social Psychology* 38: 225-244.

Terry, D. J., and J. E. O'Leary. 1995. The Theory of Planned Behavior: The Effects of Perceived Behavioral Control and Self-Efficacy. *British Journal of Social Psychology* 34: 199-220.

Trafimow, D., P. Sheeran, B. Lombardo, K. A. Finaly, J. Brown, and C. J. Armitage. 2004. Affective and Cognitive Control of Persons and Behaviours. *British Journal of Social Psychology* 43: 207-224.

Trotman, K. T. 1985. The Review Process and the Accuracy of Auditor Judgements. *Journal of Accounting Research* 23 (2): 740-752.

Trotman, K. T., and P. W. Yetton. 1985. The Effect of the Review Process on Auditor Judgments. *Journal of Accounting Research* 23 (1): 256-267.

Venkatesh, V. 2000. Determinants of Perceived Ease of Use: Integrating Control, Intrinsic Motivation, and Emotion into the Technology Acceptance Model. *Information Systems Research* 11 (4): 342-365.

Venkatesh, V., M. G. Morris, G. B. Davis, and F. D. Davis. 2003. User Acceptance of Information Technology: Toward a Unified View. *MIS Quarterly* 27 (3): 425-478.

Wheeler, B. C., and J. S. Valacich. 1996. Facilitation, Gss, and Training as Sources of Process Restrictiveness and Guidance for Structured Group Decision Making: An Empirical Assessment. *Information Systems Research* 7 (4): 429-450.

Wilks, T. J. 2002. Predecisional Distortion of Evidence as a Consequence of Real-Time Audit Review. *The Accounting Review* 77 (1): 51-71.

Winograd, B. N., J. S. Gerson, and B. L. Berlin. 2000. Audit Practices of Priceaterhousecoopers. *Auditing: A Journal of Practice & Theory* 19 (2): 175-182.

Figure 1: The Theory of Planned Behavior

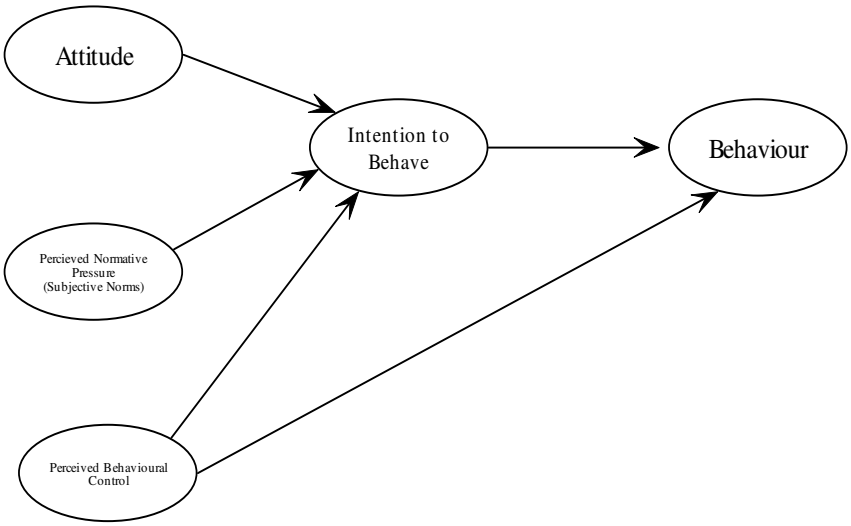

Figure 2: Theoretical Model of Factors Influencing Appropriate Audit Support System Use

