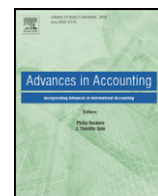




Contents lists available at ScienceDirect

## Advances in Accounting, incorporating Advances in International Accounting

journal homepage: [www.elsevier.com/locate/adiac](http://www.elsevier.com/locate/adiac)

### What factors influence auditors' use of computer-assisted audit techniques? ☆☆☆

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## ARTICLE INFO

Available online xxxx

## Keywords:

CAATs

Auditor technology adoption

UTAUT

## ABSTRACT

To meet the challenges of rapid advances in client technology, audit standards urge auditors to use computer-assisted audit tools and techniques (CAATs). However, recent research suggests that CAAT use is fairly low. This paper uses the Unified Theory of Acceptance and Use of Technology (UTAUT) to identify and then examines factors potentially influencing auditors' use or non-use of CAATs. Examining auditor use of CAATs is important because CAATs hold out the promise of improving audit efficiency and effectiveness. Data was obtained from 181 auditors from Big 4, national, regional, and local firms. Results indicate that outcome expectations, the extent of organizational pressures and technical infrastructure support influence the likelihood that auditors will use CAATs.

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## 1. Introduction

While the use of information technology (IT) in the business world has grown exponentially in the past two decades, the extent to which auditors have responded in kind remains an empirical question (Arnold & Sutton, 1998; Curtis & Payne, 2008; Kotb & Roberts, 2011). CAATs are tools and techniques employed by auditors to extract and analyze client data (Braun & Davis, 2003). CAATs hold the promise of enhanced audit effectiveness and efficiency (Zhao, Yen, & Chang, 2004, 389). For example, CAATs enable auditors to test 100% of the population rather than a sample (AICPA, 2001; Curtis & Payne, 2008; Singleton, 2011) or to select sample transactions meeting specific criteria to obtain evidence about control effectiveness (AICPA, 2006; PCAOB, 2010c). Recent audit standards encourage auditors to adopt CAATs to improve audit efficiency and effectiveness (AICPA, 2001, 2002a, 2002b, 2002c, 2006; PCAOB, 2007, 2010a, 2010b). Despite the current emphasis on CAATs, research suggests that auditors do not frequently and systematically use CAATs (Debreceeny, Lee, Neo, & Toh,

2005; Kalaba, 2002; Liang, Lin, & Wu, 2001; Payne & Curtis, 2010; Shaikh, 2005).

Information systems researchers note that technology cannot improve performance if it is not used (Davis, Bagozzi, & Warshaw, 1989; Venkatesh, Morris, Davis, & Davis, 2003). Further, information systems research has developed many theoretical models to predict user acceptance and use of IT. One important model is the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003). We modified UTAUT for our research to conform to a financial audit context. UTAUT integrates several previously accepted theoretical models to assess the likelihood of success for new technology introductions. Understanding the drivers of acceptance/rejection allows one to proactively design interventions (Venkatesh et al., 2003).

UTAUT proposes that four factors influence user acceptance: (1) user expectations about systems' performance (i.e., performance expectancy), (2) users' perceptions about the effort needed to use the new system (i.e., effort expectancy), (3) users' perceptions whether individuals important to them encourage system use (i.e., social influence), and (4) users' expectations regarding the existence of an organizational and technical infrastructure to support system use (i.e., facilitating conditions). Arguably, since larger audit firms are more likely to audit clients with highly complex financial reporting systems, we examine whether factors that influence CAAT use may differ based on firm size (Ahmi & Kent, 2013; Cheney, 2004; Lawrence, Minutti-Meza, & Zhang, 2011).

