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# **Auditor Expertise: Evidence from the Public Sector**

Working Paper No. 2009 - 20

# Auditor Expertise: Evidence from the Public Sector

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## Abstract

Public Auditors are fundamental institutions to supervise government agents. Without accurate information principals would find it hard to make adequate decisions. Since agents face strong incentives to misreport, competent audits of financial information are crucial. This paper is the first attempt to study the relationship between auditor expertise and fiscal performance. More competent auditors are more effective supervisors; they reduce the leeway of agents to misreport and improve fiscal outcomes. The empirical results support this hypothesis. I find that States requiring the auditor to hold a professional degree feature significantly lower debt and expenditures as well as higher credit ratings. (100 words)

JEL-Code: D70, H10

Keywords: public auditor, auditor expertise, auditor competence

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# 1. Introduction

Auditors are one of the fundamental supervising institutions in the public as well as the corporate sector. They are supposed to ensure that reported information is accurate. Without accurate information principals, i.e. citizens as well as investors, would find it difficult to make adequate – electoral respectively investment – decisions. Since agents face strong incentives to misreport, independent audits seem crucial.<sup>1</sup> There is a large body of literature on the influence of corporate auditors, including auditor independence and tenure, and audit quality and procedures, but only very limited evidence on the impact of public auditors. The few economic studies focusing on public sector auditing find that audits per se, auditor independence, term length and term limits as well as the audit mandate have a significant influence on outcomes.<sup>2</sup> But what about auditor competence and expertise? Does the audit competence of the chief auditor, who is responsible for the audit policy and the management of the public audit office, matter? This paper is the first attempt to study this important question in the field of public sector auditing.

Section 2 briefly reviews the literature and available evidence and establishes the basis for formulating testable hypotheses. Section 3 presents the dataset at the US State level and reports and discusses the empirical results. Section 4 gives a summary and conclusion.

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<sup>1</sup> There is ample evidence for ‘creative accounting’ and misreporting in the public sector (e.g. Milesi-Ferretti 2003, von Hagen and Wolff 2004 or Wallack 2007). Evidence on earnings management in the corporate sector supports this view (recent contributions are e.g. Beatty, Ke, Petroni (2002), Johnson, Khurana and Reynolds (2002), Leuz, Nanda and Wysocki (2003), Cornett, Marcus Tehranian (2007), Fang (2008), Li, Pincus and Olhoft Rego (2008).

<sup>2</sup> See Olken (2007) and Ferraz and Finan (2008) for the influence of random audits on corruption in the public sector; Schelker (2008) and Schelker and Eichenberger (2003, 2007) for the influence of auditor selection and audit mandate and Schelker (2010) for the influence of auditor term length and term limits on public sector performance. From the large body of literature on corporate sector auditing see e.g. Myers, Myers and Omer (2003), Mayhew and Pike (2004), Mansi, Maxwell and Miller (2004), Gosh and Moon (2005), Davidson III, Jiraporn and DaDalt (2006), and Caramanis and Lennox (2008).

## **2. Auditor Expertise**

The fundamental agency problem between citizens and their agents in government positions is well established. In order to control the agent, the principal requires information. Such information is typically revealed during some procedural mechanism by the agent himself or by some third party. In many cases the information is reviewed by an external body in order to insure the accuracy of the information provided. In the political process the quality and quantity of the available information is, to a great extent, determined by transparency and supervision requirements.<sup>3</sup>

The few economic contributions on public auditing so far emphasize the important functions of auditors in controlling the government and the bureaucracy by providing information to policymakers and citizens, and in exposing waste and corruption (e.g. Frey 1994, Olken 2007, Ferraz and Finan 2008). The studies by Olken (2007) and Ferraz and Finan (2008) do not primarily focus on the effect of independent audits but, nevertheless, they provide interesting insights for our purposes. Olken (2007) analyzes different methods of reducing corruption using a randomized field experiment in Indonesia. He finds that an increasing audit probability significantly reduces wasteful expenditures. In a randomized field experiment in Brazil, Ferraz and Finan (2008) show that independent audits actually improve the level and quality of information available to the principal, which finally influences voting behavior. The two studies only focus on financial audits. However, some auditing institutions also conduct various performance audits. In a study analyzing US State auditors Schelker (2008) finds evidence that performance audits improve policy outcomes. According to Schelker and Eichenberger (2003, 2007) and Schelker (2008), extending the audit mandate even further to include not only standard ex post audits, but also ex ante audits of the budget

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<sup>3</sup> On the influence of budgetary procedures fostering transparency see e.g. von Hagen and Harden 1995, Alesina and Perotti 1996 and Alt and Lassen 2006.

draft and individual policy proposals lead to significantly lower taxes and expenditures. The study by Schelker (2008) also analyzes whether auditor selection and removal mechanisms influence outcomes. The available empirical evidence on auditor appointment and removal procedures is not conclusive. Finally, there is also empirical evidence on the influence of auditor terms and term limits on public sector performance. Schelker (2011) finds no clear evidence on the impact of the length of the audit term, however, term limits have a strong and significant positive influence on State credit ratings.

