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Abstract: Governments may rely on the same contractor to repeatedly provide goods and services. Contractor expertise relative to the public managers, lack of vendor market competition, and advantages embedded in repeated interaction contribute to the contractor dependence. A horizontal model of contractor relations as discussed in the relational contracting literature places knowledgeable contractors as a proactive actor who could shape public management practices. This study examines contractor influence over public management through the isomorphic effect demonstrated by contractor sharing. Using an innovative text analysis approach, we show that financial disclosures of two local governments converge as they contract with the same independent auditor and the convergence increases with contractor dependence as measured by auditor tenure. The study further analyzes implications of contractor dependence on goal tradeoff. While contractor dependence improves timeliness in service provision, it may give rise to vendor opportunism and compromise public accountability.

Keywords: relational contracting, agency theory, contractor dependence, text analysis, financial management

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The growing literature on public organization contracting out has examined the determinants of contracting out versus in-house production (Brudney et al. 2004; Hefetz and Warner 2004; Ferris 1986), the cost and quality advantages of contracting out (Petersen et al. 2019; Williamson 1999), the optimal design of contracts (Malatesta and Smith 2011; Brown, Potoski, and Van Slyke 2010; DeHoog 1990), as well as the broader governance implication regarding flexibility, equity, and accountability (Heinrich, Lynn, and Milward 2010; Milward and Provan 2000; Romzek and Johnston 1999). Underlying the discussion are two strands of theories on the relationship between governments and contractors. Agency theory assumes goal divergence on the part of the contracted agent and emphasizes on using contract design and monitoring to realign the interest of the government principle and the agent. Relational contracting and related stewardship theory focus on how goal convergence is made possible by mutual desire for stability and long-term interaction, as well as by trust and shared collective interest.

Works drawing on either theory have looked at the issue of contractor dependence, although it is rarely the central topic of interest. Contractor dependence refers to the lack of choices or desire for alternative service providers due to the unique expertise of the contractor, the lack of competition in the vendor market, and the benefits of repeated interaction with the same contractor. Agency theory points to the difficulty in monitoring and sanctioning relied-upon contractors due to the common knowledge that a replacement is unlikely to occur (Girth 2014; Lambright 2008). Contractor dependence may also increase transaction costs as public agencies see a need to invest more in vendor market management in guard against problems associated with repeatedly contracting with the same private entity (Johnston and Girth 2012; Brown and Potoski 2004). As a result, potential contractor dependence may be a reason against privatization and for in-house provision. Relational contracting theory suggests that contractor

dependence may be a desired outcome from relationship building (Bertelli and Smith 2010). A horizontal model of contractor relations consider knowledgeable contractors as proactive actors in shaping the implementation and operation of public programs as opposed to being passively bound by the authority of public agencies. Repeated interaction with the same contractor ensures stability in the relationship and may give rise to growing trust between the two parties.

This study examines the implication of contractor dependence on public organization management practices and goal tradeoff. Drawing on relational contracting literature but shifting focus from public managers to contractors, the study discusses how contractors may leverage their expertise to shape public organization management regarding not only contract management, but broadly the practices and functions related to the contracted services. Looking at the contractor as the node connecting multiple public agencies it contracts with, the contractor may effectively become an isomorphic force in public administration. The contractor influence over public management practices does not unambiguously carry a normative inference. What scholars are ultimately interested in is to understand how contractor dependence affects the ability of public organizations in fulfilling multiple, often conflicted goals. While contractor expertise and continuity provide efficiency gains in terms of timeliness in service provision, the accountability concern raised by agency theorists may simultaneously be valid, particularly when another principal-agent challenge between public managers and citizens enters into the picture.

Situated in the context of contracting with independent auditors who assess the compliance of local government financial reporting, this study finds support for the isomorphic role of the auditor. Two similarity scores based on text analyses show how sharing the same auditor leads to increasing similarities between the Management's Discussion and Analysis disclosure in the financial reports of two localities. This provides evidence that auditors influence

not only the compliance review they are tasked with, but also government financial reporting and transparency practices that should be an internal management function of the localities. Further, the isomorphic role of auditor is stronger among localities heavily depending on the contractor, as measured by auditor tenure, but grows weaker for larger local governments with higher internal capacity.

Further analysis shows auditor dependence, again measured by tenure, improves efficiency but reduces accountability of the audit. Because timeliness is an important consideration for the usefulness of an audit and is mandated by higher level governments, this study examines timeliness of the audit as a measure of efficiency. We find auditors with long tenures to be more likely to complete their work within the timeframe mandated by the state. However, they are less likely to identify issues related to reporting compliance and internal control. Together, the findings suggest that for public organizations with multiple goals, both agency theory and relational contracting theory may be relevant in understanding the multifaceted implication of contractor dependence.

CONTRACTOR DEPENDENCE

Source of Contractor Dependence

Contracting out has gained and maintained popularity with public organizations. Public agencies and their constituents may have an ideological preference for market-based solutions (Ferris 1986; Hirsch 1995). By contracting out and not budgeting for full-time-equivalents for these services, the public agencies may appear more palatable to electoral penchant. Underlying the ideological preference for market-based solution is the belief that the market delivers cost savings and efficiency gains. Recently, the debate over privatization has moved from ideology to

pragmatism, by focusing on sources of better functioning contract administration that minimizes transaction costs and improve accountability (Hefetz and Warner 2012).

Unlike contracting for delivering services to the public where in-house provision is also possible but may not be as cost-effective, outsourcing internal management functions could be a result of pursuit of independent, outsider perspectives. For example, a government may contract with a management-consulting firm to improve the strategic planning of the organization or with an evaluation firm to assess the effectiveness of government programs. Although these functions can generally be performed by an internal department, the independent third-party could bring in a fresh, outsider angle to the issues on hand. Similarly, independent auditors examine the internal control and compliance of government financial reporting, although public organizations could have in-house inspectors.

Outsourcing may occur and intensify when the contractor possesses expertise that a public organization does not have, which, in turn, translates to lower cost or higher efficiency. Some functions such as information security require advanced training and intensive capital investment, and others such as engineering and accounting require credentials and recertification. Upfront investment and continuous costs associated with these functions may be prohibitive to small public agencies without support from higher level governments or collaborative efforts with peer organizations. Contractors that specialize in these areas, on the other hand, may be able to serve these functions with relatively low costs due to their expertise.

A difference between contracting for service delivery and for internal management is that, for the latter, it could be more difficult to reverse the process and return to in-house production. This further reduces the capacity-building prospect of the public agency and increases its reliance on contractors (Smith and Smyth 1996; Milward and Provan 2000; Van

Slyke 2006). Governments with limited internal management or financial resources may particularly rely on contractor expertise, as they are resource-constrained to develop capacity in house. As a result, acquiring technical expertise may overshadow the need for performance-based incentive to align principle and agent interests (Girth 2014), rendering reverse contracting more difficult.

