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THE IMPACTS OF CLIENT IT CHARACTERISTICS ON AUDIT HOURS

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Abstract

This paper documents how information technology (IT) impacts audit efforts. Using cross-sectional data on audit engagements for the 100 largest clients of an office of a leading international public accounting firm, it empirically evaluates the impact of the clients’ IT choices on their auditor’s audit effort. The results indicate that other things being equal, the higher level of automation or complexity a client’s IT exhibits, the more effort audit professionals exert for the engagement. On the other hand, the better control or support a client’s IT furnishes, the lower hours the audit team inputs into the engagement.

Keywords: Audit Production, IT Complexity, IT Automation
1. Introduction

Performing audit engagement is an information-intensive process that gathers and evaluates evidence regarding assertions about clients’ economic activities and related events. The role of information technology (IT) in production of audit engagement is of great interest with the rapid growth in IT applications recently. Audit literature has explored the use of computer-related audit procedures (Jarvrin et al. 2009), auditor’s training in information systems (Curtis et al. 2009), and the role of ERP from financial reporting perspective (Grabski 2011, Morris 2011). However, relatively few studies approach the impacts of IT in public accounting production empirically. While IT investment by auditor is empirically shown to improve the auditor’s productivity (Banker et al. 2002, Chang et al. 2011). The impacts of audit client’s IT choices have not yet been documented empirically.

Lots of studies (e.g. Palmrose 1989, O’Keefe et al. 1994, Johnstone and Bedard 2001, Bell et al 2008, Knechel et al. 2009) have examined the client characteristics that impact auditor’s audit production but none of them have considered the client IT characteristics. We argue that the IT characteristics are equivalently important as those financial or business characteristics in determining audit input. During audit process, it is the environment that affects the effort required for an engagement and IT is the major factor that shapes today’s auditing environment. Considering the gap in literature, we intend to conduct the first study in the relationship between client’s IT characteristics and audit hours. We describe our theoretical foundation and preliminary results in the following sections.

2. IT Characteristics That Shapes Auditing Environment

As organizations today rely on IT heavily for information processing, PCAOB Auditing Standard No. 5 particularly advises auditors to examine the use of IT in their clients’ yearend financial reporting (PCAOB 2007). Guided by Statements on Auditing Standard issued by the American Institute of Certified Public Accountants and the nature of audit work, we identify factors that characterize audit client’s IT usage. First, “the extent to which computer processing is used in significant accounting applications, as well as the complexity of that processing, may also influence the nature, timing and extent of audit procedures (AICPA 1984, p.2).” That is, the level and complexity of IT deployed at the client site can significantly affect audit procedures. Second, when auditing a client with computerized systems, “the auditor should obtain evidential matter about the effectiveness of both the design and operation of controls to reduce the assessed level of control risk (AICPA 2001, p.1).” Therefore, whether a client’s IT provides auditable and properly controlled systems may also affect the audit professionals’ work. In addition, better IT personnel at the client site can provide direct support to the auditor’s IT-related questions and enhance the performance of information systems related to audit process (Choe 1996; DeLone 1988; Montazemi 1988).

In summary, we conclude four client characteristics that may impact the audit professionals’ tasks and develop research hypotheses accordingly:

- **IT Automation**
  IT automation refers to the proportion of the client’s business processes that are automated by the use of IT. It should be easier for the professionals to access related information when a business function is automated if the data is only a few clicks away (Wilkinson et al. 2000). However, online real-time applications and integrated information systems are likely to increase the difficulty of the audit task and lead to a higher risk level in assuring the integrity of information. Also, transactions may be authorized by controls included in computer programs that are difficult for the professionals to verify (Messier 1997, p.229). It has been found that inadequate controls are more frequently associated with potential financial misstatements in computerized systems than manual systems (Bell et al. 1998). Overall, greater IT automation is likely to impose a heavier cognitive burden on the professionals’ decision making. The auditor needs to exert more
effort to understand and review the client’s IT and make careful decisions trading off risk and effort (Tucker 2001). Therefore, we hypothesize:

\[ H1: \text{Ceteris paribus, the higher the level of a client’s IT automation, the higher is the total audit hours exerted for the client’s engagement.} \]