Hence, the available evidence suggests that auditor characteristics have a substantial influence on public sector performance. In the corporate auditing literature one of the main drivers is audit quality, which depends heavily on auditor expertise.<sup>4</sup> Competent auditors are more likely to find data manipulation and earnings management and make it easier for owners and investors to control the management and to receive a reliable assessment of a firm's financial situation respectively. However, so far there is no evidence how auditor expertise in the public sector affects political and economic results.

From the literature on public sector auditing published so far it can be inferred that auditor characteristics and incentives matter. Since decision makers face incentives to misreport due to electoral pressure or career concerns, the question arises if auditor expertise is a restricting factor. Similar to the arguments for private sector audits, audit expertise is likely to influence the incentives of agents to misreport in the public sector. If a more competent auditor detects inaccurate reporting with a higher probability, the informational content of fiscal data improves. Seen from this perspective, it seems plausible to assume that more competent auditors reduce the incentives of decision makers to misreport. This is important for both citizens and financial market participants investing in public debt. Electoral

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<sup>4</sup> The literature on this topic is vast: see e.g. DeAngelo (1981), Dopuch, Holthausen and Leftwich (1987), Ferguson, Francis and Stokes (2003), Mansi, Maxwell and Miller (2004), and more recently, e.g. Caramanis and Lennox (2008) or van Tendeloo and Vanstraelen (2008).

decisions by voters and reactions by investors in financial markets require credible information on the state of public finance. More stringent audits by competent auditors enable principals to better control government agents or make more appropriate investment decisions, because they can observe a more reliable signal about the state of public finances.

The public auditing institution is typically a large bureaucracy and it would be very difficult to assess the expertise within such a complex structure. This study focuses on the influence of the expertise and competence of the chief auditor. Public auditing institutions are headed by the chief auditor, which is responsible for the overall activity and performance of the agency. Several departments with specialized auditing and administration staff conduct the various audits. The chief auditor could be compared to the lead partner of a big auditing firm, who is responsible for the audit mandate and audit policy, but is not necessarily directly a part of the actual auditing process. He defines the auditing policy and auditing strategy and he typically enjoys a high degree of autonomy within the legal and regulatory framework. He can usually influence the focus of the conducted audits, its timing, priorities and the thoroughness of it, which is essential for the understanding of his role as supervisor of bureaucratic agencies in a principal-agent framework. The auditing staff conducts the audits according to the auditing policy and a well defined regulatory framework. They have to follow a clear auditing mission that is tightly regulated by standardized procedures. In contrast, the chief auditor enjoys important degrees of freedom in determining timing and thoroughness of audits, which are crucial factors in the auditing process.

Hence, I test the following theoretical hypothesis:

More competent auditors improve the quality and reliance of reported information, which results in improved government performance.

### **3. Empirical Evidence from US State Auditing Institutions**

#### *US State auditors and Data*

In order to analyze the influence of auditor expertise I take advantage of the decentralized US federal structure. The US States enjoy a high degree of autonomy and every State has its own constitution and legal framework that define the primary governance structures and processes. The main advantage in this setting is that the States feature different regulations concerning the institutional details of their auditing institutions. Variation can be observed on many different levels, notably in the minimum educational requirements the State auditor has to meet in different States. Some States require the State auditor to hold at least a diploma as a Certified Public Accountant (CPA), other States do not.

In order to conduct the empirical analysis I adopt a unique dataset containing information on a variety of institutional details of US State auditing institutions (see Schelker 2008 which is based on NASACT 1992, 1996 and 2000). In addition to the information on various characteristics of the US State audit offices, the dataset contains a whole range of state-specific standard control variables (see Alt, Lassen and Rose 2006, and Besley and Case 2003) ranging from state-specific fiscal information such as public expenditures, revenues, and debt; fiscal institutions such as balanced budget requirements and voter initiatives; and a series of economic and socio-demographic variables such as the State population, real per capita income, unemployment rate, the fraction of the population holding a university degree, the fraction of the aged population (65+), and the fraction of school aged kids. I include a measure to proxy state fiscal preferences, which relies on the average of state legislators' ideological position (conservative-liberal scale) measured by ADA scores (e.g. Groseclose, Levitt, and Snyder 1999, Anderson and Habel 2009). This measure should take into account that fiscal preferences could at the same time shape institutions as well as fiscal outcomes, which



is a potential channel of endogeneity. The panel dataset contains state-specific information between 1992 and 1999. More details and summary statistics for the main variables can be found in the Appendix.

