Government Audits

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Why Governments Audit?

- Government audits are a common tool to ensure accountability in the management of public funds
- Audits are costly and don't always produce valuable results.
  - ⋆ In 2015, Canada spent $23.6M to audit its Senate to uncover $1M of improper spending

→ trade-off between accountability and efficient use of resources.

This Paper

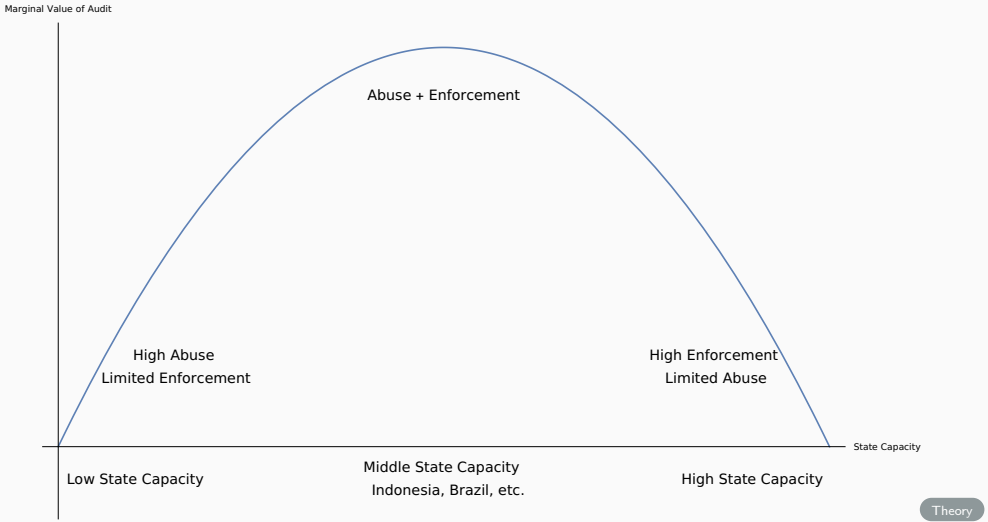
1. Simple conceptual framework of governments' trade-offs when choosing audit efforts
   - The value of audits depends on the level of mis-behavior that can be detected and the ability to respond to findings → State capacity affects both, influencing audit effectiveness.
2. Empirical evidence on audit effectiveness and state capacity
   - Cross-country patterns
   - Meta-analysis of existing literature
   - New quasi-experimental evidence on the US

Conceptual Framework

Audits and State Capacity

- Government of type s, reflecting state capacity
- Local agent that engages in abuse $c \in \{0, 1\}$ with probability $p_c(s)$, cost for society π_c
- Probability of abuse decreasing in state capacity $p_c'(s) < 0$
- Auditing reveals the abuse and costs $a(s)$
- Then, government undertakes enforcement, with probability $p_e(s)$ of success
- Probability of successful enforcement increasing in state capacity $p_e'(s) > 0$
- Successful enforcement recovers k where $k \geq \pi_c$

Inverted U-shape relationship between Audit Effectiveness and State Capacity



Theory

Empirical Evidence

1. State Capacity, Corruption, and Enforcement

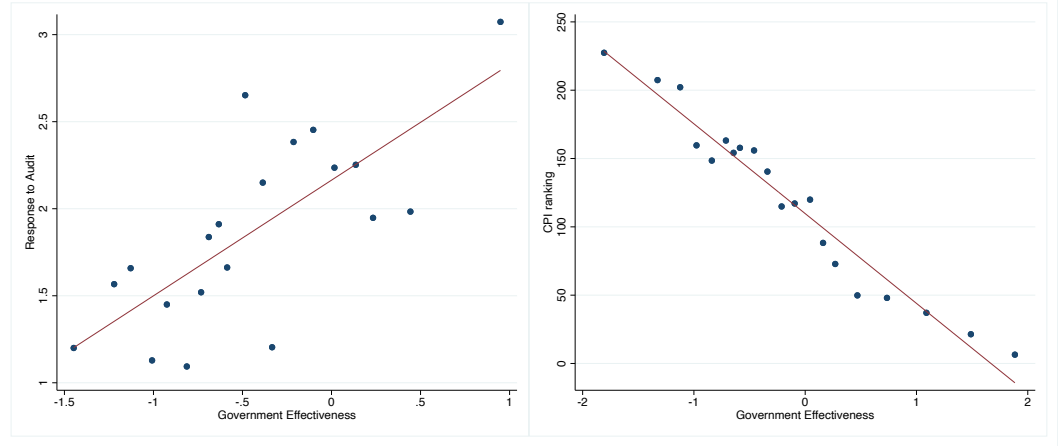
Suggestive evidence of the two key theory assumptions:

