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Audit Firm Rotation, Auditor Specialization, and Audit Quality in the Municipal Audit Context

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ABSTRACT: The topic of audit firm rotation has been debated internationally for several decades. To inform the debate, we study the effects of audit firm rotation policies on audit quality in a government audit market. Using audit firm rotation data and audit quality measures from the Florida government audit market, a setting where procurement policies vary, we find that rotation policies are indirectly associated with higher audit quality. In particular, mediation analysis suggests that the consequences of policies that encourage Florida municipalities to consider rotation impact audit quality by encouraging the use of auditors that specialize in governmental audits, rather than auditor independence, which is frequently argued to support mandatory rotation.

Keywords: audit firm rotation policies; specialist audit firm; audit quality.

INTRODUCTION

Audit firm rotation has been debated internationally for several decades. It received significant attention in 2011, as evidenced by issuance of a Public Company Accounting Oversight Board concept release ([PCAOB 2011](#)), a paper by the U.K. Financial Reporting Council ([FRC 2011](#)), and a paper issued by the [European Commission \(2011\)](#). These proposals focused primarily on two types of rotation policies: mandatory rotation and a requirement of periodic auditor assessments or requests for proposal (termed “retendering” in the U.K.) that would force audit committees to consider whether the current audit firm should be retained or replaced. Most recently, in April 2014, the European Parliament approved new preliminary audit regulations requiring most public companies to rotate audit firms every ten years ([Tysiac 2014a](#)). Although the U.K. has proposed

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mandatory retendering of audit engagements, it is reconsidering mandated rotation in light of the European Union regulations ([Tysiac 2014b](#)).¹

Research directly addressing audit firm rotation is limited, due to the lack of regulatory requirements for rotation policies, combined with the paucity of publicly held organizations voluntarily establishing such a policy.² As a result, most extant auditor rotation research studies substitute audit firm tenure for rotation, providing only indirect evidence on whether rotation policies influence audit quality proxies. Studies using tenure assume changes in audit firms result from rotation policies; however, audit firm change can be initiated by the audit firm or client for various other reasons, such as the level of audit fees, opinion-shopping, or audit firm portfolio rebalancing based on risk assessments or changes in practice focus.

In the government sector it is common for entities to adopt audit firm rotation policies that either mandate rotation of audit firms or require periodic solicitation of bids for audit services to determine whether the current audit firm should be retained or replaced ([Wendell, Pearson, and Gregson 1998](#); [Copley and Doucet 1993b](#); [Rubin 1988](#)). A GAO report ([U.S. GAO 1987](#)) recommends that governmental entities enter into multi-year contracts with audit firms and establish review or rotation policies for the contract expiration. The report suggests a bidding and evaluation process similar to that discussed in the PCAOB and FRC proposals. Within the State of Florida some, but not all, municipal governments periodically rotate audit firms, either through ordinance or established policies. Research using entities with rotation policies provides a better perspective on the effect of rotation than do studies that use audit firm changes or audit firm tenure as a proxy for rotation.

Using a Florida sample, we are able to directly examine the effect of audit firm rotation policies on audit quality to better inform policymakers and other interested parties. We study whether an audit firm rotation policy, specifically a mandatory rotation or a periodic audit firm evaluation requirement, is associated with a higher quality audit, where audit quality refers to the extent to which financial statements comply with professional standards and are not materially misstated due to errors or fraud ([U.S. GAO 2003](#); [PCAOB 2011](#)). We find that entities with audit firm rotation policies are associated with higher audit quality; the higher quality appears to be primarily attributable to technical capabilities of the audit firm. In particular, governments with rotation policies select more specialized audit firms, and specialist audit firms are associated with higher quality audits. Although other costs and benefits associated with audit firm rotation should be considered, evidence from the Florida government market suggests that rotation policies positively affect audit quality primarily through audit firm selection.

The next section provides background information about audit firm rotation, audit quality, and audit firm specialization, as well as the research hypotheses. The research design is included in the subsequent section, followed by the data analysis and results. Conclusions and policy implications of the study are discussed in the final section.

BACKGROUND AND HYPOTHESES

Audit quality is commonly defined as the probability that an auditor both discovers and reports an error or omission that could materially affect the financial statements ([DeAngelo 1981](#); [PCAOB](#)

¹ In the United States, a bill prohibiting mandatory audit firm rotation was approved by the U.S. House of Representatives in July 2013 and forwarded to the U.S. Senate for consideration. As of May 2015 no further action has been taken.

² It should be noted that a number of countries have experimented with mandatory rotation within specific industries or for limited periods ([U.S. General Accountability Office \[U.S. GAO\] 2003](#); [Cameran, Merlotti, and Di Vincenzo 2005](#)); however, no significant research of the effect of rotation on audit quality has been published to date.

2011). Audit quality is often operationalized as the degree of auditor compliance with professional standards in the conduct of a financial statement audit (U.S. GAO 2004; Deis and Giroux 1992). Recent PCAOB reports indicate that audit quality is a continuing concern, since the number of audit deficiencies found during some PCAOB reviews has actually increased relative to prior review periods (Hamilton 2011). These results, in conjunction with a PCAOB study (2011), a FRC paper (2011), and a government sector study released by the U.S. President's Council on Integrity and Efficiency (PCIE 2007) elevate the issue of audit firm rotation policies as a means to improve audit quality.

In developing our hypotheses we argue that audit firm rotation policies can positively affect audit quality, as well as the quality of the audit firm selected. In doing so, we examine a broader definition of audit firm rotation, consistent with recent policy recommendations. We further argue that the quality of the audit firm affects the quality of the audit, and that the use of rotation policies leads to contracts with quality audit firms, which in turn results in higher quality audits.

Audit Firm Rotation

Audit firm rotation has been persistently considered in the United States and abroad (Cameran et al. 2005; U.S. House of Representatives [U.S. House] 2002, Sarbanes-Oxley Act; Securities and Exchange Commission [SEC] 1994; American Institute of Certified Public Accountants [AICPA] 1978; U.S. Senate 1977; McLaren 1958). Generally, consideration has focused on mandatory rotation of the audit firm. Proponents of mandatory rotation argue that imposing mandatory limits on auditor tenure improves audit quality by reducing clients' influence over auditors or auditor complacency (e.g., Turner 2002; Brody and Moscovice 1998; SEC 1994; AICPA 1978; U.S. Senate 1977; Mautz and Sharaf 1961). Opponents of mandatory rotation argue that substandard audits occur more frequently for newer clients because auditors have less information about these firms (Stanley and DeZoort 2007; Carcello and Nagy 2004; Johnson, Khurana, and Reynolds 2002; Walker, Lewis, and Casterella 2001; AICPA 1992), or the newly appointed auditors, concerned with recovering startup costs, are more easily influenced by the client during early years of an audit engagement (Ruiz-Barbadillo, Gómez-Aguilar, and Biedma-López 2006; Geiger and Raghunandan 2002).

A developing perspective is that mandatory rotation may not be necessary as long as audit committees periodically consider whether the current auditor is providing the highest quality services available (Center for Audit Quality [CAQ] 2012). Proponents of policies that do not require mandatory rotation argue that periodic requests for proposal improve the transparency of the audit firm selection process and prompt the audit committee to proactively consider whether the audit firm should be changed or retained (Jeffrey 2011; FRC 2011; PCAOB 2011). The advantage of this policy is that periodic requests require the audit committee to undertake consideration of, and articulate justification for, retaining the current auditor.

Since only 2–3 percent of publicly held companies change audit firms each year (U.S. GAO 2003) and voluntary periodic rotation of audit firms is rare (Zeff 2003), empirical data on rotation or rotation policies are lacking in the corporate sector. Hence, archival studies generally use audit firm tenure or similarly crude proxies to consider auditor rotation (e.g., Ghosh and Moon 2005; Nagy 2005; Carcello and Nagy 2004). Although governmental entities are more likely to rotate audit firms, the impact of audit firm rotation in the public sector has not been examined. As a result of the lack of empirical data, research on audit firm rotation has been limited primarily to experimental and theoretical studies that emphasize auditor independence relative to the technical abilities of the auditor.

In this study, we observe mandatory rotators as defined by formal statute, ordinance, or council/commission edict, as well as non-mandatory rotators that possess a management or informal policy of periodically evaluating audit firms as part of the decision to rotate.³ As a result of the rotation policy or evaluation process, the current audit firm may be required to be replaced (mandatory audit firm rotation), a competitive bidding process may take place (with or without the current audit firm), or the decision may be made to retain the current audit firm without a bidding process. Thus we identify rotation policy broadly as governmental entity adoption of a periodic process either requiring rotation or involving a technical evaluation of audit firm performance. Hence, the rotation policy variable includes mandatory rotation policies as well as distinct policies in which the current audit firm is systematically and periodically evaluated. It follows that audit firm tenure differs by nature between entities that simply retain audit firms and those entities that retain audit firms after a technical evaluation.

Of particular interest is whether a policy of systematic audit firm rotation or evaluation improves audit quality. This study examines the relationships between rotation policy, audit firm specialization, and audit quality. We first address the effect of rotation policy on the choice of specialist audit firms.