- **IT Complexity**
  IT complexity considers the complexity level of the information systems. An information system can be complex for auditing purposes in various ways. Its interface and functionality can be complex when they are not standard package software. The control points can be complex when the system is connected to another entity. The data can be complex when the number of transactions is high. Since a high level of IT complexity increases the audit task complexity, it may also diminish the auditors’ judgment performance (Bonner 1994). Jarvin et al. (2009) showed that when examining clients with complex IT, auditors apply a variety of audit procedures depending on the risk assessment result. Consequently, we expect that the more complex a client’s computer system, the greater is the effort required for the professionals to complete an engagement at the desired quality level:

\[ H2: \text{Ceteris paribus, the higher the level of a client’s IT complexity, the higher is the total audit hours for the client’s engagement.} \]

- **IT Control**
  IT control is the level of assurance provided by the design, scope and processes of the client's information systems. The control level can be increased by superior systems documentation and security. It can also be enhanced by successful ERP implementation (Morris 2011). The Problems of IT control have become more prevalent as companies adopt more IT (Messier et al. 2004). Research (Bedard and Graham 2011) shows that more than twenty percent of internal control deficiencies disclosed in the Sarbanes-Oxley Act (SOX) Section 404 reports by auditors and companies are related to information systems control. Furthermore, those who disclose information systems related material weaknesses seems to pay higher audits fees than those without information systems related material weaknesses (Sutton and Kuhn 2009), possibly due to higher costs incurred by the auditor. Thus, we expect that the required effort of auditor for an engagement to decrease when the client’s IT exhibits a more adequate level of control. Our hypothesis is as follow:

\[ H3: \text{Ceteris paribus, the higher the level of a client’s IT control, the lower is the total audit hours for the client’s engagement.} \]

- **IT Support**
  IT support reflects the level of support provided by the client’s IT personnel. The IT personnel at the client site can impact the professionals’ work in two ways. First, they can provide direct support for the professionals’ questions regarding the systems. Second, they can facilitate the audit process indirectly by providing high quality maintenance of the computer systems. A high level of IT support saves the professionals the time they spend on understanding and solving problems, and makes it easier for them to perform their tasks. Many studies have documented that strong IT personnel support can improve the performance of accounting information systems (Choe 1996; DeLone 1988; Montazemi 1988) and reduce the frequency of potential financial misstatements (Bell et al. 1998). Therefore, we hypothesize:

\[ H4: \text{Ceteris paribus, the higher the level of a client’s IT support, the lower is the total audit hours for the client’s engagement.} \]

3. **Empirical Analysis**
We collected data regarding 100 largest audit engagements performed in the same year from an office of a Big Four public accounting firm (hereafter refer to as the AUDITOR to conceal its identity). The sample excludes new engagements that were performed by the AUDITOR at the first time to prevent from the new client effects. The prior audit literature found that accounting firms usually need to spend more time on new clients due to learning requirements (O'Keefe et al. 1994) The AUDITOR is aware of the impact of IT programs adopted by its clients on its auditing production process. Therefore, it offers a series of training courses to introduce its audit professionals the technologies used in its clients’ IT environments (e.g. enterprise resource planning (ERP), workflow management, electronic commerce, etc.) and how they would affect audit tasks.

Our data set includes actual audit hours (AUDITHRS) the AUDITOR spent on each engagement, drawn from the AUDITOR’s work hour systems. It also includes client financial and IT characteristics from questionnaires filled out by the audit managers who are responsible for the engagements. There are 12 IT related items in the questionnaire to measure the constructs of IT automation (ITAUTOMATION), IT complexity (ITCOMPLEXITY), IT control (ITCONTROL) and IT support (ITSUPPORT). There are also financial characteristics included as controlling factors for the AUDITOR’s audit input:

- ASSETS: client’s total assets
- PUBLIC: coded 1 if client’s shares are publicly traded, and 0 otherwise
- RECRISK: client’s receivables normalized by total assets
- INVRISK: client’s inventory normalized by total assets
- SUBSIDIARIES: square root of number of the client’s subsidiaries
- LEVERAGE: client’s ratio of long-term debt to equity
- PROFIT: the client’s ratio of net income before tax to asset
- NETMARGIN: the client’s ratio of net income before tax to sales
- LIQUIDITY: the client’s quick ratio
- RECENTLOSS: a dummy variable coded 1 if the client had loss in any of the three preceding years, and 0 otherwise