1. Probability of abuse decreasing in state capacity $p_c'(s) < 0$
2. Probability of succesful enforcement increasing in state capacity $p_e'(s) > 0$

Data:

1. State Capacity:
   - ⋆ Government Effectiveness from World Bank 2020 Indicators
2. Probability of successful enforcement:
   - ⋆ audit responsiveness from Public Expenditure and Financial Accountability (PEFA) 2016 framework, World Bank
3. Probability of abuse:
   - ⋆ Corruption ranking from 2021 Transparency International Corruption

1. State Capacity, Corruption, and Enforcement

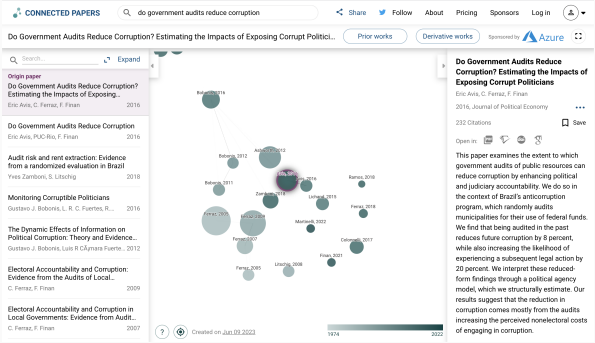


Notes: We combine data from three sources: state capacity measures from World Bank 2020 Indicators on the X axis, the ability to respond to an internal audit, as measured by PEFA on the Y axis of the left panel, and the corruption ranking from the 2021 Transparency International Corruption Perceptions Index on the Y axis of the right panel. In line with our theory, the ability to respond to audit findings is increasing in state capacity, while corruption is decreasing in state capacity.

2. Audits and State Capacity: Evidence from Existing Studies

Review existing evidence on auditing, treating estimates like data (Jackson and Mackevicius, AEJ Applied 2023)

- To be included, papers have to:
  1. use quasi-experimental design
  2. focus on effect of government audits/ audit reforms
  3. look at outcomes related to government performance and/or accountability
     - ⋆ corruption, fiscal spending, procurement, electoral accountability
- Executed using iteratively Connectedpapers
  - ⋆ We end up with a set of 15 studies.



2. Audits and State Capacity: Evidence from Existing Studies

Article	Journal	Country	Treatment	Outcome Variable	Point Estimate	Dependent Variable Mean	% Change
Di Tella and Schargrodsky (2003)	Journal of Law & Economics	Argentina	Audits	Hospital prices (log)	−0.146	Not reported	15%
Avis et al. (2018)	Journal of Political Economy	Brazil	Random audits	Number of irregularities (logs)	−0.06	Not reported	−1.33%
Ferraz and Finan (2008)	The Quarterly Journal of Economics	Brazil	Timing of audits	Incumbent likelihood's of reelection	−0.03	Not reported	−9%
Ferraz and Finan (2011)	The American Economic Review	Brazil	Term Limit of Mayors	Corruption's detected by Audits	−0.019	0.06	−30.2%
Lauletta et al. (2022)	Economica	Brazil	Random audits	Discretionary employment	−1.445	12.24	−11.8%
Zamboni and Litschig (2018)	Journal of Development Economics	Brazil	Increase in audit risk	Audited funds in procurement	−0.118	Not reported	Not reported
Gerardino et al. (2017)	Working paper	Chile	Public sector audits	Usage of auctions in procurement	−0.079	0.67	−11.9%
Chu et al. (2021)	American Economic Journal: Applied Economics	China	Auditor's local ties	Suspicious expenditures	0.471	11.7	4%
Wong (2021)	Working Paper	India	Timing of random audits	Misappropriated expenditure	−28.06	187.1	−15%
Olken (2007)	Journal of Political Economy	Indonesia	Random audits	Missing expenditure	−0.085	0.25	−36.8%
Vannutelli (2021)	Working paper	Italy	Change in auditing policy	Budget management	15.88	−306.97	−5.2%
Larreguy et al. (2020)	The Economic Journal	Mexico	Timely diffusion of audits	Incumbent mayors vote share	0.02	−0.035	−62.47%
Boboni et al. (2016)	American Economic Review	Puerto Rico	Timing of audits	Number of corruption violation	−1.43	1.38	103.5%
Berliner and Wehner (2021)	Journal of Politics	South Africa	Timing of audits	Incumbent mayor's vote share	0.071	0.655	10.8%
Calvo,Cui and Serpa (2016)	Management Science	United States	Federal law requiring audits	Projects delays	0.59	Not reported	6.1%