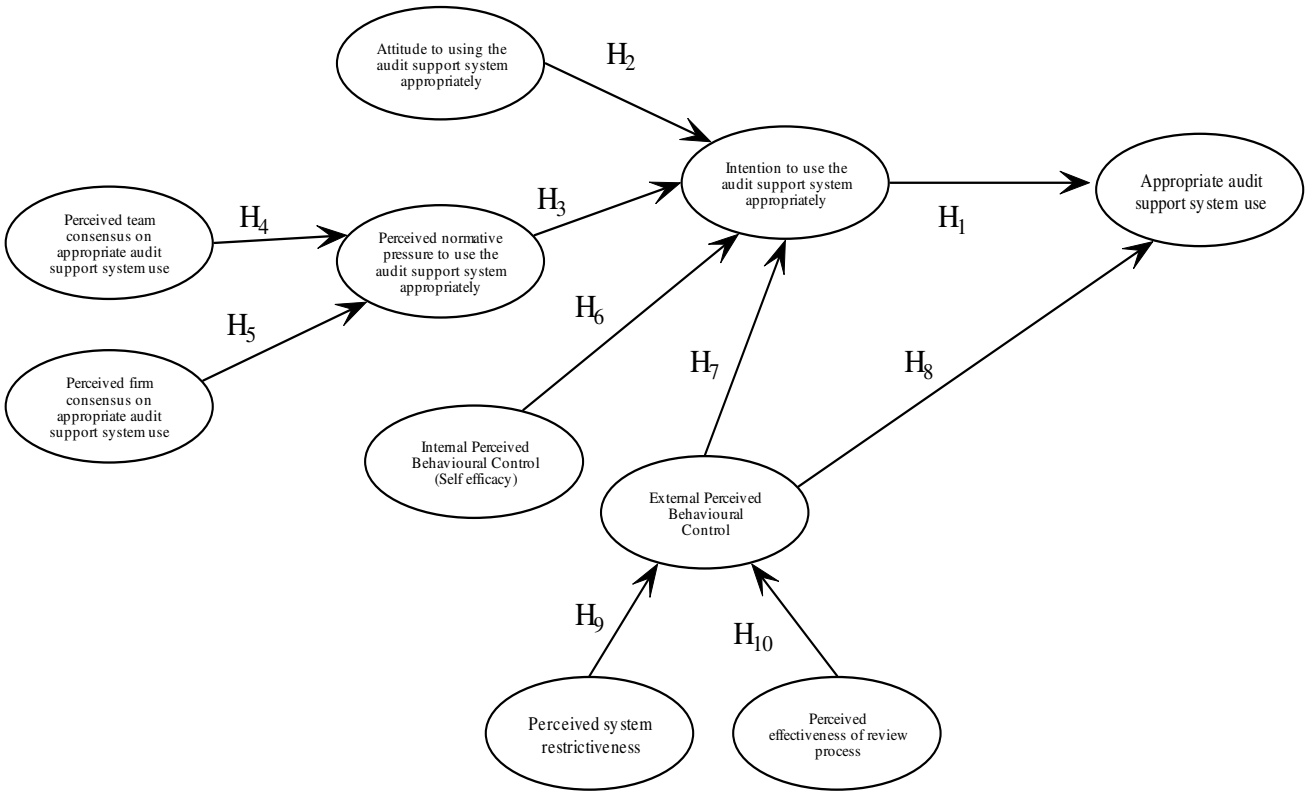

Figure 3: PLS Standardized Estimates of the Structural Paths of the Theoretical Model