It is the standard approach of most studies on the influence of fiscal institutions on government performance to adopt fiscal variables such as government expenditure or debt as right-hand-side variables. Hence, the first series of estimates follow this tradition and rely on standard fiscal measures to estimate the influence of auditor expertise on government performance. Even though the empirical section presents results on the influence of auditor expertise on public expenditure and debt a brief discussion of the choice of the dependent variable in the context of transparency and the role of auditors is due: 1) standard fiscal variables might be biased and 2) fiscal levels might not be informative about government efficiency. First, officially reported fiscal information might be unreliable, because the quality of fiscal information itself could depend on audit quality and transparency (see Schelker 2008 and 2011). In other words, data quality might be endogenous to auditor characteristics, which would cause biased estimates and thus, undermine statistical inference. There could be differences with respect to the severity of this problem depending on the type of fiscal information. One might argue that debt figures are more difficult to manipulate than expenditure measures. Nevertheless, one should be very careful when using fiscal information in such an empirical setup. Secondly, the level of expenditures or debt might not be very informative about government performance as long as one is not able to reliably control for the provision of public goods in the regression framework. High as well as low levels of expenditure and debt might be the outcomes of good or bad governance respectively, since e.g. especially efficient governments might face a higher demand for public goods relative to inefficient governments (Eichenberger 1994, Ferejohn 1999, Alt, Lassen and Skilling 2002).

Therefore, I also present evidence based on an alternative identification strategy and I adopt State General Obligation Bond (GOB) ratings that reflect a market evaluation of State fiscal performance. Johnson and Kriz (2005), Depken and Lafountain (2006) and Schelker (2011) use a similar approach to estimate the impact of fiscal institutions and state corruption respectively on State credit ratings. Johnson and Kriz (2005) find that the existence of balanced budget requirements and debt and expenditure limitations are significantly correlated with higher state credit ratings. Depken and Lafountain (2006) find that higher corruption levels are significantly correlated with lower credit ratings. The results for similar control variables in the present study are consistent with the findings reported in Johnson and Kriz (2005) and Depken and Lafountain (2006).<sup>5</sup> In the literature on the influence of auditor quality in the corporate sector similar approaches (using corporate credit ratings) have been implemented (e.g. Mansi, Maxwell and Miller 2004). In order to obtain the market evaluation of anticipated audit quality I always control for the influence of the reported state of public finance and hence, I include real per capita State debt accumulation and government expenditure as covariates in the regression framework.

The data on State credit ratings are collected from Moody's Investor Services, Fitch Ratings and Standard & Poor's. State General Obligation Bond (GOB) ratings are available for a maximum of 42 US States for some or the entire period 1992-1999, but do not include States that have no general obligation debt.<sup>6</sup> When observing States without GOB ratings, selection bias seems a concern. When approaching this potential selection problem, I do not find a significant correlation between auditor characteristics and the excluded States.

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<sup>5</sup> Further studies assessing borrowing cost use credit ratings as explanatory variables (e.g. Benson, Marks and Raman 1986 and Benson and Marks 2007) and find that other factors beyond credit ratings also impact on borrowing cost. Capeci (1991) reassess the findings by Benson, Marks and Raman (1986) and disentangles market assessments of credit worthiness from direct effects of credit ratings. He finds that borrowing rates and credit ratings closely respond to fiscal indicators, which is consistent with the view that credit markets discipline municipal fiscal behavior. Hence, credit ratings seem to be strong, though probably not perfect proxies for State fiscal performance.

<sup>6</sup> The States without any rating during the analyzed period are Arizona, Colorado, Iowa, Idaho, Nebraska and South Dakota.

Furthermore, I cannot explain any of this selection with the auditor or institutional variables in a regression framework either. Hence, it seems that selection bias is not a major issue in this analysis. In the context of this study a further, though minor, adjustment is the exclusion of Alaska and Hawaii from the analysis, which is the general practice for studies analyzing fiscal institutions in US States (see e.g. Alt, Lassen and Skilling 2002). Alaska and Hawaii are outliers in many respects, but most importantly with regard to fiscal data, since these States depend disproportionally on federal transfers. Given the available data, the exclusion of Alaska and Hawaii does not affect the results, while it enables the readers to compare the results to related work using fiscal data on the US State level.

The construction of the credit rating variable follows the approach suggested by Depken and Lafountain (2006) and implemented by Schelker (2011). The three principal rating agencies (Moody's, Standard & Poor's, and Fitch) rate State General Obligation Bonds. Unfortunately, it was not possible to receive Standard & Poor's (S&P) ratings prior to 1995.<sup>7</sup> Hence, the ratings from 1992 to 1994 have to rely on ratings provided by Moody's and Fitch. The agencies use very similar rating scales. S&P and Fitch use a rating scheme that ranges from AAA to D including 22 rating categories, while Moody's rates GOBs according to a rating ranging from AAA to C with 21 categories. In order to construct a single credit rating measure including all available rating information I first assign every rating category a score between -1 and -21 in the case of Moody's and -22 in the case of Fitch and S&P. Following the notation by Depken and Lafountain (2006) the numerical rating for State  $s$  in year  $t$  by rating agency  $j$  is  $R_{stj} \in \{-1, \dots, -N_j\}$ , where -1 corresponds to the highest GOB rating and  $-N_j$