Procurement and Audit Firm Specialization

Copley, Doucet, and Gaver (1994) suggest that an audit client contracts for a desired level of audit quality in the audit procurement process, which is in part determined through the identity of the audit firm (Simunic 1980). Copley and Doucet (1993b) find that competitive bidding leads to higher quality audits because entities are able to choose an audit firm that provides an acceptable level of audit quality. Bidding provides choice in audit quality at a point in time. A rotation policy is likely to have a similar effect on audit quality since it also requires the entity to select (or retain) an audit firm that will provide an acceptable level of service. The entity is likely to compare the quality of the audit firms during the procurement process, selecting the optimal audit quality within an acceptable price range, as recommended by professional organizations and agencies (e.g., Gauthier 2005; U.S. GAO 1987). Stated in another way, clients contract for a given level of audit quality. A rotation policy requires the client to periodically decide about the level of audit quality. Thus, the rotation or evaluation is likely to impact audit quality through the quality of the audit firm selected or retained.

While theory does not explicitly associate rotation policy with an entity's decision to choose a specialized audit firm, DeFond (1992) notes that auditees consider audit firm industry specialization during the selection process, while Jensen and Payne (2005) find that entities with well-developed audit-procurement practices are more likely to engage experienced or specialized audit firms.⁴ In the nonprofit sector, Tate and Feng (2013) find that audit firm specialization is an important consideration in the decision to request proposals from audit firms.

Choice of a specialist audit firm also mitigates potential negative impacts of audit firm rotation on audit quality. Stanley and DeZoort (2007) argue that problem audits occur more frequently for newer clients because auditors have less information about these organizations, but suggest that rotation policies that result in selection of an audit firm with industry experience likely compensate

³ While an entity may review the performance of its audit firm regardless of whether there is a rotation policy in place, our variable is measured by finance director survey responses to questions regarding required periodic rotation.

⁴ We also attended city council/commission meetings and reviewed meeting minutes available online noting that governmental entities consider industry experience as one of the primary factors in selecting an audit firm.

for a lack of client-specific knowledge. An audit firm's past government or industry experience was listed as an important factor to consider during the technical evaluation portion of the procurement process (U.S. GAO 1987). As a result, we expect entities with formal rotation policies are more likely to select industry specialist audit firms.

H1: Rotation policies are positively associated with choice of specialist audit firms.

By itself, audit firm evaluation or change does not necessarily imply higher audit quality since an entity can select a higher or lower quality audit firm. When selecting an audit firm, the client considers both quality and cost.⁵ As a result, the optimal audit firm choice can result in selection of a lower quality audit firm (i.e., Copley et al. 1994). However, government auditing standards, competitive markets, and industry standards make it likely that the choice will be an audit firm of adequate quality, lending support to our directional hypothesis.

Audit Firm Specialization and Audit Quality

Specialization, a proxy for auditor expertise, is based on training and practical experience gained from auditing in a particular industry (Gramling and Stone 2001; Solomon, Shields, and Whittington 1999; Hogan and Jeter 1999; Craswell, Francis, and Taylor 1995). Existing research links audit firm industry specialization to audit quality proxies (Lowensohn, Johnson, Elder, and Davies 2007; Jensen and Payne 2005; Gramling and Stone 2001; Abbott and Parker 2000). In an experimental study, Low (2004) finds that industry specialization improves audit risk assessments as well as the quality of audit planning decisions. Additional evidence suggests that auditors with training or experience in specialized areas outperform those without the training or experience (Kwon 1996; Libby 1995) and are superior at error detection (Hammersley 2006; Owghoso, Messier, and Lynch 2002).

Deis and Giroux (1992) also find a positive association between audit firm industry expertise, measured by the number of school districts audited, and governmental audit quality, while O'Keefe, King, and Gaver (1994) find industry specialization corresponds with fewer GAAS reporting standard violations. Using enforcement files of the Texas State Board of Accounting from 1991–1995, Thomas, Davis, and Seaman (1998) find that audit firms performing substandard governmental audits devote a lower percentage of their practice to governmental accounting and auditing and are less likely to receive a voluntary quality review than those audit firms that performed governmental audits that were not deemed substandard.

Several studies suggest that audit firm specialization is associated with higher audit quality for public companies (Krishnan 2003; Balsam, Krishnan, and Yang 2003) and governmental entities (Lowensohn et al. 2007; O'Keefe et al. 1994; Deis and Giroux 1992), as well as perceived audit quality (Samelson, Lowensohn, and Johnson 2006). Accordingly, we expect that specialist audit firms are associated with higher audit quality.

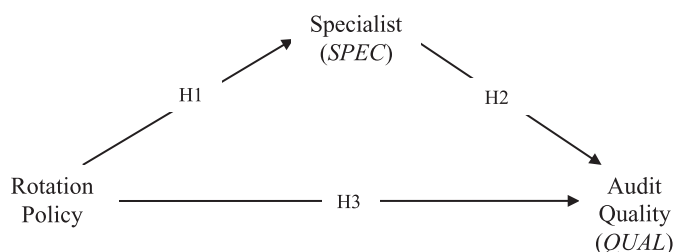
H2: Specialist audit firms are associated with greater audit quality.

Audit Firm Rotation and Audit Quality

The first two hypotheses argue that rotation policies are positively associated with specialist audit firms and that audit firm specialization is associated with increased audit quality. We also examine whether rotation policy is directly associated with greater audit quality.

⁵ Research suggests that audit firm specialization may be associated with efficiencies and lower costs of production, which are often passed on to clients (Neal and Riley 2004; Mayhew and Wilkins 2003).

FIGURE 1
The Relationship between Rotation Policy, Auditor Specialization, and Audit Quality



As noted earlier, research examining the effects of audit firm rotation on audit quality is limited. In experimental research, [Dopuch, King, and Schwartz \(2001\)](#) find that rotation decreases auditors' willingness to issue biased and misstated reports. [Gietzmann and Sen \(2002\)](#) use a game theory model to demonstrate that incentives for independence in audit markets with relatively few large clients outweigh the costs involved in rotation. [Church and Zhang \(2006\)](#) develop a theoretical model to suggest that mandatory rotation is beneficial, dependent upon audit firm switching costs, the cost of biased reporting, auditor learning costs, and management incentives. In contrast, we address the effect of audit firm rotation policies with archival data.

A number of researchers have studied the rotation question using audit firm tenure as a proxy for rotation. These studies have examined the effect of audit firm tenure on accrual-based proxies of quality ([Ghosh and Moon 2005](#); [Nagy 2005](#); [Chung and Kallapur 2003](#); [J. Myers, L. Myers, and Omer 2003](#); [Johnson et al. 2002](#)), or the effect of audit firm tenure on audit "failures" ([Carcello and Nagy 2004](#); [Geiger and Raghunandan 2002](#); [Walker et al. 2001](#); [Vanstraelen 2000](#)). However, [Gietzmann and Sen \(2002\)](#) note that conclusions regarding audit "failures" in transition years directly following an auditor switch are premature, given that the change of audit firms was voluntary and, therefore, possibly the result of client opinion-shopping or audit firms releasing high-risk clients. [Imhoff \(2003\)](#) adds that first year audit failures may have occurred because of poorly trained staff, a low-ball bid for a new engagement, or any number of confounding effects other than rotation.

While professional guidance in the public sector presumes the relation between audit firm rotation policies and governmental audit quality ([AICPA 1987](#); [U.S. GAO 1987](#)), uniform, formal rotation requirements do not exist. Prior governmental auditing research, using measures other than rotation, indicates that quality is higher for initial governmental audits ([Deis and Giroux 1996](#); [O'Keefe et al. 1994](#)) and appears to decrease over time ([Giroux, Deis, and Bryan 1995](#); [Copley and Doucet 1993a](#); [Deis and Giroux 1992](#)).

Some suggest that policies that regularly consider audit firm retention (such as rotation policies) improve audit quality by reducing client influence over auditors or auditor complacency ([Turner 2002](#); [Brody and Moscovice 1998](#); [SEC 1994](#); [AICPA 1978](#); U.S. Senate 1977; [Mautz and Sharaf 1961](#)). Given prior research findings related to audit firm retention, arguments presented to the PCAOB, and the GAO recommendations, we test whether rotation policies directly impact audit quality.

H3: Audit quality is higher for entities with rotation policies than for entities without rotation policies.

To test whether audit quality is the *result* of rotation policies, we examine the effect of rotation policies on audit quality (H3) after examining the effect of the rotation policy on the choice of a specialist audit firm (H1) and the effect of specialist audit firms on audit quality (H2). These relationships are included in Figure 1.

Although H3 and the preceding discussion imply a direct relationship between rotation policies and audit quality, an indirect or mediating effect is also possible. That is, as a *result* of rotation policies, governments evaluate audit firm performance and ultimately use a specialist audit firm, which in turn results in a higher quality audit. We are unaware of theory or research that predicts that auditor specialization mediates the relationship between rotation policies and audit quality. As a result, we investigate this as a research question rather than a formal hypothesis.

RQ1: Does auditor specialization mediate the relationship between rotation policies and audit quality?