- Most studies tend to find that audits are highly effective...
- .. but they mostly focus on middle-capacity contexts: Brazil, Indonesia, Mexico.
- There is limited evidence on audit effectiveness in high and low capacity contexts, potentially due to publication bias.

3. Audits in High-Capacity Environments: Evidence from the U.S.

- US highly decentralized, federal government transfers a lot of money to local governments
  - ⋆ In 2018, federal grants accounted for 22% of local revenues
- Law requires organizations receiving more than a threshold amount of total federal transfers to undergo an annual Single Sudit
  - ⋆ Includes multiple programs and pass-through money –hard for cities to control
- Objective is to ensure proper and efficient spending and respect of earmarking of resources
- Threshold increased over time, from $300,000 to $750,000 since 2016
  - ⋆ Increases motivated by reducing regulatory burden for small places

Data & Empirical Strategy

- **Data:**
  - Audit status and findings from Federal Audit Clearinghouse.
  - Budgets for universe for cities/towns in NY State from 2001-2019.
  - Outcomes include revenues, taxes, charges, and various spending categories.
    - Sufficient statistic for the level of underlying impropriety/mis-management in spending
    - Audits check respect of earmarking of funds $\rightarrow$ If cities are found to misuse funds (e.g. using Title I education funds for admin spending) shifts in spending categories should be observed.
    - City finance data are not biased by selective enforcement
- **Strategy:**
  - Use of a threshold for Single Audits creates quasi-random auditing: cities just above are audited (treated) and those below aren't (control).
  - However, cities could undergo multiple audits, with potential lagged effects.

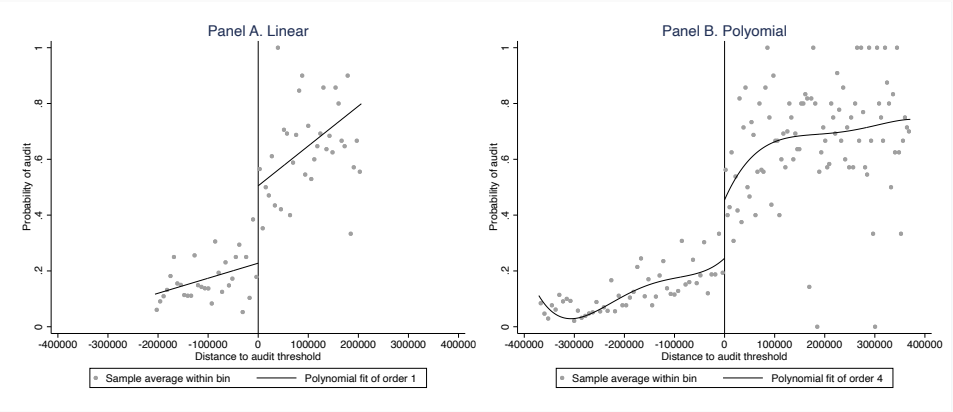
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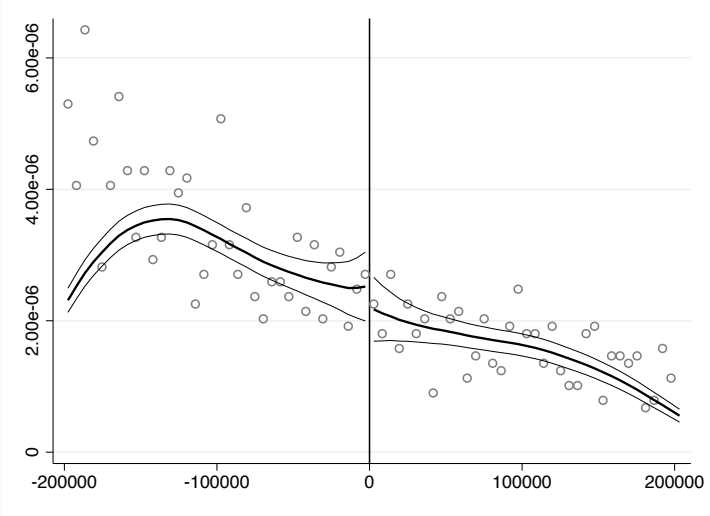
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First Stage