We performed confirmatory factor analysis (CFA) on the IT items using AMOS to construct four variables for IT automation (ITAUTOMATION), IT complexity (ITCOMPLEXITY), IT control (ITCONTROL), and IT support (ITSUPPORT). Then we estimate the following model to evaluate the impacts of client IT on audit hours:

\[
\ln \text{AUDITHRS} = \beta_0 + \beta_1 \text{ITAUTOMATION} + \beta_2 \text{ITCOMPLEXITY} + \beta_3 \text{ITCONTROL} + \beta_4 \text{ITSUPPORT} + \\
\beta_5 \ln \text{ASSETS} + \beta_6 \text{PUBLIC} + \beta_7 \text{RECRISK} + \beta_8 \text{INVRISK} + \beta_9 \text{SUBSIDIARIES} + \\
\beta_{10} \text{LEVERAGE} + \beta_{11} \text{RECENTLOSS} + \beta_{12} \text{LIQUIDITY} + \beta_{13} \text{NETMARGIN} + \beta_{14} \text{PROFITABILITY} + \epsilon_i
\]

4. Preliminary Results

The preliminary OLS estimation results are summarized in Table 1. The results verified that clients’ IT characteristics can influence the auditor’s production input. As expected, the total hours incurred for a client increases with both the client’s levels of IT automation and IT complexity. The finding illustrates the technological challenges the audit professionals are facing due to the increasing use of IT in business, and changes in auditing standards on IT and internal control (Curtis et al. 2009). The accounting profession needs stronger IT skills and new audit methodologies that work efficiently with the client’s digital environment and new e-business models. In contrast, the total audit cost decreases with the level of a client’s IT control and support. When a client carries high quality IT control and IT support, it helps audit professionals perform their audit tasks and reduces their total effort for an engagement.

Our next step is to run various validity tests our IT constructs and refine our IT variables. Then we will rerun our estimation model and conduct econometric tests to validate our empirical model. Our final results are expected to be similar to our preliminary results.
\[ \ln \text{AUDITRS} = \beta_0 + \beta_1 \text{ITAUTOMATION} + \beta_2 \text{ITCOMPLEXITY} + \beta_3 \text{ITCONTROL} + \beta_4 \text{ITSUPPORT} + \beta_5 \ln \text{ASSETS} + \beta_6 \text{PUBLIC} + \beta_7 \text{RECRISK} + \beta_8 \text{INVRISK} + \beta_9 \text{SUBSIDIARIES} + \beta_{10} \text{LEVERAGE} + \beta_{11} \text{RECENTLOSS} + \beta_{12} \text{LIQUIDITY} + \beta_{13} \text{NETMARGIN} + \beta_{14} \text{PROFITABILITY} + \epsilon_i \]

<table>
<thead>
<tr>
<th>Dependent Variables</th>
<th>Predicted Sign</th>
<th>Estimated Coefficient</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ITAUTOMATION</td>
<td>+</td>
<td>0.0467</td>
<td>2.06**</td>
</tr>
<tr>
<td>ITCOMPLEXITY</td>
<td>+</td>
<td>0.9300</td>
<td>1.88**</td>
</tr>
<tr>
<td>ITCONTROL</td>
<td>-</td>
<td>-0.0987</td>
<td>-1.51*</td>
</tr>
<tr>
<td>ITSUPPORT</td>
<td>-</td>
<td>-2.3951</td>
<td>-1.83**</td>
</tr>
<tr>
<td>\ln ASSETS</td>
<td></td>
<td>0.1618</td>
<td>2.73***</td>
</tr>
<tr>
<td>PUBLIC</td>
<td></td>
<td>0.4651</td>
<td>2.73***</td>
</tr>
<tr>
<td>RECRISK</td>
<td></td>
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<td>0.04</td>
</tr>
<tr>
<td>INVRISK</td>
<td></td>
<td>0.5671</td>
<td>1.19</td>
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<tr>
<td>SUBSIDIARIES</td>
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<tr>
<td>LEVERAGE</td>
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<td>RECENTLOSS</td>
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<td>LIQUIDITY</td>
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<tr>
<td>NETMARGIN</td>
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<td>0.35</td>
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<tr>
<td>PROFITABILITY</td>
<td></td>
<td>0.1243</td>
<td>1.35*</td>
</tr>
</tbody>
</table>

*, ** and *** indicate statistical significance at 10%, 5% and 1% levels respectively (one-tail test).

Table 1. Preliminary Results

References