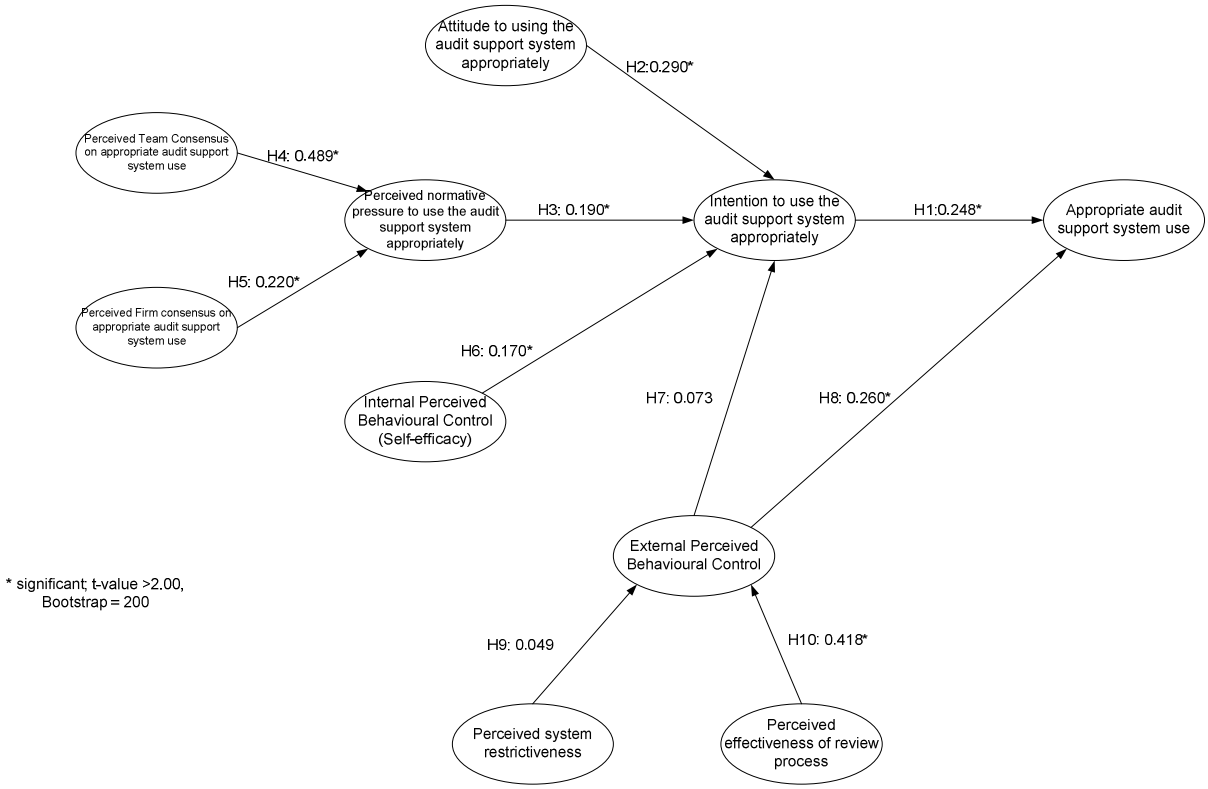

Table 1: Descriptive Statistics of Sample

		Auditors who responded to instrument 1 only (*n*=210)		Auditors who responded to instrument 1 and instrument 2 (*n*=356)	
		Number	**Percent**	**Number**	**Percent**
Firm	A	69	32.9	59	16.4
	B	43	20.5	76	21.2
	C	61	29.0	73	20.3
	D	23	11.0	79	22.0
	E	7	3.3	35	9.7
	F	7	3.3	37	10.3
Team Size*	3 or less	42	20.0	89	24.8
	4 to 10	143	68.1	219	61.0
	11 to 20	16	7.6	38	10.6
	More than 20	9	4.3	12	3.3
Team Position	Graduate	9	4.3	39	10.9
	Junior	36	17.1	67	18.7
	Senior	83	39.5	102	28.4
	Supervisor	34	16.2	45	12.5
	Manager	24	11.4	73	20.3
	Senior Manager	16	7.6	29	8.1
	Other	8	3.8	4	1.1
User Type	Preparer	110	52.4	171	47.6
	Reviewer	31	14.8	59	16.4
	Preparer and Reviewer	69	32.9	129	35.9
Audit Experience	Less than 1 year	13	6.2	44	12.3
	1 - less than 2 years	32	15.2	59	16.4
	2 - less than 4 years	75	35.7	98	27.3
	4 - less than 6 years	49	23.3	75	20.9
	6 - less than 9 years	22	10.5	56	15.6
	9 - less than 12 years	15	7.1	15	4.2
	12 or more years	4	1.9	12	3.3
Gender	Female	101	48.1	177	49.3
	Male	109	51.9	182	50.7
Training on Audit Support System	Less than 3 days	46	21.9	78	21.7
	4 - 10 days	92	43.8	144	40.1
	11 - 20 days	45	21.4	74	20.6
	21 - 45 days	23	11.0	49	13.6
	More than 45 days	4	1.9	14	3.9