Besides the expertise gap, lack of competition on the vendor market further contributes to contractor dependence. While neoclassic economics theory points to competition for ensuring market success, many public service markets are not robust (Hirsch 1995; Warner and Bel 2008; Girth et al. 2012; Johnston and Girth 2012). Hefetz and Warner (2012) conclude that, on average, fewer than two alternative providers are available to local governments seeking to outsource services. The lack of competition may be due to high regulatory costs doing business with the public sector or due to the specialized nature of public services. Even when the type of goods and services provided by a vendor to public and private sectors are similar, special regulation and procedural requirements often apply to public sector contracts. Thus, adequate suppliers on the private market does not readily translate into sufficient supply to the public sector. Further, in some public works, natural monopoly exists due to significant upfront cost and benefits of economies of scale (Warner and Bel 2008). Finally, policies that establish preferences for specific types of vendor such as local or traditionally disadvantaged providers could also limit the market pool.

Sometimes, the number of providers with certain expertise may appear to be sufficient but a public agency may still repeatedly rely on a single supplier due to a desire for relationship building. Unlike transaction-based governance rooted in the competitive forces of the market, relational governance depends heavily on informal norms, frequent communication, and flexible

negotiation (Lamothe and Lamothe 2011). Relational contracting theory predicts that continuity in contracting relationship could generate desired reliability, predictability, and stability in service provision (Provan and Milward 1995; Smith and Smyth 1996). Johnston and Romzek (2008) show that stability of both contract provisions and network relationships are favorable. Specifically, network instability imposes high transaction costs on not only the government but also citizens served by the public programs, ultimately undermining the success of program implementation. Staff overseeing the public programs may also find comfort in stability due to the familiarity of contractors (Johnston and Romzek 2008). Indeed, Johnston and Girth (2012) report that a market management strategy taken by public managers is to nurture a relation with contractors through providing training and feedback on product.

Relationship building and repeated interaction with a single vendor could contribute to trust, one of the central tenets of relational governance. Trust can be learned in that through repeated past experience and ongoing interactions, exchange partners gain an increasing understanding of each other's behavior, and familiarity grows into anticipation of mutual faithfulness. Lamothe and Lamothe (2011) label prior interaction as a "knowledge-based" trust-building factor. Trust could also arise from the belief and desire that a future, long-term relationship could minimize any incentive to renege on the contract in the short run, thus lessoning moral hazard and adverse selection (Lamothe and Lamothe 2011; Bertelli and Smith 2010). With trust come various advantages. For example, trust may serve as a substitute of costly formal control mechanism and thus reduce transaction costs; trust could also facilitate mutual adjustment against uncertainty (Fernadez 2009; Van Slyke 2006).

In sum, relative contractor expertise, lack of market competition, and relationship building are three key factors contributing to the government dependence on contractors. This

dependence may manifest through repeated use of the same contractor, that is, long contractor tenure.

Contractor as Isomorphic Force

Relational contracting theory presents a horizontal model of government action, in contrast with an authority-based process where public managers directly regulate and control public programs (Bertelli and Smith 2010). Through relational contracting, policy networks are formed, where a public organization becomes market participant through roles such as contract negotiators, relationship builders, or network managers. Service delivery partners in a horizontal governing model could shape the implementation and management practices related to the public programs, and in the long run, policymaking. Guttman and Willner (1976) paints an early picture of invisible bureaucracy of federal contractors who suggest and shape governmental policy. Kelleher and Yackee (2008) contend that besides apolitical feedback on activities, outputs, and outcomes performed by the contractors, another form of feedback intends to shape policies, for example, by advocating for budgetary changes or shifts in regulatory burdens. They find that interactions between organized interests and public managers are more frequent with the presence of contracting. Whether the multi-sectoral network leads to a state of agents, where no one inside a public agency understands the public goods being provided and the process of providing them, depends on whether the government "no longer has the ability to arrange contractual network or otherwise carry out its function without the assistance of agents" (Heinrich, Lynn, and Milward 2010, i6). If a government can steer governance mechanism through, for example, supplier market management as opposed to having autonomous, self-

governing networks of actors take control, the hollow state still retains public authority, despite not through direct service provisions.

Studies on supplier market management (Johnston and Girth 2012) and relational contracting (Bertelli and Smith 2010) have placed public manager at the locus of a policy network connecting contractors and potential contractors. However, a different angle of observing the network may point to contractors, through their interaction with multiple public entities, being the central node in the relationship. This is particularly true if many public organizations (say, local governments) simultaneous shop for the same service from the same pool of vendors. The market network facilitates the exchange of not only the product but information about the service provided, other market participants, effective contract practices, and so on (Brown and Potoski 2004). Two public agencies contracting with the same vendor may take up similar practices as the vendor serves as the conduit of information.

While past research has looked at public managers adopting converging management practices due to their desire for perceived legitimacy, professional connection, common membership in the same organization, or promulgation by higher level governments and "best practice" authorities (Tolbert and Zucker 1983; Ashworth, Boyne, and Delbridge 2007; Pitts et al. 2010; Teodoro 2014), limited attention is paid to the focal role of vendors as the source of information and influence. Public agencies adopting similar management practices due to sharing the same contractor could be considered a type of isomorphism by normative forces (DiMaggio and Powell 1983). Normative forces refer to the effect of professional standards and the influence of professional communities on public managers' adoption of systems and techniques considered to be legitimate. Contractors are members of professional communities as they are hired for their professionalism and expertise. Therefore, they are likely to provide public

managers with ideas for program implementation and operation, possibly beyond what is formally prescribed in the contracts. This could be particularly true in a horizontal, collaborative contracting structure, where public managers rely heavily and repeatedly on the knowledge and input from vendors. When working with multiple public agencies at the same time, contractors becomes the focal point of normative isomorphic forces on public organizations.

What differentiates contractors as an isomorphic force from other sources may be their expertise in a specific area. Ashworth, Boyne, and Delbridge (2007) hypothesize that the impact of isomorphic pressure is stronger on organizational structures and processes than on strategy and culture. Contractors are unlikely to impact core characteristics of public organizations (with the exception of active advocacy some might engage in as demonstrated by Kelleher and Yackee 2008), but are well positioned to suggest changes to technical and procedural matters related to their area of expertise. This stands in contrast with other isomorphic forces such as higher level governments, which possess legislative and financial resources that are more conducive to core changes.

H1: Public entities sharing the same contractor are more likely to adopt similar management practices.

Collaborative contract management literature (DeHoog 1990; Van Slyke 2006; Amirkhanyan 2009) places the government and the contractor as equal partners who work jointly on ensuring successful contract implementation, and points to relative expertise as a determining factor of their respective roles. Amirkhanyan (2008) finds that contractors often negotiate performance evaluation terms and public managers seek contractor input in designing performance measures. Further, communication with contractors influences performance measures adopted. The collaborative approach of contract monitoring is premised on the idea that vendor contribution

help expand public managers' perspectives on the service provided and contracting management. One factor that increases the likelihood of contractor influence over performance measure is contractor expertise and competitive advantage on the market. Contractors that public organizations depend on due to their unique expertise and market position are more likely to possess the bargaining power in shaping service delivery and implementation.

H2: Public entities sharing the same contractor are more likely to adopt similar management practices, especially as they increase dependence on the contractor.

