From Lapdogs to Watchdogs

Random Auditor Assignment and Municipal Fiscal Performance

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NBER SI 2022, Public Economics

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Monitoring local governments' finances is key to limit over-expenditure

- Most countries around the world are highly decentralized
  - ⋆ Subnational governments manage 25% of total government expenditures worldwide (OECD)
  - ⋆ Subnational tax revenue accounts for up to 50% of total taxation (OECD)
- While decentralization usually improves governance, it poses agency problems
  - ⋆ Local officials prefer to keep taxes low and finance spending issuing debt
  - ⋆ Subnational government debt accounts for over 20% of GDP in the OECD
  - ⋆ Local governments accumulate debt expecting bailout from central government
- Many countries adopt fiscal rules to limit over-indebtness, but rules are ineffective if not enforced $\rightarrow$ oversight by external auditors is a common tool to mitigate this problem

To be effective watchdogs, monitors should be independent

- Oversight mechanisms might be ineffective if monitors' independence is compromised
- One common source of this failure: audited party itself appoints the monitor
- Why allow the target to appoint auditor?
  - ⋆ Pros: local informational advantage, flexibility in application of rules
  - ⋆ Cons: local capture, favoritism

→ How to design effective monitoring institutions in decentralized organizations?

⋆ Rare to observe changes in the design of monitoring institutions

This Paper

Question: Does shifting control over auditor appointments improves monitoring effectiveness and the financial health of local governments?

Setting: Unique reform of appointment system of auditors of municipal governments in Italy

- Before: discretionary appointment by mayors
- After: random assignment of auditors

Methodology: Staggered implementation based on expiration of current auditor's term

- Generalized difference-in-differences, comparing municipalities treated earlier vs. later

Contribution: New evidence of the value of independence in monitoring, and on the consequences of the organizational design of the state for government performance Literature

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Preview of results: auditors' independence matters!

1. How does random assignment affect the selection and allocation of auditors?
   - Share of auditors who are local residents drops from 31% to 1%
2. Does random assignment of auditors improve municipal financial health?
   - Net surplus ↑ 8%, debt repayments ↑ 9%
3. What are the margins of adjustment?
   - Revenues from property tax ↑ 20%
4. Where are randomly assigned auditors more effective?
   - Higher Collusion Risk Before
     - ⋆ Worse financial conditions, corruption investigations, local residents as auditors
   - Lower Collusion Risk After
     - ⋆ Random assignment of a less connected or more distant auditor

→ Suggestive evidence that the reform operates by making collusion harder

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Institutional Context

Fiscal Monitoring in Italy

- Highly decentralized country
  - 20 regions, 8000 municipalities
  - Municipalities manage 8% of public expenditure, large fiscal autonomy
- Local governments subject to national fiscal rules
  - Deficit limits, repayment of outstanding debts, constraints on new borrowing
- Fiscal monitoring system to ensure compliance with fiscal rules
  1. Central monitor: Court of Auditors
  2. Intermediary: municipal auditor
  3. Target: municipality

What do Auditors do?

- Auditors review and certify all municipal financial documents
- Auditors have 3 yrs-long mandate, possibility of 1 renewal
- Mayor in charge of the appointment of a Certified Public Accountant as auditor

Monitoring Process

1. Auditor assists municipality along the budgetary process, reviews the proposed budget and balance sheets, verifies respect of fiscal rules, suggests changes before approval
2. Municipal council should act to implement suggested changes or justify the lack of action
3. Statements and auditor's report sent to the Court, that can start ex-post audit

$\rightarrow$ Risk of serious sanctions from ex-post audits: cuts in transfers, restrictions to borrowing, monetary sanctions for mayor, councilors, and auditors

The Auditors' Appointment Reform

- **Who**? National Government
- **What**? Random auditor assignment
  - Drafting from a public list (stratified by region and experience level)
  - Any Certified Public Accountant can sign up online for the list in their region of residence
- **When**? Adopted in August 2011, effective in December 2012
  - Staggered implementation based on expiration of current auditor's term
  - Municipalities are on different audit cycles for historical reasons
- **Why**? Part of a package of "emergency" austerity measures
  - August 2011 is peak of the sovereign debt crisis for Italy
  - Pressure to reduce national debt to restore confidence from financial markets
  - Municipal debt is part of the national debt

Data and Empirical Strategy

Empirical Analysis

Novel Dataset

- Balanced panel of 5603 Italian municipalities, years 2007-2015
- Balance-sheet data: financial health parameters (net surplus, debt repayments), revenues, and expenditures
- Auditors' data: draft dates and outcomes, characteristics drafted, and pool of auditors

Empirical Strategy

- Exploit staggered introduction of the reform
- Compare outcomes of municipalities treated earlier vs. later
- Main identifying assumption: treatment timing is uncorrelated with changes in outcomes
- Implemented using Stacked-by-event DID design (Deshpande & Li 2019, Cengiz et al. 2019), robust to using other "new" diff-in-diff estimators

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Identification Using Staggered Treatment