RESEARCH METHOD

Data

We use a sample of local governments from the State of Florida. Florida state statutes (Section 218.391) prescribe audit firm selection procedures for governmental entities, which require establishment of an audit committee,⁶ public announcement and solicitation for audit services, and adoption of procedures for evaluation of audit firm proposals. The statutes also encourage competition and contract negotiations and require written contracts. Thus, Florida governmental entities are an appropriate sample to test our hypotheses, since the statutes allow for differing acceptable practices relative to audit firm selection, subsequent evaluation, and tenure. Some entities retain their audit firms indefinitely or until a change is deemed necessary by the entity and/or the audit firm, while others follow policies that require periodic rotation. Still others may have rotation policies requiring periodic requests for proposal for audit services, but may allow for contract extensions with their current audit firms. Each of these governmental entities follows state statutes; however, their rotation policies differ. We examine whether those entities that possess a rotation policy use more specialized audit firms and receive higher quality audits.

We surveyed all 453 Florida city and county government finance directors to determine which Florida governments have rotation policies, the current audit firm employed by their government, and the tenure of the current audit firm. We received 232 responses (a 51 percent response rate).⁷ We supplement survey content with historical information regarding independent audit firm local government audit market share in Florida between 1998 and 2003 obtained from the State Auditor General's Office.

For each fiscal year, in accordance with Florida Statutes (Sections 11.45 and 218.39), the Auditor General's Office reviews the audits of all local governments with revenues or expenditures in excess of \$250,000. A primary purpose of the reviews is to determine whether audit reports and financial statements comply with American Institute of Certified Public Accountants (AICPA) audit standards (from the State and Local Governments industry audit guide), government auditing standards published by the Government Accountability Office, generally accepted accounting principles (GAAP), and Florida statutes. To facilitate the reviews, each year the Auditor General's

⁶ In 2005 Florida law was amended to require the governing body of each municipality to establish an audit committee ([Florida State House of Representatives \[FL House\] 2005](#)). Prior to the enactment of Chapter 2005-32, Laws of Florida, such entities were only required to establish auditor selection committees. The data in this study cover the period prior to this requirement.

⁷ To test for non-response bias, we compared late responders to all other responders. Late responders had lower population (*LogPop*) and audit fees (*LogAuditFee*) than early responders (both differences at $p < 0.001$). No other variables were significantly different between late and early responders.

Office personnel develop a checklist of compliance items that is completed for each local government. Noncompliance with review items is reported annually in the *Review of Local Governmental Entity Audit Reports Prepared by Independent Certified Public Accountants* (State of Florida Office of Auditor General 2006). Checklist items include proper revenue recognition, valuation and capitalization practices, financial statement format, audit report requirements, and note disclosures. An instance of noncompliance indicates that the government failed to properly report or disclose an item *and* the audit firm failed to correct the item in the financial statements or note the problem in the management letter mandated by the State of Florida. As a result, noncompliance is a function of the client and audit firm, although incidents involving client noncompliance must also involve failure by the audit firm to note the noncompliance.

We were provided with checklist items for fiscal years ending September 30, 2003 and 2004 and completed checklist reviews for the 232 local government entities completing the survey. Review items vary from year to year by nature and level of severity. There were 58 possible items in 2003 and 77 in 2004 when all entities were subject to Governmental Accounting Standards Board (GASB) Statement No. 34 implementation.⁸ For the entities within the study, we observe noncompliance with 31 of the 58 items in 2003 and 33 of the 77 items in 2004.

Variables

In this section we include the definition of rotation policy, audit firm specialization, and audit quality, as well as descriptions of how the terms are measured for our analyses. Additionally, we define a number of variables expected to be associated with use of a specialist audit firm and audit quality.

Rotation Policy is a dichotomous variable indicating whether the government entity periodically rotates or evaluates its external audit firm. A government entity where the finance director indicates that the entity has a rotation policy is coded as 1. Included are governments subject to a legal requirement to rotate and those with an administrative policy of periodically issuing a request for proposal for audit services with the intent of changing external audit firms or evaluating the current audit firm. Accordingly, governments coded as having a rotation policy *change audit firms or renew audit contracts periodically*, as opposed to those with no rotation policies who may voluntarily change audit firm but usually have longer tenure with the same audit firm.

Our specialization measure (*SPEC*) follows the market share approach and identifies a specialist firm as one that differentiates itself from its competitors in terms of market share within a particular industry (Neal and Riley 2004). *SPEC* is the log of total Florida governmental revenues audited by the audit firm or firm office for the fiscal year 2003, which is a weighted measure of specialization.⁹ We measure *SPEC* at the office level since prior research (Ferguson, Francis, and Stokes 2006, 2003) finds that specialization occurs at the local office level rather than the firm level.¹⁰ In Table 3 we convert *SPEC* to a dichotomous specialization measure (*Specialist Audit Firm*) by splitting it at the median; this allows us to construct frequency tables and examine the

⁸ Comparing annual reports over time, it is clear why many items leave the Auditor General's checklist. We observe new review items with high rates of noncompliance dwindle to a noncompliance rate of less than 10 percent, the relative cutoff for removal.

⁹ Two alternative measures of specialization are used in sensitivity analyses reported later in the paper.

¹⁰ In addition to the Big 4 firms, three regional/national audit firms provided audit services to governments in our sample—Cherry Bekaert Holland, Grant Thornton, and McGladrey and Pullen (now McGladrey).

relationship between the use of specialist audit firms (those above the median *SPEC* value) and rotation policies.

Because audit quality is not directly observable, prior researchers use proxies to study various facets of audit quality (Watkins, Hillison, and Morecroft 2004). Since Copley et al. (1994) suggest that auditors' planned level of audit assurance is positively associated with compliance with professional standards, Copley et al. (1994), O'Keefe et al. (1994), Deis and Giroux (1992), Lowensohn and Reck (2004), and Lowensohn et al. (2007) have used audit firm compliance with professional standards based on regulatory agencies' quality reviews as a measure of audit quality. This measure is a direct *ex post* indication of audit quality supplied. Therefore, we assess audit quality based on the total number of incidents of noncompliance with accounting and auditing standards over a two-year time period (years 2003 and 2004) for which data are available. We measure noncompliance (*NonComply*) over a two-year period to minimize the effects of the content of the checklist items and random fluctuations in annual audit quality.¹¹ Since the number of noncompliance incidents is not a continuous measure, we group the observations into five groups of relatively similar size based on the number of incidents of noncompliance (*NonComply*): zero incidents, one incident, two incidents, three incidents, and four or more incidents. Using our groupings we develop an ordered probit model for hypotheses testing. The *probability* of compliance (that is *no* incidents of noncompliance) is later depicted in the *QUAL* variable.

We use prior government and corporate research to identify a number of variables representing entity and audit firm characteristics that are likely related to audit quality and use of a specialist audit firm. Characteristics of the entity considered are whether the entity requires a single audit (*Single Audit*), the number of the entity's major funds (*Major Funds*), whether the entity has been awarded the Government Finance Officers Association's Certificate of Achievement (*GFOA*), the entity's average growth over a five-year period (*AveGrowth*), the size of the entity (*LogPop*), the entity's form of government (*Form Govt*), and how long the finance director has been employed by the entity (*YrsEmploy*). Audit firm characteristics include audit firm size (represented by *Big 4*), the length of time the audit firm has performed the entity's audit (*Tenure*), and whether the firm is a member of the AICPA Center for Audit Quality (*CAQ*). We also include the log of audit fees (*LogAuditFee*).

Single Audit is a dichotomous variable used to proxy for the complexity of the entity's audit. Entities expending in excess of \$500,000 in federal funds during the fiscal year are required to have a single audit. Single audits require substantial financial and program compliance-related audit work that results in several additional audit reports being issued by the audit firm. Due to the complexity of single audits, we expect a positive relationship between the *Single Audit* variable and selection of a specialist audit firm since government entities requiring a single audit are more likely to select an audit firm knowledgeable and experienced in government audits than an inexperienced audit firm.

Another measure of the complexity of an entity's audit is the number of *Major Funds* (as defined by GASB [1999]) a government entity reports in its government-wide financial statements. As the number of funds increases, the complexity of the audit increases due to the need for additional risk and materiality assessments. *Major Funds* is a count variable that we expect to be positively related to the demand for a specialist audit firm and negatively related to audit quality.

¹¹ See O'Keefe and Westort (1992) for validation of this approach. Deis and Giroux (1992) and O'Keefe et al. (1994) used a weighted measure of similar items; however, weightings were provided by the appropriate government officials. Since the Florida Auditor General's Office does not apply such weightings, we use raw counts in our primary analysis and test weighted counts in the supplemental analysis later in the paper.

The *GFOA* variable indicates whether the entity received a Certificate of Achievement for Excellence in Financial Reporting. The *GFOA* sponsors a voluntary program to assess the level of compliance with financial accounting and reporting practices in government. We include the *GFOA* variable as a measure of governance, arguing that entities applying for and receiving a certificate have an interest and ability to provide high quality financial reporting. As a result, they will also be more likely to use a specialist audit firm to ensure the quality of accounting and reporting practices, and also have higher audit quality. *GFOA* is a dichotomous variable, with 1 indicating a certificate has been awarded.