Implication of Contractor Dependence

Existing empirical studies on the implication of contractor dependence focus on how the dependence increases two types of transaction costs. In preparing for outsourcing, public managers could engage in market management activities such as creating, nurturing, and expanding the supplier market, especially when faced with a thin market (Brown and Potoski 2004; Graddy and Chen 2006; Girth et al. 2012). In the contract execution stage, governments may need to exercise greater oversight given the lack of discipline brought by competition (Girth et al. 2012). On the other hand, contractor dependence is obviously associated with cost savings for costs associated with recurring search for, negotiation with, and selection of new suppliers.

Besides concerns over the costs of administering and delivering services, public agencies are ultimately interested in fulfilling its mission and goals by relying on contractors. One of the most often repeated observations about public organizations is that their goals are intangible, multiple, and conflicting when compared to those of private business firms (Wildavsky 1979; Boyne 2002; Rainey 2009). Public agencies are subject to multiple sources of authority demanding different objectives (Boyne 2002; Bozeman 2007). Contract administration, as part of

public administration, occurs in the context of goal multiplicity (Williamson 1999). Therefore, it is important to understand how contractor dependence could help public agencies fulfill and excel in certain goals, while compromising others.

One of the most commonly discussed tradeoff for a hollow state is between "flexibility, innovation, and diversity of evolving governance forms and the constitutional values of transparency and accountability that are steadfastly associated with traditional bureaucratic structures and their central control mechanisms" (Heinrich, Lynn, and Milward 2010, i8). As manifested in the case of contractor dependence, tradeoff may occur between efficiency (particularly, timeliness) and accountability.

As a public organization becomes dependent on contractor expertise, continued relationship with the same contractor ensures stability in service provision. While this could further the reliance on the contractor, stability enables public managers to know what to expect and reduces the demand for contingency plan. From the perspective of the contractor, stability means repetitively engaging in the same task for the same organization. The contractor gains experience, and over time, may perform the tasks more quickly. Timeliness of contract execution is essential in many service areas, when the service provided is not a one-time deal but needs to occur on a regular basis. Often, higher level governments, especially if they provide partial funding for the services, may also mandate expectation of timeliness.

However, over-reliance on a contractor may give rise to vendor opportunism and compromised contract accountability (Girth 2014). When a contractor with a strong market presence faces little challenge from competitors, government buyers have to rely on services provided by the contractor due to the lack of substitutes (Cohen and Eimicke 2008). Competition shortage also compromises the potential to use sanctions to guard against principal-agent

problem. Vendor opportunism occurs when the contractor recognizes that the government is unlikely to replace them due to the lack of competition or the cost associated with seeking a new contractor, and thus pursues its own interest at the expense of the government.

Meanwhile, interpersonal relationships also develop between the contractor and the public official in charge of service procurement. While repeated interactions could lead to trust building between public managers and private contractors, encompassing the principle-agent issue between the two is the principle-agent problem between citizens and public officials. When there is a lack of performance monitoring to ensure benefits to the general public, the "cozy insider relationship" between public managers and contractors can be problematic (DeHoog and Salamon 2002). The repeated relations may also give rise to complacency in expectations (Amirkhanyan 2009).

H3: Increased contractor dependence is likely to improve timeliness in contract implementation but compromised accountability.

INDEPENDENT AUDITOR AND GOVERNMENT FINANCIAL REPORTING

Governments prepare financial reports, usually on an annual basis, to summarize the financial transactions they engage in and changes in the financial position of the organization. To ensure comparability and integrity in the reporting, state and local governments in the United States follow the Generally Accepted Accounting Standards (GAAP) set by the Governmental Accounting Standards Board (GASB). Further, they contract with independent auditors, often at the requirement of the higher-level government, to review whether financial information are fairly presented in the financial reports in compliance with GAAP. The Single Audit Act of 1984 is an example of audit mandated by higher-level governments: entities that spend more than

$500,000 in federal awards during a fiscal year must have either a single or program-specific audit be conducted. In addition to determining whether financial information are fairly presented in annual reports, the Single Audit Act also requires auditors to disclose any deficiencies in internal controls and noncompliance with federal regulations.

The independent auditor may be a private firm or a government entity. For example, before 2015, the state of Minnesota required the State Auditor's Office to audit all county governments. Private audit firms may perform audits for both governments and nongovernmental entities. Specifically in Florida, the case of interest for this study, local governments must contract with a private auditor and may choose an auditor based on a competitive bidding process centered on audit fees or based on technical qualifications before fees are negotiated (Hackenbrack, Jensen and Payne 2000).

Upon completing the audit, the auditor prepares a report for the governmental entity outlining findings of the audit. If they have conducted, as required by the Single Audit Act, reviews of federal regulation compliance and internal control efforts, they prepare separate reports covering those reviews. Independent auditor's reports, in turn, are included as part of the financial reports of the government.

The government and specifically its financial officers prepare other sections of the financial report. However, anecdotal evidence suggests that local governments may in practice ask the auditor to draft financial statements, which provide a numeric summary of changes in government accounts, and accompanying footnotes, possibly due to the lack of capacity for some small local governments to prepare the reports themselves (Abdo, Eick, and Meyers LLP, 2015). This presents a conflict of interest, as the auditor may not be able to fairly assess the compliance

of a report they put together themselves. Indeed, auditor preparation of financial statements constitutes a significant internal control deficiency according to GAAP.

Even when auditors do not directly prepare the financial report, they often provide counselling regarding accounting issues. For example, the auditee may double-check complex transaction with the auditor before closing the book, and auditors often inform clients about new accounting rules and provide implementation guidance. Therefore, the auditor's role goes beyond audit to consultation and thus could exert indirect effect on the financial reporting of local governments.

A part of the financial report to best detect the influence of an auditor is the Management's Discussion and Analysis (MD&A) section. GASB requires all state and local governments to include MD&A in their financial reports preceding the basic financial statements. The purpose of MD&A is to provide an easily readable summary of the overall financial condition of the government so that a person without detailed knowledge of accounting could obtain an understanding of local financial data without turning to the financial statements. Although GASB statement 34 provides a list of topics that MD&A should be confined to, GASB encourages MD&A to effectively report only the most relevant information and to not be a boilerplate discussion. That is, the MD&A section is essential for government financial transparency and accountability, because it is the place where a non-expert citizen or policymaker would go to obtain a basic understanding of the financial condition of their local government (Yusuf and Jordan 2017). To ensure the readability and specificity of MD&A, the text should be prepared by the financial manager of the government as opposed to the auditor who possesses technical knowledge but not necessarily the contextual knowledge about the community.

Users of governmental financial reports consider timeliness and accountability to be important characteristics of governmental financial reporting. The usefulness of financial information lies in its timeliness. The Federal Audit Clearinghouse requires single audit data be filed nine months after the end of the fiscal year. Many states, in monitoring the financial condition of their local governments, also impose requirements on timely filing of financial reports. Specifically in the case of Florida, state statutes 218.39 requires local government audits be completed also within nine months after fiscal year ends. However, federal and state timeliness requirements often lack enforcement mechanism for noncompliance. As a result, many local governments still fail to have timely audit. The credit markets where governments borrow money have reported audit delay to be a serious problem because information in the reports are essential for investors to evaluate and price government bonds (Payne and Jensen 2002).