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<sup>7</sup> Moody's Investor Services and Fitch Ratings directly provided the data used in this study. The S&P ratings could not be received from S&P. However, S&P rating information could be gathered from the US Census Bureau from 1995-1999.

the lowest GOB rating by agency  $j$ .<sup>8</sup> In a second step I normalize these scores  $R_{stj}$  by dividing them by the number of possible ratings  $N_j$  for each rating agency  $j = 1, \dots, n$  to obtain  $R'_{stj} = R_{stj} / N_j$ . In a last step I average the available normalized rating scores  $R'_{stj}$  to obtain a normalized overall rating  $R_{st}$  for each State  $s$  in year  $t$ . The normalized state-year rating then is  $R_{st} = \frac{1}{n} \sum_{j=1}^n \frac{R_{stj}}{N_j}$  and it varies between -1 and 0. Since not all State GOB are always rated by all three rating agencies, some State rating measures rely only on two or in some cases one agency. This however, is only the case for a minority of all States and years, but could not be circumvented.

### *The Empirical Strategy*

The empirical analysis starts with a series of regressions analyzing the influence of auditor expertise on fiscal variables such as real per capita state debt and expenditures and continues to report results adopting State credit ratings as a measure of fiscal performance.

I estimate the following basic equation:

$$y_{it} = \alpha + \beta \text{ AUDITOR EXPERTISE}_{it} + \zeta A_{it} + \lambda X_{it} + \varepsilon_{it}$$

where the dependent variable  $y_{it}$  is either the State GOB rating ( $R'_{st}$ ), public debt or expenditures,  $\text{auditor expertise}_{it}$  is a dummy variable taking 1 if a CPA is required and 0 otherwise,  $A_{it}$  are additional characteristics of public auditing institutions,  $X_{it}$  is a matrix of cross-section characteristics,  $\beta$  is the parameter of interest,  $\zeta$  and  $\lambda$  are parameter vectors and  $\varepsilon$  is the error term.

For the regressions using real per capita government expenditures and debt as the dependent variables I rely on linear models. When estimating the effect of auditor expertise on the normalized credit rating measure I have to take into account that the dependent variable

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<sup>8</sup> According to this scale the ratings are categorized as follows: AAA = -1 to C = -21 (lowest rating for Moody's) and D = -22 (S&P and Fitch). The negative signs only serve the purpose to make it easier and more intuitive for the reader to interpret the regression results.

is censored at -1 and 0. Therefore, I estimate Tobit regression models. The OLS and Tobit models assume that the variance of the cross-section specific effects ( $a_i$ ) is zero ( $\text{var}(a_i)=0$ ). In the present setting such an assumption is likely to be violated. In order to relax this assumption, I estimate random effects (RE) models that assume that the  $a_i$ 's result from a random draw and follow a normal distribution. I conduct Lagrange multiplier tests which indicate that  $\text{var}(a_i) \neq 0$  and hence, the random effects estimates allowing for individual heterogeneity are the preferred specification and will be presented in the following tables. In order to further relax the assumption on the cross-section specific effects  $a_i$ , I estimate fixed effects models. However, fixed effects Tobit models are hard to implement due to the incidental parameter problem (e.g., Greene 2003) and the lack of a sufficient statistic to condition the fixed effects out of the likelihood in a parametric setting. Therefore, I present fixed effects estimates using linear models, which are typically good approximations and allow a straightforward interpretation of the effects. The reported fixed effects models permit for arbitrary correlation between  $a_i$  and the explanatory variables and control for unobserved time-invariant heterogeneity, e.g. State-specific effects. However, due to the high time persistence of institutional variables I prefer the random effect estimates that reflect a long-term perspective of the effects.<sup>9</sup>

Since the audit offices differ in various respects, I control for consequences stemming from the different auditor selection and removal mechanisms and for differences in the audit mandate.<sup>10</sup> Furthermore, all regressions include a range of standard covariates controlling for State-specific heterogeneity. This is important in order to take structural differences between the States into account. Note that all regressions on State credit ratings also include State real

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<sup>9</sup> I also conducted Hausman tests. However, the overall picture is not conclusive since the null hypothesis cannot be rejected in all specifications.

<sup>10</sup> Not all states require the auditor to conduct exactly the same types of audit. In addition to standard financial audits several state auditors also conduct performance audits. Financial audits follow standard accounting rules and are comparable across states. The differences in the extent to which performance audits are conducted are controlled for in the empirical model.

per capita expenditures and debt in order to control for data quality and fiscal level effects. I always start by presenting a basic regression model only including the most standard control variables (real per capita income, population size, unemployment rate, fraction of young and aged population, and a dummy for southern States), and then present further specifications controlling for additional auditor variables, time effects and additional institutional covariates that have proven to be influential in previous research at the US State level (strict balanced budget rule, existence of voter initiatives). When estimating the fixed effects models some variables drop out since they do not vary at all over time (auditor election, auditor removal, voter initiatives, strict balanced budget law). Since the additional (time persistent) institutional variables drop out when including State fixed effects, only a basic specification and one including year fixed effects are reported.