Average growth (*AveGrowth*) is a continuous variable measured as the average annual percentage change in revenue over a five-year period (between 1998 and 2003) obtained from the Florida Department of Financial Services website. Francis and Wilson (1988) suggest that rapid growth increases the complexity of an audit, thus we predict a positive relationship between growth and selection of a specialist audit firm, and a negative relationship with audit quality.

The size of the entity is provided (*Population*) for the year 2000. Given the dispersion and skew in the *Population* variable we include it in our models as the log of the population (*LogPop*). Larger governments are generally more complex than small governments and also have more resources, both of which would contribute to larger governments using a specialist audit firm. Large governments have more resources, but are also more complex, so we do not predict a relationship between size and audit quality.

Form of government (*Form Govt*) is a dichotomous variable coded 1 if the entity uses the council/manager form of government. Due to a strong manager's administrative experience and need to protect his/her reputation, we posit that entities with strong managers are more likely to employ a specialist audit firm, but do not predict its effect on audit quality. Closely related to *Form Govt* is years of employment (*YrsEmploy*). The more experienced the individual responsible for financial reporting, the more likely he/she understands the difficulties and complexities surrounding government entity audits; thus, the more likely he/she uses a specialist audit firm and is associated with higher reporting quality.

Finally, the log of audit fees (*LogAuditFee*) charged to the entity in 2003 is included. This variable can indicate the complexity of the entity, with more complex entities incurring greater audit fees. It could also indicate audit firm quality, with higher quality audit firms charging a premium for their service (DeAngelo 1981).

In addition to client characteristics, we model three audit firm characteristics that could be associated with the use of a specialist audit firm. The first of these is whether the audit firm is a Big 4 firm (coded 1 for *Big 4*). Given their size and availability of resources, Big 4 audit firms have the ability to specialize to a greater extent than smaller firms. Thus, the use of specialist audit firms may be associated with Big 4 firms.

The length of time the audit firm has performed the entity's audit (*Tenure*) is also included as a control variable. We do not predict a relationship between audit quality and tenure. While we have no reason to believe that tenure is associated with the decision to utilize a specialist audit firm, it is possible that tenure is correlated with the *Rotation Policy* variable, in that rotation policy could be a proxy for short tenure.

We include whether the audit firm is a member of the AICPA Center for Audit Quality (CAQ). Membership in the CAQ is voluntary and limited to firms that are registered with the Public Company Accounting Oversight Board (PCAOB), and therefore have agreed to meet the quality control standards of the PCAOB. Similar to the peer review variable in prior research, CAQ membership signals a level of professionalism associated with higher audit quality. Therefore we expect a positive association between CAQ membership and auditor specialization.

Definitions for all variables included in our models are provided in Appendix A.

Descriptive Statistics

From the 232 surveys received, nine observations were dropped from the study due to incomplete and inconsistent data, two observations were removed due to missing revenue data, three additional observations were dropped because the mean revenue growth for the period was greater than 1,300 percent, and two observations were dropped because they were missing data for the years of employment variable, leaving a sample of 216.¹²

Variable descriptive statistics are reported in Table 1. The second column reports the descriptive statistics for the full sample of 216 observations.¹³ The next two columns compare the 57 rotators to the 159 non-rotators, and the last two columns compare the 108 (108) governments with specialist (non-specialist) audit firms. Of those governmental entities responding, 26.4 percent indicated that they have a rotation policy.^{14,15} Auditor tenure (*Tenure*) averages 8.713 years and is significantly lower for rotators and entities with specialist auditors.

We use the log of the amount of governmental revenues an audit firm/office audits (*SPEC*) in 2003 as a measure of audit firm specialization. The mean for the *SPEC* variable is 19.509 with a standard deviation of 2.025 (untabulated). Untabulated results indicate that the deviation in the *SPEC* variable is greater for non-rotators (standard deviation 2.108) than for rotators (standard deviation 1.310). Governments with rotation policies on average hire audit firms with more government audit experience (*SPEC* = 20.456) than those without policies (*SPEC* = 19.138). This expertise appears to be reflected in the relatively low number (mean 1.778) of audit deficiencies (*NonComply*) identified by the Florida Auditor General's Office for 2003 and 2004. Governments with rotation policies experience fewer audit deficiencies (mean 1.474) than governments without such policies (mean 1.887), and governments with a specialist audit firm had 1.528 mean audit deficiencies while those with a non-specialist audit firm had 2.028 mean deficiencies.

Complexity measured by the number of *Major Funds* is greater for governments that have rotation policies (mean 5.263 funds) than for governments that do not have policies (mean 4.447 funds). A greater number of major funds increases the complexity of the audit, in part because audit materiality must be established for each major fund. Thus, the number of major funds is also greater for governments using specialist audit firms (mean 5.111 funds) than for those using a non-

¹² As an additional sensitivity test, two observations for which the continuous variable was more than four standard deviations from the mean were deleted. The reported results are substantially unchanged as a result of the deletions. We retain the observations in reported results since we have no basis for believing the average growth for these two observations is unusual or abnormal.

¹³ Audit fee data are available for only 201 of the observations, including 56 (145) rotators (non-rotators) and 104 (97) governments with specialist (non-specialist) audit firms.

¹⁴ For each entity whose financial official indicated a rotation policy, we examined available data from the Florida State Auditor General's Office and/or the Single Audit Database found at <http://www.harvester.census.gov> (last accessed July 22, 2015). We were able to verify that each of the entities with rotation policies changed audit firms or allowed for a contract extension between 1993 and 2003. Over the ten-year period, each of the rotators changed audit firms at least one time.

¹⁵ We surveyed rotators regarding the basis for rotation policy. The mandatory rotators have a commission/council/committee policy or an ordinance for rotation. Voluntary rotators overwhelmingly rotate based upon "management decision," which is consistent with the idea that management is aware of the benefits of periodic rotation (while not specifically required to rotate by ordinance or statute) and periodically evaluates the audit firm. Voluntary rotations take place over a range of 3–7 years (mean 4.49 years, median 5 years).

TABLE 1
Descriptive Statistics for Florida City/County Governments
Mean (Median)

Variable ^a	Full Sample	Rotators	Non-Rotators ^b	Specialists	Non-Specialists ^b
<i>Rotation Policy</i>	0.264 (0.000)			0.380 (0.000)	0.148*** (0.000)***
<i>Tenure</i>	8.713 (6.000)	3.158 (3.000)	10.704*** (10.000)***	7.333 (5.000)	10.093*** (10.000)***
<i>SPEC</i>	19.509 (19.995)	20.456 (20.770)	19.138*** (19.330)***		
<i>NonComply</i>	1.778 (2.000)	1.474 (1.000)	1.887* (2.000)**	1.528 (1.000)	2.028*** (2.000)***
<i>Major Funds</i>	4.662 (4.000)	5.263 (5.000)	4.447** (4.000)*	5.111 (5.000)	4.213*** (4.000)***
<i>Single Audit</i>	0.569 (1.000)	0.702 (1.000)	0.522** (1.000)**	0.759 (1.000)	0.380*** (0.000)***
<i>Big 4</i>	0.074 (0.000)	0.140 (0.000)	0.050* (0.000)**	0.148 (0.000)	0.000*** (0.000)***
<i>GFOA</i>	0.458 (0.000)	0.614 (0.403)	0.403*** (0.000)***	0.602 (1.000)	0.315*** (0.000)***
<i>AveGrowth</i>	0.111 (0.086)	0.105 (0.103)	0.114 (0.086)	0.119 (0.087)	0.103 (0.082)
<i>Population</i>	69,461 (10,465)	134,120 (15,956)	46,322*** (7,264)***	117,819 (21,625)	21,163*** (6,042)***
<i>LogPop</i>	9.238 (9.255)	9.990 (9.680)	8.969*** (8.890)***	9.910 (9.980)	8.567*** (8.710)***
<i>Form Govt</i>	0.551 (1.000)	0.702 (1.000)	0.497*** (0.000)***	0.574 (1.000)	0.528 (1.000)
<i>CAQ</i>	0.431 (0.000)	0.544 (1.000)	0.390** (0.000)**	0.648 (1.000)	0.213*** (0.000)***
<i>YrsEmploy</i>	8.436 (6.000)	7.895 (5.000)	8.630 (7.000)	9.693 (7.000)	7.180*** (5.000)***
<i>LogAuditFee^c</i>	10.566 (10.491)	10.882 (10.758)	10.445*** (10.439)**	10.972 (10.883)	10.312*** (10.127)***
n	216 (201) ^c	57 (56)	159 (145)	108 (104)	108 (97)

*, **, *** p-value < 0.10, < 0.05, and < 0.01, respectively.

^a Variable descriptions are provided in Appendix A.

^b Means are compared parametrically, medians are compared non-parametrically using Wilcoxon z-statistic. Two-tailed significance indicated.

^c Due to missing data there are 201 observations for which audit fee data are available. Numbers in parentheses represent the number of observations in each category for which audit fee data are available.

specialist (mean 4.213 funds). Another factor adding to the complexity of a government audit is a single audit requirement, and entities with rotation policies were more likely (70.2 percent) to have a single audit than governments without such policies (52.2 percent), as were those using a specialist audit firm (75.9 percent versus 38.0 percent).