→ Crossing threshold increases probability of audit by 21-28%.

McCrary Test



→ No evidence of differential sorting around the threshold.

Dynamic RD Estimates of Audits on City Budgets

Outcomes	(1) Taxes	(2) Charges for services	(3) Total revenue	(4) Administrative expenditure	(5) Culture and education	(6) Debt services	(7) Employment	(8) General services	(9) Utilities
Same Year	-0.0166	0.0252	-0.000666	-0.0461	0.121	0.0483	-0.0124	0.00636	0.124
	(0.0179)	(0.0524)	(0.0234)	(0.0378)	(0.0928)	(0.116)	(0.0802)	(0.0481)	(0.138)
+ 1 Year	-0.0140	0.0137	0.0198	0.000101	-0.0810	-0.0341	-0.0441	0.0614	-0.0921
	(0.0188)	(0.0562)	(0.0200)	(0.0324)	(0.0737)	(0.121)	(0.0736)	(0.0458)	(0.127)
+ 2 Year	-0.0121	0.0432	0.0355	-0.0254	-0.0267	-0.0660	0.0170	0.000867	-0.105
	(0.0200)	(0.0571)	(0.0259)	(0.0393)	(0.0682)	(0.117)	(0.0692)	(0.0512)	(0.148)
+ 3 Year	-0.0141	0.0474	-0.0161	-0.0128	0.0450	-0.0168	-0.00796	-0.000972	-0.219
	(0.0211)	(0.0636)	(0.0236)	(0.0424)	(0.0755)	(0.111)	(0.0747)	(0.0548)	(0.143)
+ 4 Year	-0.0135	-0.0247	-0.0255	-0.00361	0.0340	-0.0949	-0.00942	-0.123	-0.332
	(0.0237)	(0.0625)	(0.0251)	(0.0438)	(0.0754)	(0.112)	(0.0689)	(0.0539)	(0.170)
+ 5 Year	-0.0228	-0.0264	-0.0234	0.0405	0.0839	-0.160	-0.0807	-0.111	-0.330
	(0.0255)	(0.0649)	(0.0280)	(0.0543)	(0.0956)	(0.135)	(0.0771)	(0.0535)	(0.165)
+ 6 Year	-0.0160	-0.0500	-0.0218	-0.00787	0.0868	-0.206	-0.0116	-0.181+	-0.191
	(0.0259)	(0.0673)	(0.0282)	(0.0499)	(0.0954)	(0.169)	(0.0781)	(0.0648)	(0.167)
Observations	5,149	5,149	5,149	5,149	5,149	5,149	5,149	5,149	5,149
R^2	0.980	0.948	0.964	0.923	0.902	0.791	0.911	0.852	0.813
Y mean	960.6	369.6	1607	450.3	164.6	174.8	100.5	933.6	197.5

- ⋆ Estimates are small and statistically insignificant
- ⋆ Consistent with our predictions, if the US is a high state capacity country
- ⋆ For audited cities, most audit reports yield no findings or highlight minor errors Findings