We obtained data from 181 auditors representing Big 4, national, regional, and local firms. Our results provide evidence that CAAT use may be dependent on predictable cost effectiveness tradeoffs. Implications of our findings are that to increase CAAT use, audit firms should improve employee education that emphasizes how CAATs can operationally

☆ We appreciate the helpful comments of Joseph Brazel, Efrim Boritz, Julie Smith David, Julie Anne Dille, Gary Hackbarth, Frank Hodge, Cynthia Jeffrey, Eric Johnson, Maureen Mascha, Brian Mennecke, Ed O'Donnell, Kurt Pany, G. Prem Premkumar, Tony Townsend, and Chris Wolfe. We also appreciate the comments from participants at the 2009 American Accounting Association Annual Meeting. Finally, we gratefully acknowledge the assistance of Krissy Gronborg, Omar Torren, Pat Wagaman, Katie Wallace, Dongyang Wang, AICPA, and study participants.

☆☆ Data availability: Data used in this study is available from the authors on request.

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improve audit efficiency and performance. Our study can be differentiated from related studies on several dimensions. First, prior studies were focused more on the prevalence of CAATs rather than the underlying reasons for their use or non-use (e.g., Braun & Davis, 2003; Debreceny et al., 2005; Lovata, 1990). Second, research has often assessed only a limited number of CAATs using rather narrow participant groups (e.g., Mahzan & Lymer, 2008). In contrast, our study utilizes 181 auditors with varying levels of experience from Big 4, national, regional, and local firms and examines a larger set of CAATs. This is important given that results have been shown to vary based on audit and IT expertise, particularly as it relates to effort expectancy (EE) (Diaz & Loraas, 2010; Mahzan & Lymer, 2008). Third, prior research (e.g., Curtis & Payne, 2008; Diaz & Loraas, 2010; Payne & Curtis, 2010) has used hypothetical experimental cases within the context of restrictive time budgets. The results of these prior studies may not generalize to actual CAAT use. Given these concerns, our study is based on *actual* CAAT use related to individual auditors' own previous experience with selected clients.<sup>1</sup>

## 2. Background and hypotheses development

### 2.1. Prior CAAT research

Prior CAAT research has primarily been descriptive and has focused on the Audit Command Language (ACL), a commercially available CAAT. For instance, Braun and Davis (2003) surveyed governmental auditors regarding their use of ACL. They found that while participants perceived the potential benefits associated with ACL, they displayed a lower confidence in their technical abilities to use ACL. Similarly, Pennington, Kelton, and DeVries (2006) suggest that auditors resist the use of ACL when they perceive that the task at hand is too complex and that adequate training has not been provided. On the other hand, Debreceny et al. (2005) interviewed external auditors in Singapore and found they often did not adopt CAATs because of their lack of knowledge of CAATs; they defended their non-use of CAATs arguing it was inapplicable to the nature of testing the financial statement assertions or the extent or quality of computerized internal controls.

Three recent studies examining behavioral intentions to use CAATs have utilized a modified UTAUT (Curtis & Payne, 2008; Mahzan & Lymer, 2008; Payne & Curtis, 2010). Curtis and Payne (2008) conducted an experiment with audit seniors who responded to a hypothetical case involving different budget horizons and knowledge (or no knowledge) of a superior's preferences. The results indicated that these auditors were more likely to implement new software if they are given longer-term budget and evaluation periods and a superior who favors implementation. Payne and Curtis (2010) surveyed a similar subject pool of audit seniors and measured their responses to a hypothetical audit engagement that included budget information and a description of the additional hours required to implement new software. Their results revealed that performance expectancy, effort expectancy, and facilitating conditions are positively related to intent to adopt substantive testing software. Finally, Mahzan and Lymer (2008) extend the UTAUT to the internal audit domain and find that performance expectancy and facilitating conditions influence internal auditors' intention to adopt CAATs.