Only a small number (7.4 percent) of respondents use a Big 4 audit firm. Governments with rotation policies are more likely (14.0 percent) to use a Big 4 audit firm than those without (5.0 percent). Of specialist audit firms, 14.8 percent are Big 4, and none of the non-specialist firms are Big 4. For those respondents with a rotation policy, well over half (61.4 percent) received the GFOA certificate, while less than half (40.3 percent) of respondents without a rotation policy received the certificate. As expected, governments using a specialist are more likely to receive the GFOA certificate (60.2 percent) than those using a non-specialist (31.5 percent).

Population, on average, is larger in cities with rotation policies (134,120) and with specialist auditors (117,819) compared to cities without rotation policies (46,322) and non-specialist auditors (21,163). However, there are no significant differences in average revenue growth across entities. A larger percentage (70.2 percent) of governments with rotation policies use the council/manager form of government than do those without rotation policies (49.7 percent). However, the form of government is similar among governments using specialist and non-specialist audit firms.

On average, 43.1 percent of the audit firms employed by governments are members of the AICPA Center for Audit Quality (CAQ). This percentage is considerably higher (54.4 percent) for governments with rotation policies than for non-rotators (39.0 percent). It is also much higher for governments using specialists (64.8 percent) versus non-specialists (21.3 percent). The number of years the finance officer has been with the government (*YrsEmploy*) is similar for rotators and non-rotators. However, for governments using a specialist, we find that the finance officer, on average, has been with the city longer (9.693 years) than when a non-specialist is used (7.180 years). Governments with rotation policies, and those using specialist audit firms have a higher log of audit fees (10.882 and 10.972, respectively) than those governments with no rotation policies, and using non-specialists (10.445 and 10.312, respectively).

Table 1 shows significant differences between rotation policy and non-rotation policy governments and between governments using specialist and non-specialist audit firms for most of the variables considered in the study. The univariate results generally support our decision to include the variables from Table 1 in our analyses.

The Pearson correlations reported in Table 2 show that *Rotation Policy* is significantly associated ($p\text{-value} = 0.055$) with incidents of noncompliance (*NonComply*). The negative correlation indicates that entities with rotation policies have fewer incidents of noncompliance. Audit firm rotation policies are positively and significantly ($p\text{-value} < 0.001$) correlated with the audit firm specialization variable (*SPEC*), indicating that entities with policies to periodically evaluate their current audit firm use more specialized audit firms than those without such policies. We also find that audit firm specialization (*SPEC*) is negatively ($p\text{-value} < 0.001$) correlated with incidents of noncompliance (*NonComply*). The correlation indicates specialist audit firms are associated with fewer audit deficiencies (*NonComply*), suggesting higher compliance with reporting and auditing standards. These descriptive statistics provide preliminary support for the hypotheses.

DATA ANALYSIS AND RESULTS

Analysis of Use of Specialist Audit Firms and Audit Firm Rotation Policies

Because rotation and use of a specialist audit firm are decisions that may be made jointly, we address whether these decisions are independent, and then analyze the effects of these decisions on audit consequences including audit quality. In Table 3, Panel A we perform a frequency analysis of the relationship between the use of specialist audit firms and the use of rotation

TABLE 2
Pearson Correlations of the Variables Used in Reported Models
(two-sided p-values; n = 216)

Panel A: Correlation Variables *Rotation Policy to Big 4*

<u>Variables^a</u>	<u>Rotation Policy</u>	<u>Tenure</u>	<u>SPEC</u>	<u>Non- Comply</u>	<u>Major Funds</u>	<u>Single Audit</u>	<u>Big 4</u>
<i>Rotation Policy</i>	1						
<i>Tenure</i>	-0.473 (< 0.001)	1					
<i>SPEC</i>	0.307 (< 0.001)	-0.199 (0.003)	1				
<i>NonComply</i>	-0.131 (0.055)	0.038 (0.578)	-0.281 (< 0.001)	1			
<i>Major Funds</i>	0.155 (0.022)	-0.012 (0.858)	0.268 (< 0.001)	- 0.015 (0.830)	1		
<i>Single Audit</i>	0.160 (0.019)	-0.054 (0.429)	0.436 (< 0.001)	-0.126 (0.066)	0.354 (< 0.001)	1	
<i>Big 4</i>	0.152 (0.026)	-0.011 (0.871)	0.317 (< 0.001)	0.033 (0.635)	0.232 (< 0.001)	0.210 (0.002)	1
<i>GFOA</i>	0.187 (0.006)	-0.079 (0.249)	0.391 (< 0.001)	-0.187 (0.006)	0.451 (< 0.001)	0.425 (< 0.001)	0.237 (< 0.001)
<i>AveGrowth</i>	-0.031 (0.653)	-0.126 (0.065)	0.110 (0.106)	-0.042 (0.538)	-0.045 (0.514)	-0.146 (0.031)	-0.035 (0.614)
<i>LogPop</i>	0.230 (< 0.001)	-0.049 (0.476)	0.479 (< 0.001)	-0.130 (0.057)	0.637 (< 0.001)	0.568 (< 0.001)	0.357 (< 0.001)
<i>Population</i>	0.194 (0.004)	-0.035 (0.606)	0.282 (< 0.001)	0.025 (0.718)	0.350 (< 0.001)	0.244 (< 0.001)	0.513 (< 0.001)
<i>Form Govt</i>	0.182 (0.008)	-0.085 (0.476)	0.136 (0.046)	-0.091 (0.184)	-0.075 (0.269)	0.098 (0.149)	-0.100 (0.143)
<i>CAQ</i>	0.137 (0.044)	-0.106 (0.122)	0.520 (< 0.001)	-0.144 (0.035)	0.167 (0.014)	0.246 (< 0.001)	0.325 (< 0.001)
<i>YrsEmploy</i>	-0.047 (0.493)	0.055 (0.422)	0.179 (0.008)	0.039 (0.569)	0.095 (0.166)	0.156 (0.022)	0.110 (0.106)
<i>LogAuditFee^b</i>	0.195 (0.006)	0.013 (0.859)	0.554 (< 0.001)	-0.127 (0.072)	0.621 (< 0.001)	0.565 (< 0.001)	0.433 (< 0.001)

(continued on next page)

TABLE 2 (continued)

Panel B: Correlation Variables GFOA to YrsEmploy

Variables ^a	GFOA	Ave Growth	LogPop	Population	Form Govt	CAQ	Yrs Employ
GFOA	1						
AveGrowth	0.003 (0.965)	1					
LogPop	0.627 (< 0.001)	-0.033 (0.633)	1				
Population	0.256 (< 0.001)	-0.028 (0.684)	0.625 (< 0.001)	1			
Form Govt	0.233 (< 0.001)	-0.027 (0.698)	-0.021 (0.756)	-0.264 (< 0.001)	1		
CAQ	0.138 (0.042)	-0.087 (0.202)	0.199 (0.003)	0.211 (0.002)	-0.136 (0.046)	1	
YrsEmploy	0.134 (0.050)	-0.073 (0.285)	0.163 (0.017)	0.108 (0.113)	-0.086 (0.206)	0.133 (0.051)	1
LogAuditFee ^b	0.526 (< 0.001)	-0.031 (0.665)	0.872 (< 0.001)	0.565 (0.001)	-0.067 (0.346)	0.277 (< 0.001)	0.149 (0.034)

^a A description of all variables is provided in Appendix A.

^b Due to missing data there are 201 observations for which audit fee data are available.

policies. Given that the specialist audit firm variable (*SPEC*) is continuous, for the frequency analysis we arbitrarily divide the continuous *SPEC* variable at its median. As shown, a Chi-square test provides preliminary support for H1, indicating that audit firm rotation policy is associated with use of a specialist audit firm. Panel A indicates that 42/57 (73.7 percent) of entities with a rotation policy use specialist audit firms; however, only 69/159 (43.3 percent) of entities without such policies use specialist audit firms.

We also conduct a preliminary analysis of the relationships between our variables of interest (*Rotation Policy* and *Specialist Audit Firm*) and audit quality, as well as several other variables that are often associated with audit quality to provide a better understanding of some potential benefits of having a rotation policy or using a specialist audit firm. Panel B of Table 3 displays the relations of rotation policy and use of a specialist firm with audit fees, membership in the Center for Audit Quality, receipt of the GFOA certificate, the *NonComply* metric, and auditor tenure.¹⁶

The presence of a rotation policy is significantly (p -value = 0.080) associated with the probability of a government holding the GFOA Certificate of Achievement. We find that that rotation policy is significantly negatively (p -value < 0.001) associated with *Tenure* suggesting that the tenure of the audit firm is likely to be lower if a government has a rotation policy. Finally, although the presence of a rotation policy increases the probability of fewer instances of noncompliance (*NonComply*), the relationship is not significant at conventional levels with a p -value = 0.122.

¹⁶ Modeling techniques were selected to fit the characteristics of the variables being modeled. Thus, both GLM and categorical modeling procedures were employed.