Table 2: Confirmatory Factor Analysis Results

Latent variable indicators	Attitude		System Restrictiveness		Team Consensus		Firm Consensus		Perceived Normative Pressure		Self-Efficacy		Perceived Behavioral Control		Audit Review Effectiveness		Intention		Appropriate Use	
	n=210	*n*=359	*n*=210	*n*=359	*n*=210	*n*=359	*n*=210	*n*=359	*n*=210	*n*=359	*n*=210	*n*=359	*n*=210	*n*=359	*n*=210	*n*=359	*n*=210	*n*=359	*n*=210	*n*=359
Panel A: Item Loadings estimated in LISREL (all loadings are significant; $t > 1.96$)																				
ATT1	0.909	0.857																		
ATT3	0.873	0.926																		
SR4			0.355	N/a																
SR6			0.602	0.801																
SR7			0.467	0.593																
TCON1					0.821	0.700														
TCON2					0.740	0.669														
TCON3					0.992	0.925														
TCON4					0.878	0.889														
FCON1							0.882	0.872												
FCON2							0.868	0.859												
FCON3							0.676	0.728												
PTNR2									0.836	0.876										
REVIEW									0.850	0.852										
MGR2									0.907	0.919										
GRAD2									0.804	0.789										
SE1											0.842	0.817								
SE2											0.900	0.836								
SE3											0.852	0.845								
PBC2													0.886	0.905						
PBC3													0.721	0.705						
AR1															0.758	0.791				
AR2															0.866	0.770				
AR3															0.724	0.752				
IUSE13																	1.000	1.000		
AUSE13																			N/a	0.805
AUSE14																			N/a	0.724
AUSE15																			N/a	0.934
Panel B: Reliability Estimates & Average Variance Extracted (AVE) estimated in SPSS or PLS																				
Cronbachs alpha	0.860	0.851	0.439	0.618	0.873	0.825	0.814	0.814	0.885	0.889	0.871	0.836	0.696	0.701	0.753	0.765	1.00	1.00	N/a	0.802
Composite Reliability	0.934	0.931	0.727	0.839	0.917	0.891	0.894	0.893	0.922	0.925	0.921	0.903	0.878	0.878	0.860	0.866	1.00	1.00	N/a	0.893
AVE	0.877	0.870	0.471	0.723	0.735	0.672	0.735	0.736	0.747	0.754	0.795	0.757	0.782	0.783	0.672	0.684	1.00	1.00	N/a	0.736

Table 3: LISREL Structural Path Estimates of the Theoretical Model

Hypothesis	Structural Path	Unstandardized (Standardized) Parameter Estimate	Standard Error	*t*-value
H1	INTENT → APUSE	0.105 (0.264)	0.031	3.350*
H2	ATT → INTENT	0.296 (0.372)	0.265	4.030**
H3	PNORM → INTENT	0.503 (0.195)	0.156	3.226*
H4	TCON → PNORM	0.424 (0.488)	0.126	4.464**
H5	FCON → PNORM	0.259 (0.316)	0.116	2.999*
H6	SE-EF → INTENT	0.172 (0.199)	0.294	1.975*
H7	PBC → INTENT	0.084 (0.049)	0.239	0.353
H8	PBC → APUSE	0.242 (0.353)	0.051	4.783**
H9	SYSRES → PBC	-4.462 (-3.249)	3.274	-1.572
H10	AREV → PBC	6.089 (3.795)	3.292	1.969*

* significant at the $p<0.05$ (1-tailed); ** significant at the $p<0.01$ (1-tailed)

Key:
APUSE = Appropriate use of the audit support system
AREV = Perceived effectiveness of the audit review process
ATT = Attitude to using the audit support system appropriately
FCON = Perceived firm consensus on appropriate audit support system use
INTENT = Intention to use the audit support system appropriately
PBC = External Perceived Behavioral Control
PNORM = Perceived normative pressure to use the audit support system appropriately
SE-EF = Internal Perceived Behavioral Control (Self-efficacy)
SYSRES = Perceived System Restrictiveness
TCON = Perceived team consensus on appropriate audit system use