Tasked to identify material weaknesses in financial reporting and internal control deficiencies, independent auditors of governments are found by some to provide low quality services. The Government Accountability Office (GAO) found continuing deficiencies related to the documentation and testing of internal controls in federal audits (GAO, 2007). That is, auditors fail to identify and report noncompliance in financial reporting and internal control deficiencies that should have been identified following GAAP. As a result, the accounting literature often measures audit quality based on whether material noncompliance and internal control deficiencies are reported (Lopez and Peters 2010; Fitzgerald, Omer, and Thompson 2018). From a management perspective, identifying these issues are essential in ensuring the accuracy of financial data, safeguards against corruption and embezzlement, and ultimately, government accountability.

DATA AND METHOD

The empirical analyses consist of two parts. First, to test whether local governments sharing the same independent auditor are more likely to adopt the same financial management practices (H1), especially when the localities face strong auditor dependence (H2), we focus on the disclosure in the MD&A section of the financial report. Specifically, we examine whether having the same auditor leads to similarities in MD&A text and whether this effect is stronger when auditor dependence is higher as measured by auditor tenure. Second, we examine whether longer auditor tenure leads to improved audit report timeliness but decreased audit quality and accountability in identifying accounting deficiencies, using single audit data from the federal audit clearinghouse.

We choose to focus the empirical analyses on local governments in Florida for several reasons. First, the state requires all local governments, regardless of their sizes, to follow GAAP which ensure comparability in their accounting basis and financial reporting. Second, Florida Auditor General's office posts all annual financial reports submitted by local governments on its website. Third, the Auditor General's office also compiles and makes public account level data from the local government financial reports, which provide for important control variables in later analyses. Lastly, with 66 counties and 412 city, town, and villages, Florida has a large number of localities with wide variation in independent auditors and financial reporting practices.

Local government financial condition affects both the disclosure in MD&A and audit findings. Therefore, we obtain financial account data from the state Auditor General's office for fiscal year 2003 through 2016, covering accounts such as short-term assets and liabilities, fund

balance, revenue, and expenditure. We calculate financial ratios commonly used in the literature to measure liquidity, reserve, and surplus conditions of a local government. Liquidity is measured as the ratio between governmental funds short-term asset to short-term liabilities, logged due to strong skewness to the right. A higher value represents better liquidity. Reserve is measured as general fund balance to expenditure ratio, with a higher value signifying more savings available. Surplus ratio equals the difference between governmental fund revenue and expenditure, divided by expenditure. Therefore, a positive number indicates the locality ran a surplus while a negative number suggests a deficit.

Auditor Sharing and Disclosure Similarity

We collect MD&A text and auditor firm names from the annual financial reports posted on the state Auditor General's website. Manually performed, this is a time consuming process due to the lack of consistency in how localities arranged and saved their financial reports which precludes automated text scraping. Therefore, we limit this analysis to only fiscal year 2016. Among 478 Florida local governments, 37 did not file an annual financial report with the state or did not include an MD&A section in the report, rendering a total of 441 localities for which we obtained MD&A text. Information on auditor firm names enable us to generate auditor identifier and pinpoint localities sharing the same auditor for the fiscal year.

To measure the similarity in MD&A reporting, we turn to a growing literature on computational text methods and their applications. As governments produce a tremendous amount of written, textual information both for policymaking and implementation, these data provide a fertile ground for research. Despite underutilized in public policy and public administration research (Hollibaugh 2018), computational text methods enable researchers to

develop new measures of abstract or complex concepts (Pandey, Pandey, and Miller 2017), to identify and group underlying topics (Hollibaugh 2018), to analyze tones and sentiment of writing (Marvel and McGrath 2016), and to measure similarity in text (Haeder and Yackee 2015).

Text similarity measures are an important topic in natural-language processing and have been applied to detect plagiarism (for example, Haeder and Yackee 2015 relied on an open source plagiarism software to measure text similarity) and develop internet search engines. Two approaches are available: one focusing on the linguistics, that is, words and phrases in the text, and the other focusing on contents and themes (Gomaa and Fahmy, 2013). Because the topics covered in MD&A are specified by GASB and universally applied to all local governments, this study adopts the first approach of similarity measure. Specifically, we calculate two types of similarity measures, after extracting and cleaning the MD&A text (to remove headers, numbers, stop words, etc.; more details in Appendix A). The first measure is rooted in the Vector Space Model (VSM) described by Salton, Wong, and Yang (1975), which represents a document as a vector in an n-dimensional Euclidean space. Here, n is the number of unique words in all documents analyzed, and the value of each vector element is the frequency of a particular word in that document (Brown and Tucker 2011). The similarity of any two documents, then, is measured by the angle between the two vectors representing the documents, specifically, by taking the cosine of the angle. The idea behind this word-based cosine similarity measure is that a person's writing should be distinctive in the words used and the frequencies of these words. This measure has been applied to measuring similarity and change over time in corporate financial reports (Brown and Tucker 2011; Lang and Stice-Lawrence 2015), public firm 10-K filing with the Securities and Exchange Commission (Peterson, Schmardebeck, and Wilks 2015;

Brown and Knechel 2016; Cohen, Malloy, and Nguyen 2018), initial public offering prospectus (Hanley and Hoberg 2010), and product descriptions in firm reports (Hoberg and Phillips 2010).

The word-based cosine similarity measure has two limitations. First, it is insensitive to semantics in that different words with similar meanings will result in nonmatches; second, the same word in different phrases may mean different things but is undifferentiated in the measure. The n-gram approach at least partially mitigates these issues. An n-gram is a sequence of *n* adjacent words. Work in linguistics shows that the frequency distribution of words is skewed to the right: most words are used rarely while only a few words are used often (Manning and Schutze 1999). The skewness is higher for n-grams; Gibbon, Moore, and Winski (1998) find that within documents of 38 million words, 77 percent of trigrams have only occurred once. Simply put, even when two people use the same words to describe an object or situation, their ways of combing these words to phrases are likely to differ significantly. Because the number of n-grams are likely large and many n-grams only appear in one document, the large number of dimensions in an n-gram-based VSM will lead to computational challenges. Instead, a Jaccard similarity score between two documents is measure as follows: dividing the number of n-grams appearing in both documents by the number of n-grams appearing in either documents (Nelson et al. 2016). That is, whether a document contains a given n-gram matters but the frequency the n-gram does not. This study focuses on bigrams (a sequence of two adjacent words) but using trigrams offers similar results. Appendix A provides details on word-based cosine similarity and bigram-based Jaccard similarity measures.

To answer the question whether sharing auditor leads to increased similarity in MD&A disclosure, the unit of analysis is naturally the dyad or pair of local governments. Therefore, each of the 441 localities is paired with the other 440 localities, rendering a dyadic sample of 194,040.

For a pair of local governments x and y, we estimate the following regression with standard errors clustered by locality x:

(1) $sim_{xy} = \beta_1 * SAuditor_{xy} + \beta_2 * SAuditor_{xy} * tenur_{x} + \alpha * D_{xy} + Auditor_y + \mu_x + \varepsilon_{xy}$

where sim_{xy} represents either the word-based cosine similarity or bigram-based Jaccard similarity score. Table 1 presents the summary statistics. The mean cosine similarity score is 0.1336 but there is a large variation across locality dyads. The Jaccard similarity score offers a more intuitive interpretation. The mean of 0.1021 shows that for an average dyad, they share about 10 percent of the same bigrams. In contrast, the most similar dyad share about 95 percent of the same bigrams. Further, $SAuditor_{xy}$ is an indicator which takes on the value of one if two localities share the same auditor firm and zero otherwise. In fiscal year 2016, 75 firms provided auditing services to the 441 Florida local governments, and the summary statistics show that about 4 percent of the dyads share the same auditor.