TABLE 3

Relationship between Audit Firm Rotation Policy and Use of Specialist Audit Firm (H1)

Panel A: Number of Governments with Specialist Audit Firms and Audit Firm Rotation Policies

Specialist Audit Firm ^a Actual Number (Expected Number) (n = 216)			
Rotation Policy	No	Yes	Total
No	90 (77)	69 (82)	159
Yes	15 (28)	42 (29)	57
Total	105	111	216
Chi-square	15.408		
p-value	< 0.001		

Panel B: Consequences of Having a Specialist Audit Firm and an Audit Firm Rotation Policy^b

Variable	<i>LogAuditFee</i> (n = 201) Coefficient (p-value) ^c	CAQ (n = 216) Coefficient (p-value)	GFOA (n = 216) Coefficient (p-value)	<i>NonComply</i> (n = 216) Coefficient (p-value)	<i>Tenure</i> (n = 216) Coefficient (p-value)
Intercept	10.101 (< 0.001)	-1.326 (< 0.001)	-0.871 (< 0.001)	(omitted)	11.163 (< 0.001)
<i>Rotation Policy</i>	0.202 (0.180)	0.126 (0.720)	0.583 (0.080)	-0.444 (0.122)	-7.222 (< 0.001)
<i>Specialist Audit Firm</i>	0.792 (< 0.001)	1.890 (< 0.001)	1.072 (< 0.001)	-0.536 (0.034)	-1.087 (0.216)

Panel C: Full and Reduced Models for Determinants of Specialist Audit Firm Obtained from Stepwise Procedures (H1)^d

Variables ^d	Expected Sign	Specialist Audit Firm Logistic Coeff. Full Model (p-value)	Specialist Audit Firm Logistic Coeff. Reduced Model (p-value)
Intercept	?	-11.336 (< 0.001)	-13.143 (< 0.001)
<i>Rotation Policy</i>	+	1.112 (0.006)	0.873 (0.071)
<i>Single Audit</i>	+	1.010 (0.009)	1.060 (0.019)
<i>AveGrowth</i>	+	3.090 (0.042)	2.905 (0.069)
<i>Major Funds</i>	+	-0.220 (0.033)	-0.191 (0.078)
<i>LogAuditFee</i>	?	0.988 (< 0.001)	1.299 (0.005)

(continued on next page)

TABLE 3 (continued)

Variables ^d	Expected Sign	Specialist Audit Firm	Specialist Audit Firm
		Logistic Coeff. Full Model (p-value)	Logistic Coeff. Reduced Model (p-value)
CAQ	+	1.821 (< 0.001)	1.650 (< 0.001)
Form Govt			0.266 (0.532)
Tenure			-0.042 (0.152)
GFOA			-0.036 (0.941)
LogPop			-0.177 (0.478)
YrsEmploy			0.045 (0.010)
Big 4			12.088 (0.966)
Rescaled R ²		0.473	0.341

^a To create the *Specialist Audit Firm* variable in this analysis the continuous *SPEC* variable (log of total Florida governmental revenues audited by the audit firm or firm office for the fiscal year 2003) was dichotomized by dividing into two groups based on the median value for *SPEC*.

^b The dependent variables, log of audit fees (*LogAuditFee*) and *Tenure* are modeled using a GLM procedure; whereas, the dependent variables *CAQ*, *GFOA*, and *NonComply* are modeled using a logistic procedure.

^c Two-tailed p-values are reported.

^d The same levels of significance are obtained when a probit model is used. A test for multicollinearity indicates that there was no significant multicollinearity present in the full model.

We also find that use of a specialist is significantly ($p\text{-value} < 0.001$) positively associated with audit fees. Thus, a consequence of using a specialist may be higher audit fees. These specialist firms are more likely to be a member of the AICPA Center for Audit Quality (CAQ) ($p\text{-value} < 0.001$), and their selection increases the probability that the government is associated with fewer incidents of noncompliance (*NonComply*) ($p\text{-value} = 0.034$) and holds the GFOA Certificate of Achievement ($p\text{-value} < 0.001$). Use of a specialist is not significantly associated with the tenure of the audit firm.

These results indicate that rotation policy and use of a specialist audit firm are associated with audit quality (measured as reduced instances of noncompliance), as well as other variables frequently associated with audit quality. We next examine determinants of choice of specialist firm, and whether rotation policies increase the likelihood of selecting a specialist firm.

Determinants of the Specialist Audit Firm

We use logistic regression to examine possible determinants of audit firm specialization (*Specialist Audit Firm*). In accordance with H1 and the results from our frequency analysis we expect *Rotation Policy* to be associated with the use of a specialist by a government:

$$\text{Specialist Audit Firm} = f(\text{Rotation Policy, Single Audit, AveGrowth, Major Funds, LogAuditFee, CAQ, Form Govt, Tenure, GFOA, LogPop, YrsEmploy, Big 4}) \quad (1)$$

In investigating the association between specialization and rotation policy we include in our model several entity and audit firm characteristic variables that could also be associated with specialization. Since theory does not identify which variables are important determinants of specialization we use a stepwise approach to ensure that significant variables are retained in the final model. The results of the stepwise procedure (Panel C of Table 3) indicate that the use of a specialist audit firm can be modeled well (rescaled $R^2 = 0.473$) using a limited number of variables. Only those variables making a significant contribution (p -value < 0.05) were retained in the reported model. As shown, even after controlling for highly significant variables, *Rotation Policy* has a significant (p -value = 0.006) positive association with *Specialist Audit Firm*. It should be noted that all of the variables retained in the model as a result of the stepwise procedure were also significant ($\alpha < 0.10$) in the predicted direction, where applicable, in the full Model (1); however, significance levels are higher in the reduced (stepwise) model than in the full model. The results of this process further support H1, indicating that entities that possess rotation policies use more specialized audit firms than do the entities without rotation policies. Other variables retained in the model indicate that several entity variables are significantly positively associated with the use of specialist audit firms; these include the need for a single audit, higher growth levels, number of major funds, and the size of audit fees. One audit firm characteristic, membership in the Center for Audit Quality, is associated with use of a specialist.

To determine whether *Rotation Policy* and *Specialist Audit Firm* are measuring the same construct we estimated a stepwise regression with *Rotation Policy* as the dependent variable and included the same entity and audit firm characteristics in the model as were used in the *Specialist Audit Firm* model, plus the *Specialist Audit Firm* variable. We found little commonality between the resulting models for the determinants of *Specialist Audit Firm* and *Rotation Policy* (untabulated). The log of audit fees (*LogAuditFee*) is the only variable common in both the *Specialist Audit Firm* and *Rotation Policy* models.

The results provided in Table 3 support H1 that rotation policies are positively associated with the use of a specialist audit firm. Additionally, the results of our untabulated analysis provide us with confidence that our proxies for specialist audit firm and rotation policy are not measuring the same construct. As a result of findings on Table 3, we test for H2 and H3.

Analysis of Audit Quality, Specialist Audit Firm, and Audit Firm Rotation Policies

A probit Model (2a) is used to test the relation between audit firm specialization and audit quality (H2) after controlling for contextual variables potentially related to audit quality. The probit model measures the *probability of compliance*; that is, it indicates the probability that no incidents of noncompliance (*NonComply*) occur. Since the model is measuring probability of compliance we rename the variable (*QUAL*). Model (2b) is used to examine the relationship between rotation policy and audit quality (H3):

$$\text{QUAL} = f(\text{SPEC, Major Funds, GFOA, Tenure, Big 4, CAQ, Form Govt, LogPop, AveGrowth, YrsEmploy}) \quad (2a)$$

$$\text{QUAL} = f(\text{Rotation Policy, Major Funds, GFOA, Tenure, Big 4, CAQ, Form Govt, LogPop, AveGrowth, YrsEmploy}) \quad (2b)$$

Since we are no longer examining the direct relationship between audit firm specialization and rotation policy, we use the previously defined continuous measure of audit specialization (*SPEC*) rather than the dichotomous variable we created for analyses in Table 3. As indicated by H2, we believe that specialization is associated with audit quality in a manner that increases the probability of compliance with reporting and auditing standards. Thus, we expect the sign on *SPEC* to be positive.

In Model 2b the variable of interest is *Rotation Policy*. Since H3 indicates rotation policies are associated with higher audit quality, a positive sign is predicted for the *Rotation Policy* coefficient. A significant positive sign indicates that *Rotation Policy* increases the probability of compliance with reporting and auditing standards.

Since complex entities represent a greater challenge to the audit firm, we expect that, as *Major Funds* increase in number, the probability of compliance (*QUAL*) decreases. Achieving the GFOA Certificate of Achievement involves additional reporting, and prior research has found higher quality audits are associated with receipt of a GFOA certificate (Hackenbrack, Jensen, and Payne 2000; Copley 1991). Therefore, we expect a positive relationship between receipt of a GFOA certificate and audit quality. Prior research often uses tenure as a proxy for audit quality, although arguments and results are mixed as to the effect of tenure on audit quality. Accordingly, we include tenure in our models, but make no directional prediction.