Conclusion

Takeaways:

- We study the the trade-offs of governments when choosing their audit efforts
- We highlight how enforcement and underlying abuse both matter for audit effectiveness → Audits are most valuable in middle-capacity contexts
- Consistent with evidence from meta-analysis of previous literature
- New evidence from the US shows audits have no significant effect on city finances

Policy Implications:

- Conducting audits in low and high-state capacity countries may not be the most efficient use of resources
- In low-capacity environments, focus should be on strengthening institutions that are a precondition for audit effectiveness (e.g. transparency and judicial reforms)
- In high-capacity environments, reducing audit requirements might be beneficial, as it might decrease passive waste induced by regulatory burden

Appendix

Government Trade-off

- Should the government undertake the audit?
- Assuming the government is risk neutral, the government should audit if:

$$-a(s) + p_c(s) \times [-\pi_C + p_e(s)k] > p_c(s) \times (-\pi_C)$$

- i.e. when:

$$p_c(s)p_e(s)k > a$$

- When state capacity is high, $p_c(s)$ is low, shrinking the left term, $\rightarrow$ government should not audit because there is nothing to find
- When state capacity is low, $p_e(s)$ is low $\rightarrow$ government should not audit because nothing can be done about audit findings

Back

Empirical Strategy

- Threshold of Single Audits gives rise to quasi-random auditing near the threshold
  - ⋆ Cities just above must be audited (treated), while cities just below don't have to be (control)
- However, the same city could be audited multiple times, and the effects of audits may be lagged

  → **Dynamic Regression Discontinuity Design** (Cellini et al., QJE 2010)

$$y_{jt} = \sum_{\tau=0}^{\overline{\tau}} (b_{j,t-\tau}\theta_{\tau}^{TOT} + m_{j,t-\tau}\alpha_{\tau} + f(z_{j,t})) + \lambda_j + \kappa_t + u_{jt} \quad (1)$$

- b_{jt} indicates whether the federal revenues is above the threshold;
- m_{jt} indicates whether municipality j is within \$200,000 from the threshold in year t
- $f(z_{jt})$ controls for up to the third degree polynomial in distance z_{jt} from the threshold
- λ_j are municipality and κ_t calendar year fixed effects.

⋆ identifies effect of an audit, comparing cities that, in year $t - \tau$ were just above vs. just below the threshold, but have similar audit experiences and revenues in other years. Back

Additional Evidence: Audit Findings

Audit Finding	Panel A. Share of Active Waste Terms					
	Embezzlement	Corruption	Illegal	Stolen	Misappropriated	*N*
Significant deficiency	0	0	0	0.001	0.002	1463
Material weakness	0	0	0	0.002	0	1191
Material non compliance	0	0	0	0.002	0.002	507
	Panel B. Share of Passive Waste Terms					
	Waste	Not allowed	Improper	Deficient	Weakness	*N*
Significant deficiency	0.01	0.04	0.06	0.67	0.53	1463
Material weakness	0.04	0.04	0.06	0.25	0.77	1191
Material non compliance	0.03	0.05	0.06	0.25	0.56	507

→ Textual analysis of audit findings indicates most of the issues are related to passive waste: errors, inaccurate reporting etc. Back