### *Empirical Results*

Tables 1 and 2 report the regression results using real per capita State debt and expenditures as the dependent variable. Table 3 presents the regression results of auditor expertise on GOB ratings.

[Table 1 about here]

Tables 1 and 2 present the estimates using real per capita debt and expenditure respectively as the dependent variable. These models estimate the influence of auditor expertise – parameterized by a minimum education requirement for the auditor to hold at least a CPA – on state real per capita debt and expenditure respectively. All random effects estimates in columns 1 to 4 of both Tables indicate a negative and statistically significant effect of auditor expertise on government debt and expenditure. The coefficients seem to be relatively robust to changes in the model specifications. States demanding that the State auditor must hold at least a CPA feature lower public expenditure and debt. In terms of

magnitude the results amount to approximately 95 USD lower per capita expenditures and 440 USD lower per capita debt. The fixed effects regressions shown in columns 5 and 6 in both Tables point to the same conclusion. The coefficients of the debt regressions in Table 1 confirm the negative and statistically significant results found in the previous random effects specifications, while the expenditure regressions of Table 2 are slightly lower and do not reach statistical significance. Note that these results are difficult to interpret since pure fiscal level effects might not be extremely informative on government performance.

[Table 2 about here]

Since the quality of fiscal data itself could depend on audit quality, estimates relying on fiscal information might be biased. Moreover, the pure level of fiscal measures is not informative per se, since e.g. high or low public debt might be associated to both efficient as well as inefficient governance. On the one hand (and the more traditional argument) it might be an indicator of inefficient governance. On the other hand, comparatively higher levels of expenditures might just reflect that voters are satisfied with public goods provision and delegate more competences to the public sector (Eichenberger 1994, Ferejohn 1999, Alt, Lassen and Skilling 2002). In the case of public debt efficient governments might finance public infrastructure projects with high returns on investments by public debt under the notion of tax smoothing, etc. Hence, as long as one is not able to reliably control for public goods provision the pure level effects are not satisfactory indicators for the performance of the public sector.

Therefore, I conduct regressions relying on State GOB ratings instead of fiscal data. In this setting I control for potential bias stemming from biased fiscal information by including fiscal data (real per capita State debt and expenditures) as control variables. Columns 1 to 4 of Table 3 present the random effects Tobit estimates taking into account that the dependent variable is censored. The results show that States demanding the State auditor to hold at least

a CPA feature significantly higher credit ratings. Including year fixed effects (columns 3 and 4) and further fiscal controls (column 4) do not challenge the results. The coefficients estimated within a linear fixed effects framework in columns 5 and 6 remain statistically significant, while the impact is somewhat higher in magnitude. On average the States demanding the State auditor to hold at least a CPA feature approximately a one notch higher credit rating than States without such a requirement.<sup>11</sup> The estimated coefficients of the control variables are widely in line with previous research using the same or similar covariates (e.g. Depken and Lafountain 2006, Johnson and Kriz 2005 and Schelker 2011).

[Table 3 about here]

### *Robustness and Causality*

In order to assess the robustness of the results this section presents evidence on the major issues raised that might undermine statistical inference. There are two strands of arguments I follow up in the empirical exercise. The presented regressions always include the baseline covariates as well as all additional controls and year fixed effects. Only estimating the baseline regression produces the same results.

[Table 4 about here]

First, it has been argued that expertise could primarily be a matter of experience and hence, increases over time. One might be worried that states requiring minimum professional education standards could also be the states that feature longer auditor terms. However, the literature on the influence of auditor term length also stresses the potential dwindling of auditor independence with long-lasting auditor client relationships (see Schelker 2011 for evidence concerning public auditors and Gosh and Moon 2005, Mansi, Maxwell and Miller

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<sup>11</sup> When comparing the linear random effects estimates with the presented Tobit estimates, the results are similar in terms of magnitude, however, the Tobit estimates are estimated more precisely. When estimating the quantity of interest, auditor expertise, applying linear random effects models the coefficient varies between 0.032\*\* (std.err. 0.015) and 0.039\*\*\* (0.012) and is always statistically significant at least at the 5% level.