Rome

⋆ Appointed auditor in January 2010

⋆ Receives randomly-assigned one in January 2013 → Early Treated

Florence

⋆ Appointed auditor in September 2012

⋆ Receives randomly-assigned one in September 2015 → Later Treated

Treatment Cohorts | Cohort Assignment | Pre-Treatment Balance | Anticipation

Results

1. Does random assignment change the selection and allocation of auditors?

Over 17,000 auditors join the list, 60% are new entrants

	Pre Draft	Post Draft	Difference	Standardized Difference
	(1)	(2)	(2)-(1)	(3)/S.D(1)
Female	0.24	0.24	-0.00	0.000
Age	54.01	55.28	1.26 ***	0.161
Experience as accountant	16.51	17.03	0.52 ***	0.061
Experience as auditor	6.34	2.45	-3.89 ***	-1.204
Re-appointed	0.57	0.01	-0.56 ***	-1.130
Local resident	0.32	0.01	-0.31 ***	-0.666
Distance from Residence (in minutes)	16.54	62.46	45.92 ***	1.568
Same gender of mayor	0.73	0.70	-0.03 ***	-0.067
Same birthplace of mayor	0.19	0.02	-0.16 ***	-0.410
Same surname of local politician	0.07	0.01	-0.06 ***	-0.230
Observations	6,966	9,331		

New entrants are similar to incumbents

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Random matching reduces proximity

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Random assignment eliminates re-appointments

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2. Do randomly assigned auditors improve fiscal discipline of local governments?

Significant improvement in financial health indicators

$$Y_{mt} = \alpha_m + \delta_t + \beta_0 Treated_{mc} + \beta_{DD} Treated_{mc} \times Post_{mt} + \sum_{k=-7}^{k=2} \beta_k * D^k + X'_{mt}\zeta + \epsilon_{mt}$$

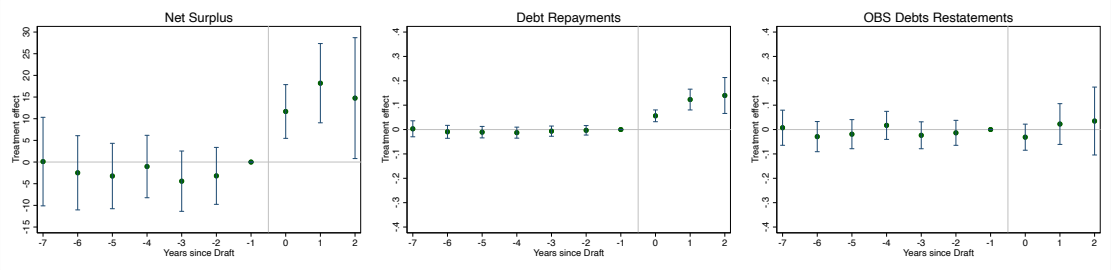
	Net Surplus		Debt Repayments		OBS Debt Repayments	
	(1)	(2)	(3)	(4)	(5)	(6)
Treated	16.45***	15.88***	0.0885***	0.0872***	-0.00218	-0.00293
× Post	[3.240]	[3.236]	[0.0140]	[0.0139]	[0.0253]	[0.0253]
Controls	No	Yes	No	Yes	No	Yes
Dep. Var Mean	-194.8	-194.8	65.29	65.29	3.255	3.255
Observations	114028	114028	114028	114028	114028	114028
Adj. R-sq	0.699	0.700	0.757	0.757	0.412	0.413

- Magnitudes: effect on net surplus is of comparable magnitude to what found by Grembi et al. (2016) when analyzing the effect of relaxing fiscal rules
- Average size of the budget is 1,600 euro p.c., so effect on net surplus is around 1 % of overall annual per-capita spending (2 % of "discretionary" spending budget)

No pre-trends, prompt and persistent effects

standardized outcomes

$$Y_{mt} = \alpha_m + \delta_s t + \beta_0 Treated_{mc} + \sum_{k=-7}^{k=2} \gamma_k * D^k \times Treated_{mc} + \sum_{k=-7}^{k=2} \beta_k * D^k + X'_{mt}\zeta + \epsilon_{mt}$$



Notes: Event-Study coefficients, 95% C.I. All dependent variables are in per capita terms, *DebtRepayments* and *OBSDebtRepayments* are transformed using the inverse hyperbolic sine transformation.