Evidence generally supports a positive relation between audit quality and audit firm size (i.e., National Commission on Fraudulent Financial Reporting [NCFRR] 1987; O'Keefe and Westort 1992; Brown and Raghunandan 1995; Becker, DeFond, Jiambalvo, and Subramanyam 1998; Francis, Maydew, and Sparks 1999). However, Big 4 audit firms have been associated with lower perceived audit quality than non-Big 4 audit firms in a governmental setting (Lowensohn et al. 2007; Samelson et al. 2006). We include Big 4 as a proxy for audit firm size. However, due to the mixed results on the effect of audit firm size on audit quality for governmental entities, we do not predict a direction.

Deis and Giroux (1992, 1996) found that voluntary membership in the AICPA Peer Review Section was associated with higher audit quality. We include an indicator of membership in the AICPA Center for Audit Quality (CAQ) and predict a positive association in our model.¹⁷

The *Form Govt* variable is included because the quality of control systems and demand for monitoring may vary across types of government (Zimmerman 1977; Copley 1989). A size variable (*LogPop*) is included since larger governments have greater resources available to invest in procuring a quality audit; however, they are also more complex, which can increase audit risk. No direction is predicted for either form or size of government. Average growth (*AveGrowth*) is included since Francis and Wilson (1988) suggest that rapid growth increases audit complexity, which could negatively impact audit quality. We also include an experience variable (*YrsEmploy*) because the quality of financial reporting may be associated with the experience of government employees responsible for financial reporting.¹⁸

¹⁷ The nature of peer reviews has changed since the Deis and Giroux studies. Now, firms required to be registered with and inspected by the PCAOB must be enrolled in the Center for Public Company Audit Firms (CPCAF) Peer Review Program (PRP) and have a peer review under that program's standards. Firms that are not required to be registered with and inspected by the PCAOB may elect to have a peer review under either the CPCAF PRP or the AICPA Peer Review Program. We examine membership in the Center for Audit Quality, as it is voluntary and captures the intent of Deis and Giroux's peer review variable, namely "a commitment to maintain professional standards, to interact with peers within the profession, and to internalize professional norms" (Deis and Giroux 1992, 470).

¹⁸ Years of experience may positively affect audit quality if it reflects managerial abilities, although it does not include previous relevant experience. Alternatively, years of employment may negatively affect audit quality if it reflects management entrenchment.

TABLE 4
Probit Analysis of the Impact of Rotation Policy and Use of Specialist on Audit Quality
(Dependent Variable *QUAL* = the Probability of Fewer Errors)
(n = 216)

Variables ^a	Expected Signs	Column A (H2) Coefficient (p-value)	Column B (H3) Coefficient (p-value)	Column C Coefficient (p-value)
<i>Major Funds</i>	–	–0.063 (0.127)	–0.074 (0.073)	–0.066 (0.110)
<i>GFOA</i>	+	0.337 (0.093)	0.364 (0.068)	0.345 (0.085)
<i>Tenure</i>	?	0.003 (0.753)	0.008 (0.524)	0.009 (0.428)
<i>Big 4</i>	?	–0.660 (0.030)	–0.626 (0.040)	–0.692 (0.024)
<i>CAQ</i>	+	0.106 (0.569)	0.392 (0.015)	0.114 (0.542)
<i>Form Govt</i>	?	–0.000 (1.000)	0.092 (0.567)	–0.023 (0.887)
<i>LogPop</i>	?	0.011 (0.853)	0.062 (0.279)	0.006 (0.916)
<i>AveGrowth</i>	–	0.042 (0.944)	0.520 (0.375)	0.122 (0.840)
<i>YrsEmploy</i>	+	–0.017 (0.129)	–0.011 (0.131)	–0.016 (0.155)
<i>Rotation Policy</i>	+		0.306 (0.123)	0.226 (0.259)
<i>SPEC</i>	+	0.165 (0.002)		0.157 (0.003)
Log Likelihood		–327.342	–331.070	–326.704
Chi-square Goodness-of-Fit Statistic		1.014	1.012	1.016
p-value		0.384	0.395	0.365

When the models reported on Table 4 are run on a reduced sample of the 201 observations for which audit fee information is available, the significance of the hypothesized relationships is the same.

^a A description of all variables is provided in Appendix A. For convenience, intercept values are not reported.

Impact of Audit Firm Specialization on Audit Quality

To reiterate, the probit Model (2a) indicates the probability of *compliance*; therefore, we expect a positive sign on *SPEC* if using an audit specialist is associated with greater audit quality. As reflected in Table 4, Column A, specialization (*SPEC*) is significantly (p-value = 0.002) associated with the *QUAL* variable, indicating that use of a specialist audit firm is associated with the probability of higher audit quality as measured by compliance with reporting and auditing standards. This result supports H2.

Two of the control variables used in the model are associated with *QUAL*. *GFOA* is positively (p -value = 0.093) associated with *QUAL*, indicating that a *GFOA* certificate is associated with greater audit quality. Additionally, *Big 4* is negatively (p -value = 0.030) associated with the *QUAL* variable. This result supports prior research findings that *Big 4* audit firms are perceived to be associated with lower audit quality in the governmental audit market.

Impact of Audit Firm Rotation Policy on Audit Quality

We next test the impact of rotation policy on audit quality. Since the probit model examines the probability of *compliance*, we expect the sign on the *Rotation Policy* variable to be positive if it is associated with greater audit quality. Table 4, Column B shows that, although *Rotation Policy* is positively associated with audit quality (*QUAL*), the relation is not significant at conventional levels (p -value = 0.123). The result provides minimal support for the direct relationship posited in H3.

Four of the control variables included in the model are significant. *Major Funds* is negatively (p -value = 0.073) associated with *QUAL*, indicating that, as the number of major funds increases, audit quality decreases. As expected the *GFOA* Certificate of Achievement is positively (p -value = 0.068) related to audit quality, indicating that governments receiving the certificate have higher audit quality. Conversely, *Big 4* is negatively (p -value = 0.040) associated with audit quality. Finally, contracting with audit firms that are members of the AICPA Center for Audit Quality (CAQ) is associated with higher quality audits (p -value = 0.015).

Impact of Rotation Policy on Audit Quality in the Presence of Audit Firm Specialization

Although the direct relationship between rotation policy and audit quality is not strongly indicated in our models, Table 3, Panel A indicates that those governments with rotation policies are significantly more likely to use a specialist audit firm. In turn the use of a specialist is associated with significantly higher quality audits (Table 4, Column A). As posited by our research question, the relation between *Rotation Policy* and *QUAL* may be an indirect mediation effect rather than direct.

To test this question, we use mediation analysis (Preacher and Hayes 2004, 2008). Using the mediation model we first consider whether rotation policies are significantly associated with use of a specialist audit firm (H1). We then investigate whether rotation policies are significantly associated with audit quality (H3). Finally, we ascertain whether, in the presence of a specialist audit firm, rotation policies are significantly associated with audit quality. If there is a mediation effect, then we should find that H1 remains supported, and H2 remains supported; however, the association between rotation policies and audit quality (H3) is significantly less in the presence of a specialist audit firm. Although the association between audit quality and rotation policy should be significantly less if there is a mediation effect, the association between specialist audit firm and audit quality (H2) should remain relatively unchanged.

We test for the presence of a mediation effect by including both *SPEC* and *Rotation Policy* in the *QUAL* model (Table 4, Column C). The results indicate that the *Rotation Policy* variable adds less explanatory power (p -value = 0.259) when the *SPEC* variable is present. *SPEC*'s contribution to the model, however, remains largely unchanged from Column A to Column C (p -value = 0.002 and p -value = 0.003, respectively).

Analysis (untabulated) of the indirect or mediation effect of rotation policy on audit quality is conducted by constructing a t -statistic (Sobel 1982) comparing the effect of *Rotation Policy* on *QUAL* when *SPEC* is not present (Column B) and when *SPEC* is present (Column C). The result supports (one-sided p -value = 0.077) our conjecture that rotation policy's effect on audit quality is

through the use of a specialized audit firm. Due to the non-normal nature of the sampling distribution for the mediation effect, [Preacher and Hayes \(2008\)](#) recommend the use of a bootstrapping procedure. The results of the bootstrapping procedure we conducted provide even stronger support ($p\text{-value} < 0.05$) for the presence of a mediation effect.

To summarize, in Table 3, *Rotation Policy* is significantly correlated with audit quality, and in the probit analyses in Table 4, Column B, *Rotation Policy* is in the hypothesized direction and nearing statistical significance. However, in Table 4, Column C, when *SPEC* is added to the model *Rotation Policy* is clearly not significant. This indicates a mediating relationship whereby the mediator (*SPEC*) reduces or eliminates the influence of the independent variable (*Rotation Policy*) on the dependent variable (*Audit Quality*) while still maintaining its influence on the dependent variable (*Audit Quality*). The results suggest that the effect of rotation policy on audit quality in this setting is in part through the choice of audit firm.

Sensitivity Analysis (Not Tabulated)

As a sensitivity test, we replaced the dichotomous specialization variable with the continuous variable *SPEC*. The association between *Rotation Policy* and *SPEC* reported in Table 3 Panel C remains highly significant. Table 4 reports the association between audit firm specialization and audit quality. If we dichotomize the continuous specialization variable (*SPEC*), then reported results are slightly weaker. The result for Column A indicates that firm specialization remains significant at a lower level ($p < 0.10$); however, when both firm specialization and rotation policy are included in the model, the p -value becomes 0.122.