[Table 1 about here]

A vector of variables D_{xy} are included to control for other factors that may drive the textual similarity of two reports. This includes first an indicator variable of whether two localities are in the same county: those in the same county are exposed to a similar economic environment and thus could take on similar reporting practices. Second, we control for the absolute difference in log expenditure, log population, and reserve, surplus, and liquidity ratios. Because these financial and size factors could impact disclosure, we expect differences in these factors between two localities to be negatively correlated with the similarity in MD&A disclosure. The data source on these control variables contain missing values, and thus the

sample size with controls is smaller than the full sample. We later report estimates from regressions with and without the controls.

Equation 1 also include locality y auditor fixed effects, controlling for characteristics of the locality y's auditor that similarly impact all dyadic observations y is a party of. Lastly, we control for locality x fixed effects, i.e., characteristics of locality x that similarly impact all dyadic observations x is a party of. For example, if a particular locality uses many unique words uncommonly used by others, any pair containing this locality will be affected and the uniqueness will be controlled for by the fixed effects.

A positive and statistically significant β_1 would show that sharing the same auditor cause two localities to include similar language in the MD&A section, suggesting an auditor influence in financial disclosure. To test H3, we additionally include an interaction term between the auditor sharing dummy and a continuous variable measuring the year of tenure of locality x's auditor. We expect β_2 to be positive, as auditor dependence measured by a long tenure solidifies auditor influence over local government financial reporting. The tenure variable comes from the Federal Audit Clearinghouse, as explained below, because this database contains audit information from previous years which is the key in determining tenure. However, federal single audits are only required for local governments receiving a significant amount of federal transfers; therefore, regressions including this interaction term have a smaller sample size.

Impact of Auditor Dependence on Audit Timeliness and Quality

The Federal Audit Clearinghouse provides readily available panel data from fiscal years 2003 to 2016 on when an audit report was submitted to a local government and whether the auditor identified significant issues with government financial reporting and internal control. The

downside of this data source, however, is the limitation in coverage, as only recipients of more than $500,000 in federal transfers are included. Therefore, we do not have a balanced panel because one locality could receive more than $500,000 in federal transfers and be subject to single audit requirement in one year but falls below the threshold in another year.

We measure auditor dependence by year of auditor tenure. When a local government shows up only in some but not all years in the data, we assume they contracted with the same auditor as last observed in the data. Later to check the robustness of results to this assumption, we examine the impact of auditor change as opposed to auditor tenure.

For the dependent variable on audit timeliness, two measures are constructed. First, we calculate the number of days between local government fiscal year end and auditor report date, also known as the audit lag in the accounting literature (Payne and Jensen 2002). A smaller value of this continuous variable represents a timelier audit. Second, a local government may not be concerned by the marginal differences in the audit lag, but rather, whether they are able to meet the nine-month deadline as required by state statutes and the Federal Audit Clearinghouse. Therefore, an alternative indicator variable of late audit equals one if the audit lag is more than nine months.

Audit quality are measured by two variables. First, an indicator variable signifies whether the auditor finds a local government to have complied with GAAP in fairly preparing and presenting its financial statements. That is, the variable equals to one when the auditor gives an "unqualified opinion" of the financial reports. Another indicator variable represents whether the auditor finds the locality to have sufficient internal control. This variable equals to one when the single audit data show no reportable condition or material weakness identified by the auditor. Both financial reporting compliance and internal control sufficiency are important measures of

local government financial accountability, which is only ensured if the auditor can accurately capture any issues through its audit.

We estimate the following regressions for local government i in fiscal year t with standard errors clustered at the locality level:

(2) $timeliness_{it} = \lambda_1 * tenur_{it} + \theta * quali_{it} + \gamma_1 * F_{it} + \pi_i + e_{it}$

(3) $quali_{it} = \lambda_2 * tenure_{it} + \gamma_2 * F_{it} + \rho_i + \epsilon_{it}$

where $timelines_{it}$ and $quali_{it}$ are variables explained above. Because an audit that identifies accounting deficiencies is likely to take longer, the two $quali_{it}$ variables are also included on the right hand side when examining timeliness. Table 2 presents the summary statistics for this analysis and show that the mean audit lag is 237 days, which is within the nine month deadline. However, there is a wide variation in audit timeliness and roughly 14.3 percent of audits in the sample are not produced in a timely fashion. Further, auditors find 94.8 percent of auditees to be in compliance with accounting standards in preparing financial reports. Only 66.3 percent of the local governments are found by their auditors to have sufficient internal control in place. The locality fixed effects π_i and ρ_i help control for time-invariant factors specific to each locality that affect the timeliness and quality of their audits.

[Table 2 about here]

The vector of control variables F_{it} include first change in log expenditure. When a locality experiences budget expansion, it may require a longer audit attending to the new financial details of the government but the improved financial resources may lead to better internal control. Also controlled for is the level of intergovernmental transfers received by the local government, as federal and state grantors could impose accounting and audit requirements on local grantees which lengthen the audit time but reduce probability for adverse audit findings.

Finally, we control for common measures of financial condition including log expenditure as well as liquidity, reserve and surplus ratios. Local governments in better financial condition may be easier to audit and are less likely to exhibit accounting deficiencies. Again, financial data contain missing values and the sample with controls is smaller than the full sample.

RESULTS

Result on Disclosure Similarity

The first three columns of table 3 present results on whether sharing the same auditing firm is associated with word-based cosine similarity in MD&A text between a dyad of local governments, while the last three columns focus on bigram-based Jaccard similarity. Columns 1 and 4 do not include any control variables but do control for auditor and locality fixed effects. First looking at the control variables3, as expected, local governments located in the same county are likely to have similar text in their MD&A sections because they share similar geographical and economic trends. Two localities with a large difference in population sizes exhibit reduced similarities in disclosure, as they face differing governing and management challenges. Differences in financial variables are largely associated with reduced financial disclosure similarities, as one would expect. Specifically, as the expenditure levels diverge, localities may adopt different approaches in summarizing their financial conditions in the MD&A; difference in surplus condition also reduces disclosure similarity, as a local government running a surplus might explain in the MD&A what to do with the surplus while a locality running a deficit has to justify the deficit financing. Interestingly, differences in liquidity and reserve ratios do not exhibit a consistent relationship with disclosure similarity across the columns.

Auditor sharing is statistically significantly associated with increased text similarity, regardless of the similarity measures. Column 2 shows that controlling for a set of variables, auditor sharing is statistically significantly associated with increased cosine similarity between two localities' MD&A disclosure, at a point estimate of 0.0195. Given a mean cosine similarity score of 0.1336 as shown in table 1, the estimate represents roughly a 14.6 percent increase in similarity due to auditor sharing. Column 4 shows a similar finding: auditor sharing is statistically significantly associated with a 0.0308, or 30 percent, increase in the Jaccard similarity score. In sum, we find support for hypothesis 1 that localities sharing the same contractor are more likely to adopt the same financial management and disclosure practices. The relationship is statistically significant and meaningful in magnitude.