Dynamic RD Results – TOT Estimator on City Finance, Democrat

Table 10. CFR- TOT one step estimator, sample of cities with democratic majority

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
VARIABLES	state_rev_pc	taxes_pc	ch_serv_pc	tot_rev_pc	admin_pc	cult_educ_pc	debt_serv_pc	empl_pc	gen_serv_pc	utilities_pc
audits_prev0	0.0289	-0.0171	0.00431	-0.0118	-0.0221	0.0440	-0.0316	-0.00910	-0.0261	0.000663
	(0.0457)	(0.0204)	(0.0304)	(0.0211)	(0.0247)	(0.0433)	(0.0545)	(0.0463)	(0.0303)	(0.0766)
audits_prev1	-0.0182	-0.0116	-0.0117	0.00114	0.00911	-0.0290	-0.0395	-0.0421	-0.0490	-0.0518
	(0.0441)	(0.0195)	(0.0249)	(0.0191)	(0.0235)	(0.0514)	(0.0489)	(0.0445)	(0.0292)	(0.0581)
audits_prev2	0.0759	0.00746	-0.00358	0.0266	0.0600	0.0461	-0.0589	-0.0245	-0.00387	-0.108
	(0.0494)	(0.0202)	(0.0300)	(0.0200)	(0.0253)	(0.0471)	(0.0455)	(0.0449)	(0.0285)	(0.0644)
audits_prev3	-0.0142	-0.0238	0.0149	-0.0119	0.0290	0.0320	-0.0703	-0.112	-0.0190	-0.0860
	(0.0466)	(0.0215)	(0.0320)	(0.0206)	(0.0239)	(0.0479)	(0.0533)	(0.0451)	(0.0274)	(0.0606)
audits_prev4	-0.0103	-0.0526	-0.0592	-0.0417	-0.00200	-0.0285	-0.0979	-0.105	-0.0779	-0.0671
	(0.0465)	(0.0206)	(0.0322)	(0.0214)	(0.0239)	(0.0420)	(0.0633)	(0.0473)	(0.0313)	(0.0662)
audits_prev5	0.0565	-0.0417	-0.00965	-0.0231	-0.0170	0.00144	-0.0994	-0.0752	-0.0551	-0.0489
	(0.0485)	(0.0242)	(0.0340)	(0.0233)	(0.0264)	(0.0478)	(0.0598)	(0.0503)	(0.0351)	(0.0729)
audits_prev6	0.0372	0.0126	0.0517	0.0180	0.0421	0.0440	-0.0697	0.000525	-0.00444	0.0307
	(0.0506)	(0.0263)	(0.0385)	(0.0265)	(0.0309)	(0.0546)	(0.0712)	(0.0476)	(0.0326)	(0.0729)
Observations	4,678	4,678	4,678	4,678	4,678	4,678	4,678	4,678	4,678	4,678
R^2	0.674	0.923	0.917	0.915	0.894	0.879	0.814	0.893	0.848	0.836
Y mean	5.052	7.225	5.724	7.728	6.368	4.503	4.872	4.690	7.071	4.703

Standard errors in parentheses *** p<0.001 and ** p<0.005 and + p<0.01.
Following CFR this specification we control for up to the 3rd degree polynomial
of the distance and standard errors are clustered at the municipality level.

Dynamic RD Results – TOT Estimator on City Finance, Republican

Table 11. CFR- TOT one step estimator, sample of cities with republican majority

VARIABLES	(1) state_rev_pc	(2) taxes_pc	(3) ch_serv_pc	(4) tot_rev_pc	(5) admin_pc	(6) cult_educ_pc	(7) debt_serv_pc	(8) empl_pc	(9) gen_serv_pc	(10) utilities_pc
audits_prev0	-0.0144	-0.0475	-0.0160	-0.0264	-0.0582	-0.0177	-0.0860	-0.104	0.0139	0.0991
	(0.0567)	(0.0246)	(0.0472)	(0.0303)	(0.0291)	(0.0663)	(0.0716)	(0.0473)	(0.0412)	(0.0844)
audits_prev1	0.136	0.0347	0.0986	0.0702+	0.0428	0.0785	-0.0425	-0.00998	0.0610	0.0965
	(0.0594)	(0.0234)	(0.0480)	(0.0264)	(0.0307)	(0.0579)	(0.0838)	(0.0505)	(0.0349)	(0.0725)
audits_prev2	-0.0711	-0.0277	-0.00188	-0.0397	-0.0230	0.0190	-0.0454	-0.0387	0.00329	-0.0408
	(0.0623)	(0.0263)	(0.0457)	(0.0305)	(0.0298)	(0.0585)	(0.0813)	(0.0530)	(0.0383)	(0.0753)
audits_prev3	0.0394	-0.0415	-0.0186	-0.0161	-0.0405	-0.0234	-0.0350	-0.0582	-0.00932	0.0643
	(0.0645)	(0.0261)	(0.0464)	(0.0296)	(0.0325)	(0.0596)	(0.103)	(0.0578)	(0.0380)	(0.0754)
audits_prev4	-0.0251	-0.0178	-0.0444	-0.0134	-0.0253	-0.0534	-0.0937	0.0309	-0.00142	-0.116
	(0.0656)	(0.0265)	(0.0479)	(0.0295)	(0.0326)	(0.0606)	(0.104)	(0.0528)	(0.0396)	(0.0812)
audits_prev5	-0.0509	-0.0149	-0.0580	-0.0249	-0.0126	0.0468	-0.108	0.0200	-0.0196	-0.119
	(0.0666)	(0.0311)	(0.0492)	(0.0334)	(0.0414)	(0.0712)	(0.0961)	(0.0529)	(0.0408)	(0.0787)
audits_prev6	-0.0120	0.0296	0.0114	0.0275	0.0185	-0.0173	-0.113	0.0795	0.0533	-0.00575
	(0.0751)	(0.0370)	(0.0545)	(0.0387)	(0.0448)	(0.0749)	(0.108)	(0.0563)	(0.0463)	(0.0832)
Observations	5,042	5,042	5,042	5,042	5,042	5,042	5,042	5,042	5,042	5,042
R^2	0.551	0.836	0.918	0.836	0.811	0.857	0.722	0.836	0.754	0.829
Y mean	5.164	6.920	5.552	7.549	6.098	3.629	4.663	4.134	6.950	5.031