We also estimate several models that examined the impact of the control variables CAQ (Center for Audit Quality membership), *Big 4*, and *Single Audit*. These variables could be capturing various aspects of specialization and/or quality. Additionally, they may be correlated with other control variables. Untabulated tests of models represented on Table 4 show that results are substantively unchanged when CAQ and *Big 4* are removed from the models.

In an additional test, all cities using a Big 4 auditor were removed from the sample to determine whether the reported results changed. Due to the small number of cities using Big 4 auditors, results remain substantively unchanged from those reported on Table 4. Finally, the *Single Audit* variable was added to the models reported on Table 4. The addition of *Single Audit* does not change any of the results reported on Table 4 and the variable is not significant in any of the models.

We also use two additional audit firm specialization variables to test H1. The first variable is a longitudinal representation measured as the log of the total number of Florida government entities (general purpose and special purpose) audited by the audit firm/office over the five-year time period 1998–2003. *Rotation Policy* remains positively and significantly associated with choice of a specialized audit firm, although the explanatory power of the model is considerably reduced using this new variable (adjusted $R^2 = 0.194$). When the log of the total Florida government entities audited over a five-year period is used as the specialization variable in Table 4 models the results for *Rotation Policy* and *SPEC* are substantially the same. The second audit firm specialization variable tested is the log of the total number of Florida governments (general purpose and special purpose) audited in 2003 by an audit firm, or a firm office in the case of a firm with multiple offices. Using this alternative specialization measure yields results similar to those using the log of total Florida government entities audited over a five-year period.

An additional audit quality variable is also tested. For this variable we use an *ad hoc* procedure to weight the reported incidents of noncompliance based upon relative severity in terms of audit quality.¹⁹ In the untabulated results, we find similar but slightly weaker associations using the weighted values for audit quality. In the test of H2, *SPEC* (p-value = 0.007) remains significant. The test of H3 finds that *Rotation Policy* (p-value = 0.164) declines somewhat in significance. However, when both *SPEC* and *Rotation Policy* are tested in the same model, the results are substantially the same as those reported in Column C of Table 4.

Because of the significant correlation between *Rotation Policy* and *Tenure*, results for these variables could be affected by the inclusion of both variables in the same model. Accordingly, we perform additional tests on the model used to test H3 (untabulated). First, we exclude the *Rotation Policy* variable from the model. When *Rotation Policy* is excluded from the model, *Tenure* is not significant (alpha = 0.10). When *Tenure* is excluded from the model, the *Rotation Policy* variable's level of significance is similar to that reported (p-value = 0.159). We also exclude *Rotation Policy* and add the interaction term *Rotation Policy* * *Tenure* to the model. Neither *Tenure* nor the interaction term is significant (alpha = 0.10). Conversely, when *Rotation Policy* and the interaction term are retained and just *Tenure* is removed from the model, *Rotation Policy* is significant (p-value < 0.06) and the interaction term is not significant (alpha = 0.10). The tests indicate that the reported results are not driven by the relation between the *Tenure* and *Rotation Policy* variables.²⁰

We also examine an auditor switch variable that compares governments that switched audit firms over the five-year period 1998–2003 versus those who did not. We use univariate analyses to examine differences between governments with rotation policies that changed audit firms and non-rotators that changed audit firms within the five year period. A Chi-square test indicates that rotators that change audit firms are more likely to select a specialist audit firm than non-rotators that change audit firms. Governments with rotation policies that change audit firms have higher quality than non-rotators that change audit firms. Furthermore, rotators moving from non-specialists to specialists enjoy significantly higher quality than non-rotators moving toward specialists, and entities with specialist auditors have higher quality than entities with non-specialists.

To minimize the impact of the skewed distribution of population, we dichotomize *Population* at the median and use the dichotomized variable to rerun the models reported in Table 4. In Column A, the significance of *SPEC* increases slightly (p-value = < 0.001), and in Column B, *Rotation Policy* becomes significant at a p-value = 0.091. The results for Column C are substantially the same; *Rotation Policy* is not significant (p-value = 0.232) and *SPEC* is significant (p-value = 0.001).

¹⁹ The checklist items used to measure incidents of noncompliance originated from the AICPA State and Local Governments industry audit guide, government audit standards published by the Government Accountability Office (GAO), generally accepted accounting principles promulgated by the GASB, and Florida statutes. Audit report requirements specified by GASB or the AICPA's industry audit guide were considered the most important audit quality factors, followed by GASB financial statement requirements and GAO Single Audit items. Financial statement footnote disclosures and general administrative items (Florida Statutes) were ranked third and fourth, respectively. Admittedly, this is an *ad hoc* procedure subject to measurement error.

²⁰ Auditor tenure is also constructed as a dichotomous variable (with the middle level of the three-level variable set equal to 1 and the other two levels equal to 0). This variable was tested since it has been argued that the tenure and audit quality relationship is more of a U-shape with quality being lower when the audit firm is new to the client and due to audit firm complacency with long tenure. The alternative tenure specification is not significantly associated with audit quality and does not change the significance of the hypothesized results for H2 and H3.

CONCLUSIONS AND IMPLICATIONS

The debate surrounding audit firm rotation has largely focused on its impact on audit firm tenure, and the resultant impact of tenure on auditor independence and professional skepticism. We examine the presence of rotation policies within local governments and find that rotation policies, including either mandated rotation or periodic technical evaluation of audit firms, are associated with the use of a specialist audit firm. Our results also indicate that entities within our sample that used a specialist audit firm had higher audit quality and that those entities that adopted a rotation policy were somewhat more likely to have higher audit quality. However, when a specialist audit firm is used the rotation policy has less impact on audit quality. Thus, it appears that audit firm rotation policies are positively related to audit quality via audit firm selection.

Opposition to audit firm rotation policies is largely based on concerns that inexperienced audit firms provide lower quality audits, especially in the initial years of a new audit engagement. Without rotation policies, however, governments with poor quality audit firms may not have a formal mechanism for evaluating audit quality. [Stanley and DeZoort \(2007\)](#) suggest that the risk of lower quality in initial years is reduced with the use of specialist audit firms, and we find that specialists are associated with higher audit quality. Our results support the idea that audit firm rotation policies may be beneficial in improving audit quality, and selection of a specialized audit firm accounts for much of the quality improvement. Hence, adoption of a periodic audit firm rotation policy may be beneficial, especially in markets where audit firm specialists exist.

Our study is unique in that we were able to examine the presence of rotation policies in place, rather than proxies such as audit tenure or observed auditor change. These audit policies included mandatory rotation as well as management policies requiring auditees to proactively consider whether the current external audit firm should be retained. Since audit firm areas of strength and expertise can change over time due to personnel attrition, changes in firm strategy, and market changes, periodic evaluation of audit firm capabilities allows governments to select audit firms with a desired level of expertise. This sample allows our study to inform the current discussion concerning whether rotation or periodic evaluation policies should be considered. The entities with rotation and evaluation policies changed auditors at least once during the ten-year period preceding our study. Additional evidence is needed to understand differences between entities that evaluate but retain their incumbent auditor and entities that elect to make an auditor change.

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APPENDIX A
Description of Variables

Variable	Definition
Dependent Variables	
<i>NonComply</i>	Total number of checklist noncompliance incidents in FY 2003–2004, divided into five groups: zero incidents, one incident, two incidents, three incidents, and four or more incidents.
<i>QUAL</i>	This is a measure of the probability of compliance (that is, no incidents of noncompliance).
<i>SPEC</i>	The log of total Florida governmental revenues audited by the audit firm or firm office for the fiscal year 2003.
Independent Variable	
<i>Rotation Policy</i>	Indicates whether the government has an audit firm rotation policy that requires periodically rotating or evaluating whether its current audit firm should be retained (1) or no such rotation policy (0).
Control Variables	
<i>Major Funds</i>	Number of major funds reported in the FY 2004 Comprehensive Annual Financial Report (CAFR)—continuous.
<i>Single Audit</i>	A dichotomous variable indicating whether the government requires a single audit (1) or not (0).
<i>Big 4</i>	A dichotomous variable indicating whether the audit firm used by the government is a Big 4 firm (1) or non-Big 4 (0) firm.
<i>Tenure</i>	The number of years the government has contracted with the FY 2004 audit firm—continuous.
<i>AveGrowth</i>	The average annual percentage change in revenue over a five-year period (between 1998 and 2003).
<i>LogPop</i>	Log of population (2000). The actual population (<i>Population</i>) number is also provided.
<i>GFOA</i>	A dichotomous variable indicating whether the government received a GFOA Certificate of Achievement for its FY 2003 and FY 2004 CAFR (1) or not (0).
<i>Form Govt</i>	Form of government coded 1 if council/manager, and 0 otherwise.
<i>LogAuditFee</i>	Log of audit fees (2004).
<i>CAQ</i>	A dichotomous variable indicating whether the audit firm is a member of the AICPA Center for Audit Quality (1) or not (0).
<i>YrsEmploy</i>	Years the Finance Officer has been employed by the government.



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