[Table 3 about here]

While we cannot directly test for the mechanism behind this finding, the earlier theoretical discussion points to the auditor's role as a source of information and expertise common to its clients. Dependence on the auditor should, therefore, deepen auditor influence and the relationship between auditor sharing and disclosure similarity. Column 3 shows that the interaction term between auditor sharing and auditor tenure has a positive coefficient estimate, which suggests that higher auditor dependence is associated with stronger auditor influence over financial disclosure measured by cosine similarity. However, the estimate is not statistically significant. Column 6 shows auditor tenure to statistically significantly moderate the relationship between auditor sharing and disclosure similarity. A one-year increase in auditor tenure means that a locality's MD&A disclosure will increase in Jaccard similarity with other localities with the same auditor by about 0.1 percentage point.

Besides examining the moderating effect of auditor tenure, another approach to test whether auditor dependence strengthens auditor impact on local government financial management is to look at how the impact differs across localities of different sizes. A source of contractor dependence is contractor expertise, which also furthers a public agency's desire to engage in repeated interaction and build trust with the contractor. It is important to recognize that the possession of expertise is relative between the contractor and the public organization. In the case of financial management, many local governments serving a few hundred residents may not have full-time accounting professionals in house capable of producing a financial report. Therefore, we split the sample into four quartiles based on the population served by the local government.[1] Table 4 shows that for both similarity measures, local governments with a population in the bottom quartile appear to be most influenced by their auditors in financial disclosure: auditor sharing is associated with a 0.03-point increase in cosine similarity while the estimate is around 0.012 to 0.015 for other localities. Auditor sharing is associated with a 0.1-point increase in Jaccard similarity, roughly 6 to 18 times of the point estimate for larger localities. The subgroup analysis thus provides further support to hypothesis 2 that auditors play an important role in shaping local government financial disclosure practices, particularly among smaller localities where internal capacity is limited.

[Table 4 about here]

Results on Auditor Dependence Impacts

[1] Localities in the first quartile have a population smaller than 2,231, those in the second quartile serve a population between 2,231 and 10,344, and in the third quartile between 10,344 and 37,113. This division ensures that each subsample has roughly the same sample size and thus statistical power to detect a statistically meaningful relationship.

Moving on to the second part of the empirical analyses, Table 5 presents results on the impact of auditor tenure on audit timeliness and quality. The first four columns focus on audit timeliness, measured by days of audit lag in the first two columns, and in columns 3 and 4, an indicator of whether the audit is done more than nine months after the fiscal year end. While auditor tenure is negatively associated with the length of audit lag and thus improved timeliness, the estimates are not statistically significant. Column 3 shows that a one-year increase in auditor tenure is statistically significantly associated with a 0.8 percentage point lower probability of having a late audit. The estimate is also robust to additional controls, as shown in column 4. Given that the mean late audit probability is 14.3 percent, the impact of auditor tenure is sizable. Repeated interaction with the same auditor may have led to contractor learning and better efficiency in performing the same task each year.

[Table 5 about here]

With auditor and locality fixed effects already controlled for, most of the control variables are not statistically significant. One exception is liquidity ratio in column 4 which shows that improved liquidity is associated with timelier audits. This is possibly because improved financial condition is often associated with better accounting efforts and practices. Unsurprisingly, localities with good internal controls also experience timelier audits as it takes less time to conclude a lack of accounting deficiencies than identifying and confirming deficiencies.

Columns 5 and 6 of table 5 focus on whether an audit finds the locality to be in compliance with GAAP in preparing the financial report and the last two columns on whether the auditee is found to have sufficient internal control in place. Correctly identifying issues with reporting compliance and internal control is evidence of high audit quality. Looking at the

covariates, accounting difficulty increases with the size of the government, and larger localities with higher expenditure levels are likely to have more reporting noncompliance and internal control deficiency findings. However, a local government experiencing expansion in the budget and thus more resources is likely to have improvements in internal controls. Increases in intergovernmental transfer receipts are associated with good internal control as state and federal grantors impose accounting requirements.

Not controlling for covariates in column 5, auditor tenure is positively and statistically significantly associated with reporting compliance of local governments, suggesting that auditor with an established relationship with a locality is less likely to identify reporting compliance issues (known as qualifications in accounting terms). However, the coefficient estimate of auditor tenure becomes statistically indistinguishable from zero with the set of full controls as shown in column 6. Finally, column 8 shows that a one-year increase in auditor tenure is associated with a 1.25 percentage point increase in the likelihood of auditor finding good internal control. Given a mean value of 66.3 percent of localities with good internal control, the point estimate is equivalent to roughly a 2 percent increase.

Finding a positive relationship between auditor tenure and favorable audit findings does not automatically suggest that auditor dependence compromises accountability. An alternative explanation may be that local governments learn from repeated auditor interaction and unfavorable audit findings and correct for accounting deficiencies identified by the auditor. We estimate, therefore, an alternative specification where instead of auditor tenure, we focus on an explanatory variable of whether a local government has changed the independent auditor for a given fiscal year. That is, if the auditor for that year is different from the lastly observed auditor, the indicator variable of auditor change equals one; and for all succeeding years before a new

auditor is hired, it equals zero. Table 6 shows that audits exhibit longer lags and higher probability of being late for the years when a new auditor is hired, which suggests a learning curve for the new contractor. However, the estimates are statistically insignificant. Further, a new auditor is statistically insignificantly associated with a decreased probability of finding the locality to have compliant financial reporting and statistically significantly with reduce likelihood of good internal control findings. Specifically, a new auditor increases the likelihood of identifying internal control deficiencies by 7.4 percentage points. If the positive relationship between auditor tenure and good internal control shown earlier is due to local government improving accounting practices, a simple change in auditor should not reverse these improvements. Therefore, the analysis focusing on auditor change provides evidence that auditor tenure may compromise audit accountability and ultimately government financial accountability, as the relationship between the auditor and the local government becomes closer and cozier.

[Table 6 about here]

DISCUSSION

Although a growing body of literature examines relational contracting, this study provides new empirical evidence on contractor as the central node connecting public organizations and as an isomorphic force. Contractors are tasked with providing contracted services and thus have a natural interest in participating in the process design and debate around these services. We show that they may affect management practices of public organizations beyond contracted tasks, as public mangers draw on their expertise. As multiple public organizations simultaneously contract for the same service with the same vendor, the contractor serves as a conduit of information and

leads to public managers adopting converging management practices. Therefore, we consider contractor influence as a type of isomorphism by normative forces.

The study further shows the contractor influence to strengthen with increasing public organization reliance on the contractor. Contractor dependence may arise from contractor expertise relative to that of the public managers, lack of sufficient market competition, advantages of relational contracting and repeated interactions, or a combination thereof. Introducing a special issue on state of the agents, Heinrich, Lynn, and Milward (2010) call for more evidence on the new forms of governance and the reason for their emergence. This study attempts to provide an empirical examination of this question through focusing on contractor dependence. When the relative expertise possessed by the contractor is more pronounced, in another word, the relative internal capacity of the public organization is weaker, public managers are more likely to turn to the contractor for inputs into management practices. In addition, contractor inputs may be reinforced and strengthened through repeated interactions between the two parties over time. DiMaggio and Powell (1983), in developing the institutional isomorphism theory, hypothesize that greater dependence on an organization is associated with great isomorphic force exerted by the organization. Our finding that the isomorphic role of contractors deepens with contractor dependence is directly reflective of this theory.