Standard errors in parentheses *** p<0.001 and ** p<0.005 and + p<0.01.
Following CFR this specification we control for up to the 3rd degree polynomial of the distance and standard errors are clustered at the municipality level.

Dynamic RD Results – TOT Estimator on City Finance, Mayor

Table 6. CFR- TOT one step estimator, sample of cities with mayor and/or council

VARIABLES	(1) state_rev_pc	(2) taxes_pc	(3) ch_serv_pc	(4) tot_rev_pc	(5) admin_pc	(6) cult_educ_pc	(7) debt_serv_pc	(8) empl_pc	(9) gen_serv_pc	(10) utilities_pc
audits_prev0	0.0202	-0.0222	0.0300	-0.00405	-0.0222	0.0177	0.0209	-0.0240	0.0128	0.0705
	(0.0371)	(0.0161)	(0.0281)	(0.0175)	(0.0193)	(0.0379)	(0.0487)	(0.0327)	(0.0254)	(0.0609)
audits_prev1	0.0529	0.0193	0.0603	0.0431+	0.0414	0.0269	0.00376	0.0146	0.0124	0.0532
	(0.0366)	(0.0149)	(0.0267)	(0.0159)	(0.0190)	(0.0358)	(0.0476)	(0.0316)	(0.0220)	(0.0474)
audits_prev2	0.0380	0.00249	0.0235	0.0124	0.0294	0.0463	0.0119	0.0118	0.0227	-0.0339
	(0.0370)	(0.0162)	(0.0260)	(0.0174)	(0.0198)	(0.0356)	(0.0413)	(0.0307)	(0.0229)	(0.0487)
audits_prev3	0.0331	-0.0350	0.0121	-0.0135	-0.00301	-0.0170	-0.0246	-0.0732	-0.0276	-0.0190
	(0.0373)	(0.0161)	(0.0255)	(0.0168)	(0.0200)	(0.0352)	(0.0499)	(0.0327)	(0.0223)	(0.0476)
audits_prev4	0.0165	-0.0250	-0.0141	-0.00935	-0.00401	-0.0322	-0.0587	-0.0156	-0.0371	-0.116
	(0.0396)	(0.0175)	(0.0267)	(0.0177)	(0.0204)	(0.0331)	(0.0526)	(0.0315)	(0.0252)	(0.0524)
audits_prev5	0.0206	-0.0252	-0.0126	-0.00959	0.0115	0.0140	-0.0880	-0.0274	-0.0269	-0.0855
	(0.0416)	(0.0198)	(0.0282)	(0.0201)	(0.0237)	(0.0379)	(0.0483)	(0.0336)	(0.0270)	(0.0510)
audits_prev6	0.0244	0.0108	0.0502	0.0240	0.0405	-0.0112	-0.0684	0.0358	0.0133	0.0299
	(0.0429)	(0.0227)	(0.0306)	(0.0233)	(0.0258)	(0.0418)	(0.0554)	(0.0329)	(0.0268)	(0.0505)
Observations	9,668	9,668	9,668	9,668	9,668	9,668	9,668	9,668	9,668	9,668
R^2	0.561	0.860	0.907	0.850	0.829	0.862	0.741	0.847	0.769	0.815
Y mean	5.086	7.005	5.517	7.567	6.160	3.935	4.662	4.276	6.955	4.786