Table 4: High vs Low System Restrictiveness Groups

Hypothesis	Structural Path	Low SYSRES	High SYSRES
		Parameter Estimate[#] *t*-value	
H1	INTENT → APUSE	0.229 3.509*	0.151 2.719*
H2	ATT → INTENT	0.284 4.257**	1.361 1.566
H3	PNORM → INTENT	0.428 3.129*	0.423 1.472
H4	TCON → PNORM	0.614 6.326**	0.094 0.385
H5	FCON → PNORM	0.140 1.391	0.806 3.092*
H6	SE-EF → INTENT	0.093 2.090*	0.834 2.061*
H7	PBC → INTENT	-0.002 -0.022	0.257 0.801
H8	PBC → APUSE	0.116 1.952*	0.442 4.029**
H10	AREV → PBC	1.305 5.198**	1.448 12.449**

* significant at the p<0.05 (1-tailed); ** significant at the p<0.01 (1-tailed)

[#] Only the unstandardized estimates are reported because differences in variances across both groups means only the unstandardized estimates are relevant (Kline 2005).

Key:
APUSE = Appropriate use of the audit support system
AREV = Perceived effectiveness of the audit review process
ATT = Attitude to using the audit support system appropriately
FCON = Perceived firm consensus on appropriate audit support system use
INTENT = Intention to use the audit support system appropriately
PBC = External Perceived Behavioral Control
PNORM = Perceived normative pressure to use the audit support system appropriately
SE-EF = Internal Perceived Behavioral Control (Self-efficacy)
SYSRES = Perceived System Restrictiveness
TCON = Perceived team consensus on appropriate audit system use

Table 5: Assessment of the Effect of Measurement Error in IUSE13

Hypothesis	Structural Path	Assessment of the reliability of INTENT Unstandardized Parameter Estimate *t*-value			
		R_m=90%	R_m=75%	R_m=65%	R_m=50%
H1	INTENT → APUSE	0.148 4.829**	0.207 5.649**	0.256 6.478**	0.306 7.185**
H2	ATT → INTENT	0.282 4.097**	0.255 3.868**	0.223 3.585*	0.180 3.126*
H3	PNORM → INTENT	0.510 3.721**	0.534 4.060**	0.542 4.294**	0.542 4.453**
H4	TCON → PNORM	0.424 4.426**	0.425 4.434**	0.426 4.444**	0.426 4.459**
H5	FCON → PNORM	0.258 2.967*	0.258 2.964*	0.257 2.960*	0.256 2.955*
H6	SE-EF → INTENT	0.188 2.798*	0.211 3.286*	0.227 3.716**	0.243 4.179**
H7	PBC → INTENT	0.101 0.831	0.106 0.884	0.134 1.120	0.186 1.541
H8	PBC → APUSE	0.178 3.894**	0.116 2.375*	0.064 1.242	0.012 0.218
H10	AREV → PBC	1.295 13.368**	1.284 13.216**	1.280 13.145**	1.279 13.112**

* significant at the p<0.05 (1-tailed); ** significant at the p<0.01 (1-tailed)

Key:
APUSE = Appropriate use of the audit support system
AREV = Perceived effectiveness of the audit review process
ATT = Attitude to using the audit support system appropriately
FCON = Perceived firm consensus on appropriate audit support system use
INTENT = Intention to use the audit support system appropriately
PBC = External Perceived Behavioral Control
PNORM = Perceived normative pressure to use the audit support system appropriately
SE-EF = Internal Perceived Behavioral Control (Self-efficacy)
TCON = Perceived team consensus on appropriate audit system use