A normative analysis of contractor dependence requires looking beyond the positive description of contractor influence over public management practices, to examining how contractor dependence affects contract performance and ultimately public organization goal fulfillment. While Girth (2014) and Malatesta and Smith (2011) have looked at the implications of contractor dependence on contract design, and Lamothe and Lamothe (2012) find contractor dependence to positively relate to trust building, we test how contractor dependence impact

public organization goal fulfillment in the context of goal multiplicity and tradeoff. Public managers may prioritize goals that are easily quantifiable and mandated by higher level governments, an example being the timeliness of service provision. A contractor that repeatedly performs the tasks and interact with the public organization achieves better efficiency in this regard, which in turn may reinforce public agency dependence on the contractor. The downside of depending on the same contractor is the potential loss of accountability due the contractor opportunism. The problem could be more pronounced when there is a lack of higher level government mandate, or when it is not in the interest of public managers to pursue accountability, as seen in our example of financial audits where negative findings discredit the public manager.

A practical prescription to mitigate the accountability concern of contractor dependence may be to impose regular rotation of contractors. Indeed, many federal agencies maintain databases of qualified providers and rotate contract work through the providers in the database, based on elaborate algorithms (Johnston and Girth 2012). The option would, however, only be available when there is a robust vendor market for rotation. More importantly, public managers must plan carefully to guard against potential loss in efficiency and timeliness in contract implementation. Scholars examining the tradeoff arising from government contracting point to the shift away from emphasis on rule-based, hierarchical and legal approaches to accountability and towards professional and political mechanisms (Heinrich, Lynn, and Milward 2010). Before prescribing mandates and requirements over procurement for departments and lower-level governments, policymakers and chief executives of public organizations should consider granting deference to experts guided by professional norms, providing technical assistance to build internal expertise, and working within broader parameters that reflect expectation of

comprehensive performance outcomes. For example, specifically in the area of audit, the use of audit committees composed of community stakeholders with strong expertise may improve audit outcomes.

CONCLUSION

This study aimed to answer important questions related to contractor influence over public management and implications of contractor dependence. The result of this research shows that public organizations rely on contractor expertise for not only performing contracted tasks but also management of the public entity. As reliance on the contractor grows, the contractor influence over public management also strengthens. A direct result being observed across public agencies is that those who share the same contractor adopt similar management practices.

Contractor dependence has direct and multifaceted impacts on contract performance, and ultimately, the goal fulfillment of the pubic organization. While relying on the same contractor can achieve efficiency gains through swift implementation of the contract, public managers must be cautious about potential contractor opportunism and accountability erosion arising from contractor dependence. Market-based solutions such as vendor market management and vendor rotation are important considerations, so are broader discussion on engaging expert stakeholders, critical thinking of performance mandates, and internal management capacity building.

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Table 1. Summary Statistics, Auditor Sharing and Disclosure Similarity

	number of observations	mean	standard deviation	minimum	maximum
cosine similarity	194,040	0.1336	0.0637	0.0134	0.7732
Jaccard similarity	194,040	0.1021	0.1446	0.0003	0.9518
same auditor	194,040	0.0401	0.1961	0	1
same county	190,532	0.0309	0.1730	0	1
difference: ln(population)	190,532	2.2892	1.7145	0	13.0173
difference: ln(expenditure)	190,532	2.3632	1.7517	0	11.3071
difference: liquidity ratio	190,532	1.1005	1.0183	0	11.4858
difference: reserve ratio	190,532	0.5272	0.7122	0	10.1492
difference: surplus ratio	190,532	0.1785	0.1731	0	1.5937

Notes: The unit of observation is local government dyads. Missing values in financial variables lead to reduced number of observations for these variables.

Table 2. Summary Statistics, Auditor Dependence on Audit Timeliness and Quality

	number of observations	mean	standard deviation	minimum	maximum
audit lag	3,879	237	122	17	1,939
late audit	3,879	0.143	0.350	0	1
reporting compliance	3,881	0.948	0.222	0	1
good internal control	3,881	0.663	0.473	0	1
auditor tenure	3,881	4.692	3.869	1	20
Δln(expenditure)	2,598	0.049	0.170	-1.370	1.455
ln(expenditure)	2,598	17.90	1.720	12.08	22.82
transfer ratio	2,598	0.237	0.131	0.002	0.892
liquidity ratio	2,598	1.709	0.944	-3.772	6.790
reserve ratio	2,598	0.253	0.283	-2.397	4.374
surplus ratio	2,598	-0.052	0.138	-0.647	1.565

Notes: The unit of observation is local government annual audit. Missing values in some variables lead to reduced number of observations for these variables.

Table 3. Dyadic Analysis on Financial Disclosure Similarity

	cosine similarity			Jaccard similarity		
	(1)	(2)	(3)	(4)	(5)	(6)
same auditor	0.0334***	0.0195***	0.0071	0.0362***	0.0308***	-0.0005
	(0.0032)	(0.0024)	(0.0059)	(0.0039)	(0.0038)	(0.0028)
same auditor x tenure			0.0007			0.0009**
			(0.0006)			(0.0004)
same county		0.0380***	0.0368***		0.0161***	0.0110***
		(0.0042)	(0.005)		(0.0013)	(0.0015)
difference: ln(population)		-0.0192***	-0.0174***		-0.0018***	-0.003***
		(0.0027)	(0.0058)		(0.0002)	(0.0003)
difference: ln(expenditure)		-0.0086***	0.0009		-0.0073***	-0.005***
		(0.0027)	(0.0051)		(0.0003)	(0.0003)
difference: liquidity ratio		0.0019*	0.0049***		-0.0006***	-0.0016***
		(0.001)	(0.0008)		(0.0002)	(0.0002)
difference: reserve ratio		0.0025	0.0008		0.0059***	0.0068***
		(0.0031)	(0.0034)		(0.0005)	(0.0004)
difference: surplus ratio		-0.0177***	-0.0260***		-0.0100***	-0.0142***
		(0.0067)	(0.007)		(0.001)	(0.001)
$Auditor_y$ fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
$Locality_x$ fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	194,040	190,532	57,116	194,040	190,532	57,116
R-squared	0.112	0.190	0.319	0.451	0.496	0.557

Notes: Standard errors are clustered on $locality_x$ and reported in the parentheses. * p<0.1, ** p<0.05, *** p<0.01; two-tailed tests.

Table 4. Subgroup Analysis on Financial Disclosure Similarity, by Population Quartiles

By population quartile:	cosine similarity				Jaccard similarity			
	1st	*2nd*	*3rd*	*4th*	*1st*	*2nd*	*3rd*	*4th*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
same auditor	0.0295***	0.0124**	0.0121***	0.0149***	0.100***	0.0161***	0.0119***	0.0055***
	(0.0071)	(0.0049)	(0.0030)	(0.0027)	(0.0128)	(0.0034)	(0.0024)	(0.0018)
Covariates	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
$Auditor_y$ fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
$Locality_x$ fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	47,524	47,088	47,524	48,396	47,524	47,088	47,524	48,396
R-squared	0.284	0.141	0.266	0.343	0.468	0.514	0.520	0.561

Notes: Standard errors are clustered on $locality_x$ and reported in the parentheses. * p<0.1, ** p<0.05, *** p<0.01; two-tailed tests.