### 2.2. Role of CAATs in the audit process

Although CAATs may not be widely used in practice (Debreceny et al., 2005; Liang et al., 2001; Payne & Curtis, 2010; Shaikh, 2005), audit standards suggest that their use may improve audit efficiency and effectiveness. SAS No. 99 encourages auditors to use CAATs to evaluate fraud risks, identify journal entries, and evaluate inventory

<sup>1</sup> The method we used to capture data from auditors' *selected clients* is similar to that utilized by Gibbins, Salterio, and Webb (2001), Nelson, Elliott, and Tarpley (2002), Dowling (2009), and Brazel, Carpenter, and Jenkins (2010).

existence and completeness (AICPA, 2002b). PCAOB risk standards (AS Nos. 8–15) suggest that auditors use CAATs to select sample transactions from key electronic files, sort transactions with specific characteristics, test an entire population instead of a sample, and obtain evidence about control effectiveness (PCAOB, 2010c). Furthermore, standards encourage auditors to use CAATs to check the accuracy of electronic files and re-perform selected procedures such as aging of accounts receivable (AICPA, 2001). The standard on risks of material misstatement (PCAOB, 2010a) suggests that auditors may respond to an increase in fraud risk by using CAATs to obtain more evidence by testing all items in the account of interest. Finally, the standard on evaluating audit results cautions auditors that situations where clients are unwilling to facilitate access to key electronic files for testing through CAATs may suggest that their assessment of fraud risks may need to be revised (PCAOB, 2010b).

While regulators and audit standards encourage the use of CAATs, prior research indicates that CAAT use may be lower than expected (Carmichael, 2004; Debreceny et al., 2005; Kalaba, 2002; Liang et al., 2001; Payne & Curtis, 2010). In the following section, we discuss factors included in the UTAUT model that may explain why auditors may be reluctant to use CAATs.

### 2.3. UTAUT theoretical model

Auditor acceptance of CAATs may be influenced by both firm resources and individual user perceptions (Payne & Curtis, 2010). Prior information systems research suggests that even when sufficient resources exist to purchase IT, users may not accept the new IT (Davis, 1989). The culture of the public accounting firm or office may variously encourage or create impediments to the adoption of new technologies by audit teams (Vendrzyk & Bagranoff, 2003). Thus, our study attempts to examine these factors that influence individual auditor use of CAATs. To do so, we adopt the UTAUT model (Venkatesh et al., 2003) because it incorporates elements of several prominent information systems theoretical models that predict use including the technology acceptance model (TAM) (Davis, 1989), theory of planned behavior (Ajzen, 1991; Taylor & Todd, 1995), innovation diffusion theory (Moore & Benbasat, 1991), and social cognitive theory (Compeau & Higgins, 1995). UTAUT is designed for complex and sophisticated organizational technologies (Venkatesh et al., 2003, 3); and, the UTAUT has been shown to explain up to 70% of variance in intention to use technology, outperforming each of the aforementioned specified theoretical models (Venkatesh et al., 2003).

The UTAUT proposes that three factors (i.e., performance expectancy, effort expectancy, and social influence) predict behavioral intention. Further, facilitating conditions and behavioral intention may influence IT acceptance. We use a modified version of the UTAUT model based on recent research (e.g., Curtis & Payne, 2008; Mahzan & Lymer, 2008; Payne & Curtis, 2010). That is, we investigate if performance expectancy, effort expectancy, social influence, and facilitating conditions influence actual CAAT use.

### 2.4. Factors influencing auditors' use of CAATs

*Performance expectancy* refers to 'the degree to which an individual believes that using the tool will help him or her better achieve desired outcomes' (Venkatesh et al., 2003, 23). CAATs may assist auditors in meeting audit time budget since CAATs reduce the number of hours spent conducting tests of controls and substantive testing and thereby improve audit efficiency. Prior research suggests that the perceived usefulness of technology is the single most significant predictor of technology acceptance for physicians (Chau & Hu, 2002) and accountants (Bedard, Jackson, Ettredge, & Johnstone, 2003; Loraas & Wolfe, 2006). Thus, we expect that performance expectancy will positively influence CAAT use.

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