APPENDIX A: CONSTRUCTS, ITEMS AND ITEM CODES

Item Code	Item
Appropriate Use (AUSE) Only AUSE13, AUSE14 and AUSE15 are used in the measurement model - see note A at end of table.	
AUSE1	Consulted with audit team members when not sure how to use your firm's audit support system
AUSE2	Provided answers to checklist questions in your firm's audit support system when you were not confident as to the 'true' answer (R)
AUSE3	Knowingly provided incorrect answers to checklist questions in your firm's audit support system (R)
AUSE4	Used your firm's audit support system's help function when you were unsure how to use the system
AUSE5	Changed or deleted difficult to complete audit steps generated in your firm's audit support system (R)
AUSE6	Changed or deleted inefficient to complete audit steps generated in your firm's audit support system (R)
AUSE7	Completed steps in your firm's audit support system after the work was signed off (R)
AUSE8	Documented additional work in a review note instead of the working papers contained in your firm's audit support system (R)
AUSE9	Backdated work papers contained in your firm's audit support system (R)
AUSE10	Completed all audit steps generated in your firm's audit support system
AUSE11	Logged on to your firm's audit support system as someone else (R)
AUSE12	Signed off an audit step as completed in your firm's audit support system when it had not been completed (R)
AUSE13	Used your firm's audit support system in the way your audit firm intends the system to be used
AUSE14	During the last 3-4 months there have been times when I did not use my firm's audit support system as it should have been used (R)
AUSE15	My use of my firm's audit support system was consistent with how my audit firm expects the system to be used
Intention to use the audit support system appropriately (INTENT) Only USE13 is used in the measurement model – see note B at end of table.	
IUSE1	Consult with audit team members when you are not sure how to use your firm's audit support system
IUSE2	Provide answers to checklist questions in your firm's audit support system when you are not confident as to the 'true' answer (R)
IUSE3	Knowingly provide incorrect answers to checklist questions in your firm's audit support system (R)
IUSE4	Use your firm's audit support system's help function when you are unsure how to use the system
IUSE5	Change or delete difficult to complete audit steps generated in your firm's audit support system (R)
IUSE6	Change or delete inefficient to complete audit steps generated in your firm's audit support system (R)
IUSE7	Complete steps in your firm's audit support system after the work is signed off (R)
IUSE8	Document additional work in a review note instead of the working papers contained in your firm's audit support system (R)
IUSE9	Backdate work papers contained in your firm's audit support system (R)
IUSE10	Complete all audit steps generated in your firm's audit support system
IUSE11	Log on to your firm's audit support system as someone else (R)
IUSE12	Sign off an audit step as completed in your firm's audit support system when it has not been completed (R)
IUSE13	Use your firm's audit support system in the way your audit firm intends the system to be used
Attitude (ATT)	
ATT1	Using my firm's audit support system the way my audit firm intends the system to be used is beneficial to me

Item Code	Item
ATT2	Using my firm's audit support system the way my audit firm intends the system to be used is useless to me (R)
ATT3	Using my firm's audit support system the way my audit firm intends the system to be used is good for me
Perceived Normative Pressure to use the audit support system appropriately (PNORM) Only PTNR2, REVIEWER1, MGR2, and GRAD2 are used in the measurement model – see note C at end of table.	
PTNR1	My audit team partner always uses our firm's audit support system the way our audit firm intends the system to be used
PTNR2	The partner(s) in my audit team always expect me to use our firm's audit support system the way our audit firm intends the system to be used
REVIEWER1	The audit team person who reviews my work always expects me to use our firm's audit support system the way our audit firm intends the system to be used
MGR1	The manager(s) in my audit team always use our firm's audit support system the way our audit firm intends the system to be used
MGR2	The managers in my audit team always expect me to use our firm's audit support system the way our audit firm intends the system to be used
SEN1	The senior(s) in my audit team always use our audit support system the way our audit firm intends the system to be used
GRAD1	The graduate/junior(s) in my audit team always use our firm's audit support system the way our audit firm intends the system to be used
GRAD2	The graduate/junior auditor(s) in my audit team always expect me to use our firm's audit support system the way our audit firm intends the system to be used
Team Consensus on Appropriate Use (TCON)	
TCON1	There is mutual understanding in my audit team regarding the appropriate use of our firm's audit support system
TCON2	There is no conflict in my audit team regarding the appropriate use of our firm's audit support system
TCON3	Overall, members of my audit team agree on the appropriate use of our firm's audit support system
TCON4	My audit team has reached a consensus on the appropriate use of our firm's audit support system
Firm Consensus on Appropriate Use (FCON)	
FCON1	Overall employees in my audit firm agree on the appropriate use of our firm's audit support system
FCON2	Mutual understanding exists in my audit firm regarding the appropriate use of our firm's audit support system
FCON3	There is no conflict in my audit firm regarding the appropriate use of our firm's audit support system
FCON4	Irrespective of the audit team I assigned to, I am expected to use my firm's audit support system in the same way for the same type of task
Self-Efficacy (SE-EF)	
SE1	I am very confident in my ability to use my firm's audit support system in the way my audit firm intends the system to be used
SE2	I have the ability to use my firm's audit support system in the way my audit firm intends the audit support system to be used
SE3	I have the skills to use my firm's audit support system in the way my audit firm intends the system to be used
Perceived Behavioral Control (PBC)	
PBC1	I have total control as to whether I use my firm's audit support system in the way my audit firm intends the system to be used
PBC2	I have access to the resources I need to use my firm's audit support system in the way my audit firm intends me to use it
PBC3	There are no barriers to my using my firm's audit support system in the way my audit firm intends me to use it