Table 5. Regression Analysis on Impacts of Auditor Tenure on Audit Timeliness and Quality

	Days of Audit Lag		Is Late		Reporting Compliance		Good Internal Control	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
auditor tenure	-0.170	-0.997	-0.0083***	-0.0091**	0.0105***	0.0015	-0.0024	0.0125***
	(0.872)	(1.604)	(0.0025)	(0.0041)	(0.0016)	(0.0011)	(0.0032)	(0.0045)
Δln(expenditure)		25.73		0.0934		0.0061		0.138**
		(25.18)		(0.0607)		(0.0179)		(0.0596)
ln(expenditure)		-66.94		-0.0779		-0.0571**		-0.345***
		(42.09)		(0.0796)		(0.0262)		(0.0850)
transfer ratio		40.60		-0.0201		0.0315		0.299**
		(56.10)		(0.149)		(0.0488)		(0.138)
liquidity ratio		-7.880		-0.0381**		0.0028		0.0031
		(5.731)		(0.0152)		(0.0085)		(0.0190)
reserve ratio		-18.56		-0.0324		-0.0091		-0.0426
		(17.79)		(0.0628)		(0.0135)		(0.0697)
surplus ratio		-50.22		0.0714		-0.0284		-0.0362
		(42.67)		(0.0990)		(0.0291)		(0.0993)
reporting compliance		-42.43		-0.0381				
		(33.12)		(0.128)				
good internal control		-26.56***		-0.0645***				
		(7.097)		(0.0223)				
Auditor fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Locality fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,879	2,598	3,879	2,598	3,881	2,598	3,881	2,598
R-squared	0.344	0.453	0.331	0.452	0.371	0.691	0.525	0.564

Notes: Standard errors are clustered on the locality level and reported in parentheses. * p<0.1, ** p<0.05, *** p<0.01; two-tailed tests.

Table 6. Regression Analysis on Impacts of Auditor Change on Audit Timeliness and Quality

	Days Late	Is Late	Reporting Compliance	Good Internal Control
	(1)	(2)	(3)	(4)
auditor change	6.209	0.0188	-0.0089	-0.0740***
	(7.988)	(0.0218)	(0.0061)	(0.0273)
Covariates	Yes	Yes	Yes	Yes
Auditor fixed effects	Yes	Yes	Yes	Yes
Locality fixed effects	Yes	Yes	Yes	Yes
Observations	2,598	2,598	2,598	2,598
R-squared	0.453	0.449	0.691	0.563

Notes: Standard errors are clustered on the locality level and reported in parentheses. * p<0.1, ** p<0.05, *** p<0.01; two-tailed tests.

APPENDIX A

Text analyses often start with cleaning and preparing the text (Hollibaugh 2018 provides an excellent walkthrough of this process). The collection of documents to be analyzed are known as *corpus*. Punctuations, numbers, and HTML codes are removed because they do not contain relevant information. All letters are set to lower case for comparability. We further simplify text by *stemming*, which convert words to their common conceptual roots. For example, governance, government, govern, and governing all become govern. After stemming, we further remove stop words that do not convey meaning, such as a, the, and of.[2]

Transformation of text into usable data for statistical analysis often involves focusing on the words or a sequence of adjacent words (n-grams). Once the text is cleaned and processed, we create a document-term matrix where the columns represent every document in the corpus and rows represent the number of unique words (or n-grams) in a given document. This matrix becomes the primary input to further calculation and analysis.

As a concrete example, let us assume we have a corpus of three text files: "Debt condition is good", "Debt condition improved", and "Liquidity is in good condition." Based on the procedure described above, the processed corpus will read: "debt condit good", "debt condit improv", and "liquid good condit". We demonstrate below how to obtain the two similarity measures for the three documents.[3]

Word-Based Cosine Similarity

[2] We rely on the "tm_map" function in R to identify all common stop words in English.
[3] The codes for obtaining the similarity measures are posted on the author's website and publicly available.

Suppose the sample of documents has *n* unique words. For any two documents within the sample, they will each be represented as an n-dimensional vector: v_1 for document 1 and v_2 for document 2:

$$v_1 = (w_1, w_2, \ldots w_n) \text{ and } v_2 = (u_1, u_2, \ldots u_n)$$

where w_i and u_i are counts of each word in document i. If a word appears in many documents, it will exert large influence over the similarity measure if not adjusted for. A common approach, TF-IDF weighing function, is to weigh the word counts by the logarithm of M/m, where M is the number of all documents in the corpus and m is the number of documents in which a particular word appears. As a result, common words are down weighted in the adjusted vectors v_1^* and v_2^*. The cosine similarity score is then calculated as:

$$\cos(\theta) = \frac{v_1^* \cdot v_2^*}{\|v_1^*\|\|v_2^*\|}$$

where θ is the angle between the two vectors v_1 and v_2 in the *n*-dimensional vector space, $(\cdot)$ is the dot product operator, and $\|v_i\|$ is the vector length of v_i. Mathematically, $\|v_1\|$ is calculated as $(w_1^2 + w_2^2 + \cdots + w_n^2)^{0.5}$. The cosine measure is bounded between 0 and 1 with a higher score indicating more similarity (the cosine of two identical vector and thus a zero angle equals 1).

For our example above, there are 5 unique words in the corpus: condit, debt, good, improv, liquid. The table below shows the calculation process for obtaining cosine similarity scores.

	Document 1	Document 2	Document 3
Original vector	v_1=(1,1,1,0,0)	v_2=(1,1,0,1,0)	v_3=(1,0,1,0,1)
Weighted vector	v_1^*=(0,0.41,0.41,0,0)	v_2^*=(0,0.41,0,1.1,0)	v_3^*=(0,0,0.41,0,1.1)
Weighted vector length	0.5734	1.171	1.171
Dot product with v_3^*	0.1644	0	
Similarity with v_3^*	0.2448	0	
Dot product with v_2^*	0.1644		
Similarity with v_2^*	0.2448		

Bigram-Based Jaccard Similarity

Denote the set of bigrams in the first document by S(A), and the set of bigrams in the second document by S(B), then the Jaccard similarity score between the two documents can simply be calculated as the ratio between the length of set intersection and the length of set union:

$$jaccard = \frac{|S(A) \cap S(B)|}{|S(A) \cup S(B)|}$$

The similarity score is bounded between 0 and 1, and two identical documents have a score of 1.

Regarding our example, the table below shows the calculation process for obtaining Jaccard similarity scores.

	Document 1	Document 2	Document 3
Set of bigrams	condit good, debt condit	debt condit, condit improve	good condit, liquid good
Length of intersection with document 3	0	0	
Length of union with document 3	4	4	
Jaccard similarity with document 3	0	0	
Length of intersection with document 2	1		
Length of union with document 2	3		
Jaccard similarity with document 2	0.3333		