Standard errors in parentheses *** p<0.001 and ** p<0.005 and + p<0.01.
Following CFR this specification we control for up to the 3rd degree polynomial of the distance and standard errors are clustered at the municipality level.

Dynamic RD Results – TOT Estimator on City Finance, City Manager

Table 7. CFR- TOT one step estimator, sample of cities with a manager

VARIABLES	(1) state_rev_pc	(2) taxes_pc	(3) ch_serv_pc	(4) tot_rev_pc	(5) admin_pc	(6) cult_educ_pc	(7) debt_serv_pc	(8) empl_pc	(9) gen_serv_pc	(10) utilities_pc
audits_prev0	0.137	-0.0179	-0.0420	-0.0389	-0.0558	0.107	-0.0352	-0.107	-0.0239	-0.0179
	(0.0910)	(0.0417)	(0.0584)	(0.0457)	(0.0485)	(0.116)	(0.0821)	(0.0719)	(0.0610)	(0.115)
audits_prev1	0.0276	-0.0284	0.0634	-0.0173	-0.0270	0.0344	-0.0397	-0.158+	-0.00864	-0.100
	(0.0859)	(0.0458)	(0.0529)	(0.0456)	(0.0577)	(0.105)	(0.0811)	(0.0586)	(0.0576)	(0.108)
audits_prev2	-0.104	-0.0483	-0.00171	-0.0636	-0.00475	-0.0151	-0.102	-0.170+	-0.0499	-0.0189
	(0.117)	(0.0443)	(0.0529)	(0.0448)	(0.0446)	(0.0962)	(0.0661)	(0.0580)	(0.0628)	(0.0885)
audits_prev3	0.00627	0.0327	0.0622	0.0427	0.0751	0.101	-0.0774	-0.0400	0.107	0.0462
	(0.0971)	(0.0434)	(0.0597)	(0.0477)	(0.0622)	(0.0845)	(0.0949)	(0.0512)	(0.0549)	(0.0907)
audits_prev4	0.0254	-0.00395	0.00286	0.00327	0.0498	0.0182	-0.0652	-0.107	0.00238	-0.00998
	(0.0832)	(0.0529)	(0.0558)	(0.0528)	(0.0522)	(0.0838)	(0.102)	(0.0907)	(0.0694)	(0.0934)
audits_prev5	-0.137	-0.0795	-0.0892	-0.0773	-0.0650	-0.212	-0.101	-0.192	-0.0565	-0.110
	(0.0915)	(0.0461)	(0.0552)	(0.0478)	(0.0468)	(0.116)	(0.101)	(0.0803)	(0.0551)	(0.0993)
audits_prev6	0.0168	0.0861	0.0135	0.0525	0.0304	-0.0819	-0.0289	-0.00712	0.110	-0.0771
	(0.100)	(0.0473)	(0.0640)	(0.0522)	(0.0658)	(0.125)	(0.115)	(0.0626)	(0.0646)	(0.121)
Observations	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047	1,047
R^2	0.795	0.953	0.956	0.944	0.937	0.895	0.856	0.934	0.913	0.897
Y mean	5.365	7.660	6.652	8.261	6.874	5.166	5.449	5.527	7.492	5.455

Standard errors in parentheses *** p<0.001 and ** p<0.005 and + p<0.01.
Following CFR this specification we control for up to the 3rd degree polynomial of the distance and standard errors are clustered at the municipality level.