Item Code	Item
System Restrictiveness (SYSRES) SR_PEU is not used in the measurement model – see note D	
SR_PEU	My firm's audit support system is easy to use
SR1	My firm's audit support system can readily be tailored to any client
SR2	Users can readily change or delete audit steps after the audit program has been generated in my firm's audit support system (R)
SR3	It is easy to change/alter the date on previously completed working papers contained in my firm's audit support system (R)
SR4	My firm's audit support system automatically generates audit work programs
SR5	My firm's audit support system constrains how users perform an audit
SR6	Users are required to justify in the audit support system any changes made to audit steps generated in my firm's audit support system
SR7	The audit support system contains compulsory audit steps which cannot be changed or deleted
Perceived Effectiveness of the Audit Review Process (AREV)	
AR1	The audit review process at my audit firm is able to frequently identify any mistakes/errors/omissions that I have made using my firm's audit support system
AR2	The audit review process at my audit firm is generally effective
AR3	The audit review process at my audit firm is, in general, effective at detecting when our firm's audit support system is <u>not</u> used in a manner consistent with how my audit firm expects the system to be used

(R) = item is reverse coded.
All items were measured on a scale of 1 to 7. Items measuring appropriate use (AUSE) and intended use (INTENT) were anchored with 7 = To a great extent and 1 = Not at all. All other items were anchored with 7 = Strongly agree and 1 = Strongly disagree

<u>Notes:</u>

Note A - In the instrument, the three items measuring appropriate use were preceded by 12 items (AUSE1 to AUSE12). The purpose of including these 12 items was not to obtain a measure of appropriate use, but rather to use these items as prompts for auditors to consider specific ways in which they used the audit support system, before they answered the three items measuring their overall appropriate use. The inclusion of the 12 prompting items is a cognitive technique used in instruments to improve respondents' recall (Dillman 2000). Feedback received during the initial item development indicated that the inclusion of prompting items would help respondents provide more accurate responses.

Note B - IUSE13 was collected as part of a 12 page instrument. Feedback from focus group participants indicated that when respondents understood the meaning of "appropriate use" including more than one item to measure intended appropriate use was redundant (and annoying). Based on this feedback and the length of instrument one, intention to use the audit support system appropriately is measured with a single item preceded by 12 items referring to specific behaviors (IUSE1 to IUSE12). The consequence of this is that IUSE13 is treated as an observed variable in the statistical analysis (i.e., it is assumed to be measured without error). The results of sensitivity analyses indicate that measuring intention to use the audit support system appropriately using a single item does not significantly bias the findings and thus is not a major concern.

Note C - Consistent with Ajzen's (2002) recommendations, in addition to the 4 items used in the analysis, 4 items to capture an individual's perception of how 'important others' use the system were included (PTNR1, MGR1, SEN1, GRAD2). A two factor confirmatory model indicated that each set of 4 items captured the same latent construct (r=0.91). To reduce the complexity of the final model, only the 4 items measuring 'expected' use are included to measure perceived normative pressure.

Note D - SR_PEU captures ease of use. In relation to the theoretical definition of system restrictiveness, ease of use is not relevant. It was included in the instrument because the items measuring system restrictiveness were the first items respondents answered. SR_PEU satisfies Dillman's (2000) recommendation that the first item in a instrument should be easy to answer and applicable to all respondents. It was therefore included in the instrument, but was not used in the measurement of system restrictiveness.