2004 and Johnson, Khurana and Reynolds 2002 for evidence concerning corporate auditors). Therefore, I include control variables taking auditor term length as well term limits into account, since they co-determine auditor tenure. These institutional features do not vary over the respective time period and hence, I only present random effects regressions. Note that the regressions including state fixed effects in the tables above already cover this kind of state heterogeneity. However, it seems interesting to directly address this major source of potential simultaneity and report the specific results. As can be seen from Table 4 in columns 1-3 the inclusion of these controls do not question my main results. The influence of the auditor term length measure does mostly not reach standard levels of statistical significance and it is not very robust to changes in the empirical specification, while the coefficient of auditor term limits is positive if the estimates are statistically significant in the case of the debt and GOB rating regressions (see also Schelker 2011). The interpretation of the result relying on GOB ratings is straightforward and suggests a roughly 1 notch higher credit ratings if a CPA is required. In the light of the discussion on fiscal level effects the positive sign in the case of public debt is more difficult to interpret.

Secondly, I follow up on three concerns of endogeneity. Firstly, I take into account that a CPA requirement might just be the result of a more general preference for higher education. Therefore, I include the share of population holding at least a high school diploma. Secondly, the installation of a CPA requirement might just reflect some fiscal preference of citizens, which determines the institutional design as well as actual policy outcome simultaneously. In order to proxy for state-specific fiscal preferences, I include ADA scores, which rate state legislators' ideology at the federal level on a conservative-liberal scale (Groseclose, Levitt and Snyder 1999, Anderson and Habel 2009). Thirdly, one might be worried that some form of learning from neighbors or yardstick competition could drive the results. Therefore, I include the number of neighboring states into the regression framework.

Note that the effects due to yardstick competition measured by the number of neighbors as does not vary over time. Therefore, the previous fixed effects framework should already pick up this effects. However, the results provide additional information on the importance of these measures for the influence of auditor expertise in the context of this study. As can be seen from Table 4 columns 4-6 the three measures do not invalidate the previous results. Note that when only including the baseline controls the estimated coefficient of the number of state neighbors often reaches standard levels of statistical significance. Given these results, the three main channels of potential endogeneity do not drive my findings.

The overall picture of the empirical analyses shows that auditor expertise is essentially correlated with government performance measures. Including state and year fixed effects as well as investigating several main channels of potential endogeneity do not invalidate my results. Hence, the interpretation according to the theoretical considerations above is that more competent auditors improve the reliability of fiscal information, which reduces the control problems in the principal agent relationship between citizens as well as investors and government agents.

## **4. Conclusion**

The theoretical discussion has established a relationship between auditor expertise and performance of audited organizations. More competent auditors are more effective supervisors, which reduces the leeway of agents to misreport. Since in modern democracies citizens and investors depend on fiscal information to make decisions, the quality of reported information is crucial. If competent auditors improve the quality of fiscal information, citizens and investors can observe a more reliable signal about the state of public finances, which enables them to make more appropriate decisions. The empirical results support this hypothesis. I find that minimum professional education requirements for the State auditor are negatively correlated with public debt and expenditures and positively with credit ratings. The

straightforward interpretation is that higher auditor expertise is associated with lower government debt and expenditures and higher General Obligation Bond ratings.

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## Appendix

**Table A1: Summary statistics**

Variable	Min. – Max.	Sample mean (Std. Dev.)	Description
Government expenditures	1298.31 – 2968.72	1843.54 (293.76)	Real per capita government expenditures
Government debt	2088.36 – 9376.47	4539.76 (1456.23)	Real per capita government debt
GOB rating	(-0.381) – (-0.046)	-0.133 (-0.069)	Normalized General Obligation Bond ratings by S&P, Moodys and Fitch (highest rating Aaa = -1, Aa1 = -2, Aa2 = -3, etc.)
Auditor expertise	0/1	0.219 (0.414)	Minimum Education requirement: Auditor has to hold a CPA (1), no minimum requirement (0). Details see Schelker (2008)
Auditor election	0/1	0.354 (0.479)	Auditor is elected by the citizens (1), auditor is appointed by the legislature (0). Details see Schelker (2008)
Performance audits	0 – 3	1.815 (1.119)	Index of conducted performance audits: Index adding 3 types of performance audits: Economy & Efficiency, Program, and Compliance audits. Details see Schelker (2008)
Removal procedures	0 – 3	1.146 (0.914)	Index capturing various removal procedures for the State auditor. Removal by single committee or public official (0), simple majority vote in both legislative chambers required (1), supermajority required in both chambers or if special procedures (2), agency head cannot be removed during official term (3). Details see Schelker (2008)
State Population	466251 – 3.31e+07	5491734 (5794756)	Total State population
State income	10397.11 – 22913.70	14702.42 (2213.26)	Real per capita State income in USD
Unemployment	2.5 – 11.3	5.211 (1.494)	Unemployment rate
Aged	0.087 – 0.186	0.129 (0.017)	Fraction of the aged population (65+)
Kids	0.071 – 0.264	0.189 (0.017)	Fraction of school-aged population (5-17)
Balanced budget rule	0/1	0.542 (0.499)	Balanced budget requirement (no carry-over rule)
Voter initiative	0/1	0.458 (0.499)	Voter initiative available (1), otherwise (0)

**Table 1: The influence of auditor expertise on State real per capita debt**

US State Data 1992 – 1999						
Dependent Variable	<i>State real per capita debt</i>					
Estimation Method	Linear Random Effects				Linear Fixed Effects	
	(1)	(2)	(3)	(4)	(5)	(6)
Auditor expertise	-421.460** (194.589)	-406.541** (200.151)	-470.004** (185.966)	-415.528* (216.834)	-476.177** (206.553)	-565.316*** (193.736)
Auditor election	- -	-133.729 (423.971)	-146.108 (454.834)	-254.570 (408.934)	- -	- -
Performance audit	- -	38.803 (42.998)	53.702 (44.814)	49.453 (45.413)	25.062 (43.743)	29.888 (45.828)
Auditor removal	- -	205.565 (180.956)	189.925 (185.254)	267.261 (190.185)	- -	- -
State population	2.64e-05 (2.62e-05)	2.04e-05 (2.64e-05)	2.30e-05 (2.70e-05)	1.78e-05 (2.50e-05)	-5.08e-05 (1.29e-04)	-4.06e-05 (1.33e-04)
State r.p.c. income	0.117*** (0.044)	0.117*** (0.045)	0.124 (0.080)	0.085 (0.085)	0.094* (0.053)	0.019 (0.102)
Unemployment	8.615 (33.542)	13.259 (35.022)	-27.500 (48.664)	-26.588 (49.483)	-16.162 (37.847)	-45.719 (52.433)
Aged	2,258.114 (7580.530)	2,771.811 (7993.820)	3,750.038 (8147.554)	6,812.280 (8404.809)	4,462.244 (10941.743)	8,038.408 (10909.891)
Kids	1,542.832 (1879.735)	1,887.398 (1917.777)	1,698.732 (1737.872)	2,041.386 (1844.569)	2,174.908 (1876.866)	2,584.050 (1912.649)
Balanced budget law	- -	- -	- -	-1,071.214*** (358.336)	- -	- -
Initiative	- -	- -	- -	-407.415 (406.184)	- -	- -
Year effects	-	-	included	included	-	included
Observations	384	384	384	384	384	384
R-squared	0.269	0.290	0.282	0.389	0.131	0.173
LM (Breusch/Pagan)	1029	955.7	970.9	959.7	-	-

Notes: Robust standard errors in brackets. Significance level: \* 0.05<p<0.1, \*\* 0.01<p<0.05, \*\*\* p<0.01. Source: Own calculations



**Table 2: The influence of auditor expertise on State real per capita Expenditures**

US State Data 1992 – 1999						
Dependent Variable	<i>State real per capita expenditure</i>					
Estimation Method	Linear Random Effects				Linear Fixed Effects	
	(1)	(2)	(3)	(4)	(5)	(6)
Auditor expertise	-106.559** (42.884)	-91.074** (41.311)	-91.459* (49.271)	-79.889 (50.534)	-66.276 (49.924)	-69.840 (60.627)
Auditor election	-	217.897** (100.428)	135.007 (95.762)	112.593 (82.794)	-	-
Performance audit	-	20.692** (10.347)	12.864 (11.098)	11.821 (11.256)	21.932** (10.650)	13.883 (11.671)
Auditor removal	-	-70.934 (53.292)	-19.688 (48.159)	-4.412 (43.633)	-	-
State population	-1.17e-05 (7.56e-06)	-1.08e-05 (7.37e-06)	-7.34e-06 (6.55e-06)	-7.60e-06 (6.30e-06)	-1.46e-07 (3.21e-05)	-3.88e-06 (3.07e-05)
State r.p.c. income	0.071*** (0.010)	0.073*** (0.010)	0.022 (0.015)	0.013 (0.014)	0.075*** (0.010)	0.023 (0.016)
Unemployment	-10.948 (10.566)	-6.726 (10.729)	12.790 (14.270)	13.255 (14.271)	-5.618 (12.204)	8.860 (15.343)
Aged	-2,144.181 (1589.967)	-1,860.340 (1464.928)	-970.626 (1498.952)	-360.984 (1433.841)	-2,576.763 (2240.385)	-1,551.442 (2323.936)
Kids	-1,741.958** (818.546)	-1,601.977** (750.118)	-1,093.387* (624.749)	-999.349* (581.514)	-1,705.286** (798.531)	-1,134.666* (636.103)
Balanced budget law	-	-	-	-145.392** (62.594)	-	-
Initiative	-	-	-	-101.203 (71.209)	-	-
Year effects	-	-	included	included	-	included
Observations	384	384	384	384	384	384
R-squared	0.158	0.203	0.314	0.400	0.541	0.574
LM (Breusch/Pagan)	875.8	858.6	967.9	926.2	-	-

Notes: Robust standard errors in brackets. Significance level: \* 0.05<p<0.1, \*\* 0.01<p<0.05, \*\*\* p<0.01. Source: Own calculations

**Table 3: The influence of auditor expertise on State general obligation bond rating**

US State Data 1992 – 1999						
Dependent Variable	<i>Normalized State General Obligation Bond ratings</i>					
Estimation Method	Random Effects Tobit				linear Fixed Effects	
	(1)	(2)	(3)	(4)	(5)	(6)
Auditor expertise	0.040*** (0.014)	0.040*** (0.014)	0.045*** (0.014)	0.040*** (0.014)	0.059*** (0.005)	0.065*** (0.006)
Auditor election	- -	0.015 (0.024)	0.028 (0.024)	0.025 (0.021)	- -	- -
Performance audit	- -	0.001 (0.002)	0.004* (0.002)	0.004* (0.002)	0.002 (0.003)	0.005 (0.003)
Auditor removal	- -	-0.006 (0.012)	-0.014 (0.012)	-0.016 (0.011)	- -	- -
State population	-3.22e-09** (1.50e-09)	-3.14e-09** (1.53e-09)	-3.13e-09** (1.53e-09)	-2.80e-09** (1.36e-09)	-2.06e-08* (1.03e-08)	-1.66e-08 (1.03e-08)
State r.p.c. income	3.01e-06 (2.22e-06)	3.34e-06 (2.27e-06)	1.10e-05*** (3.33e-06)	1.28e-05*** (3.30e-06)	3.28e-06 (4.93e-06)	1.33e-05 (1.08e-05)
Unemployment	-0.005*** (0.002)	-0.005*** (0.002)	-0.012*** (0.002)	-0.012*** (0.002)	-0.005 (0.003)	-0.011** (0.005)
Aged	-0.761* (0.400)	-0.733* (0.403)	-0.637 (0.398)	-1.018*** (0.395)	-0.078 (0.719)	0.060 (0.643)
Kids	-0.263 (0.188)	-0.258 (0.191)	-0.207 (0.184)	-0.237 (0.184)	-0.161 (0.199)	-0.188 (0.144)
State r.p.c. debt	-2.87e-06 (3.76e-06)	-2.91e-06 (3.76e-06)	-5.52e-06 (3.71e-06)	-4.51e-06 (3.65e-06)	8.60e-07 (7.85e-06)	-5.95e-07 (6.98e-06)
State r.p.c. expenditures	3.01e-06 (1.46e-05)	9.22e-07 (1.48e-05)	2.87e-05* (1.52e-05)	2.80e-05* (1.51e-05)	2.10e-05 (2.78e-05)	4.41e-05 (2.69e-05)
Balanced budget law	- -	- -	- -	0.055*** (0.017)	- -	- -
Initiative	- -	- -	- -	0.001 (0.017)	- -	- -
Year effects	-	-	included	included	-	included
Observations	309	309	309	309	309	309
(pseudo) R-squared	0.179	0.185	0.202	0.372	0.220	0.287

Notes: Robust standard errors in brackets. Significance level: \* 0.05<p<0.1, \*\* 0.01<p<0.05, \*\*\* p<0.01. Source: Own calculations

**Table 4: Robustness**

US State Data 1992 – 1999						
Dependent Variable	GOB rating	Debt	Expenditure	GOB rating	Debt	Expenditure
Estimation Method	RE-Tobit	RE	RE	RE-Tobit	RE	RE
	(1)	(2)	(3)	(4)	(5)	(6)
Auditor expertise	0.045*** (0.014)	-433.983** (201.358)	-84.136* (44.992)	0.038*** (0.014)	-454.692** (198.875)	-80.000 (50.283)
Auditor term length	-0.007* (0.004)	29.858 (57.463)	11.113 (13.587)	- -	- -	- -
Auditor term limit	0.043*** (0.014)	277.298*** (90.221)	-33.909 (32.380)	- -	- -	- -
% high school	- -	- -	- -	0.006*** (0.002)	29.827 (66.593)	-19.911*** (7.616)
No. State neighbors	- -	- -	- -	0.008 (0.005)	-135.949 (112.487)	-50.979*** (15.631)
Legislators' ideology (ADA scores)	- -	- -	- -	-4.05e-5 (1.83e-4)	4.148* (2.474)	0.063 (0.880)
Basic controls	yes	yes	yes	yes	yes	yes
Additional controls	yes	yes	yes	yes	yes	yes
Year effects	yes	yes	yes	yes	yes	yes
Observations	309	384	384	309	384	384
No. of States	42	48	48	42	48	48
(pseudo) R-squared	0.250	0.382	0.402	0.471	0.409	0.487

Notes: Basic controls: Auditor election, performance audit, auditor removal, state population, state r.p.c. income, unemployment, % aged, % Kids. Additional controls: Balanced budget law (no-carry over rule), citizen initiative. For GOB rating regressions: r.p.c. debt, r.p.c. expenditure. Robust standard errors in brackets. Significance level: \* 0.05<p<0.1, \*\* 0.01<p<0.05, \*\*\* p<0.01. Source: Own calculations