- Effects appear immediately and remain essentially constant → shift in budgetary practices

3. How do municipalities improve their financial position?

⋆ Cut spending ⋆ Increase revenues

Revenue-Based Adjustment

	(1) Current Exp.	(2) Capital Exp.	(3) Property Tax	(4) Income Tax	(5) Capital Rev.	(6) New Debt
Treated	0.000184	0.0423*	0.205***	0.00758	0.0445*	0.225***
× Post	[0.00309]	[0.0254]	[0.0434]	[0.0254]	[0.0266]	[0.0560]
Dep. Var Mean	875.0	465.3	158.7	43.73	398.8	123.4
Observations	114028	114028	99040	114028	114028	114028
R-sq	0.944	0.514	0.458	0.844	0.506	0.445

- Large increase in property tax and new debt
- New debt should be used only to finance capital expenditures (but potential for some ever-greening)
- Revenue-based adjustment in line with previous evidence from Italy (Marattin et al. (2019))

Event Studies

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Event Studies

Unpacking Effect on Property Tax Revenue: Tax Enforcement vs. Tax Rates

	Property Tax Revenue			Property Tax Revenue, Collected			Property Tax Rate		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Treated	0.204***	0.186***	0.186***	0.184***	0.171***	0.171***	-0.00309	-0.00278	0.00194
× Post	[0.0434]	[0.0432]	[0.0429]	[0.0421]	[0.0420]	[0.0416]	[0.0221]	[0.0222]	[0.0221]
TreatXPostXGBI		0.126***			0.111***			-0.00677	
		[0.0351]			[0.0339]			[0.0161]	
TreatXPostXUndeclared			0.165***			0.152***			-0.0460***
			[0.0337]			[0.0329]			[0.0173]
Dep. Var Mean	158.7			158.4			7.218		
Het. Var Mean		0.0268	0.0182		0.0267	0.0181		0.0268	0.0182
Het. Var SD		0.0209	0.0137		0.0209	0.0137		0.0209	0.0137
Observations	99040	98401	98878	98156	97531	97994	98316	97677	98154
R-sq	0.458	0.458	0.458	0.544	0.544	0.545	0.875	0.875	0.875

- Increase in property tax driven mostly by an expansion of the tax base
- Equal increase in reported and collected revenue, no improvement in collection ability (Basri et al. 2021)
- Effects stronger in municipalities with a higher % of housing units or buildings (GBI) undeclared

→ Results suggest independent monitoring improves tax capacity via stricter enforcement, as mayors have stronger incentives to combat evasion

4. What are the mechanisms through which the reform most plausibly operates?

Where should random assignment matter more?

Higher Collusion Risk Before

Intuitively, random assignment should matter more for places that were more likely to have lax or corrupt monitoring in the pre-reform period

- ⋆ Worse financial conditions results
- ⋆ Local residents appointed as auditors results
- ⋆ Corruption investigations results

Which randomly assigned auditors should be more effective?

Lower Collusion Risk After

⋆ Selection → New entrants results

- Less likely to be corruptible
- Less experienced in municipal auditing

⋆ Matching → Distant auditors results

- Less likely to have social ties or local interests
- Less informed about municipal practices

Detection or Deterrence?

⋆ Direct Effects → Detection Electoral Accountability

- Auditors might empower voters and opposition with better information
- Auditors might discipline mayors with re-election concerns if voters punish over-spending
- Mayors with re-election concerns might be non-responsive if voters value over-spending

⋆ Indirect Effects → Deterrence Spillovers

- Proximity to a treated municipality raises salience of audits
- Mayors might learn about implications of random assignment from neighbors

Robustness

1. Alternative estimator
   - de Chaisemartin & d'Hautefuille (2020) results
2. Alternative design
   - Heterogeneity in control of appointment in pre-reform period
   - Non-overlapping terms of auditor and mayor (3 years vs. 5 years)
     $\rightarrow$ mayors did not always have full control of auditor's appointment
   - Did discretion produce adverse effects? Yes results

Conclusion: random assignment ensures independence and improves outcomes!

Takeaways:

- Robust evidence that auditors' independence improves local financial health
- Heterogeneity tests suggest reform operates by curbing conflicts of interest and making potential collusion between the auditor and audited party harder

Policy implications:

- The reform only changes appointment mechanism → very low-cost intervention
- Benefits of independence come at no clear cost in terms of information/expertise
- Competition and low complexity likely play an important role
- Insights can be applied to other government monitoring institutions, but also to corporate settings, where similar issues of conflicts of interest exist

Open questions:

- Welfare Implications (national vs. local interests)
- ⋆ Electoral consequences of independent audits → results

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Literature back

1. Corruption, monitoring, and accountability

   Indonesia (Olken, 2007), Brazil (Avis et al., 2018; Ferraz and Finan, 2011), Puerto Rico (Bobonis et al., 2016), China (Chu et al. 2019), India (Duflo et al. 2013, 2018), Pakistan (Bandiera et al., 2021)

   - Evidence of fiscal effects of ensuring independent oversight of lower-level governments

2. Tax administration and tax enforcement

   Keen and Slemrod 2017; Khan et al. 2016; Basri et al. 2021; Balan et al. 2021

   - Evidence of the importance of organizational design in tax administration

3. Government debt, budget institutions, and fiscal rules

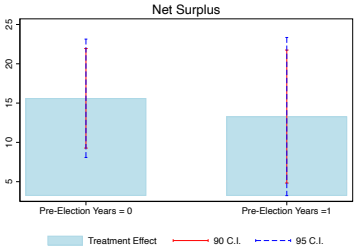
   Poterba, 1997; Skidmore, 1999; Halac and Yared, 2018, 2019; Grembi et al., 2016; Alesina and Passalacqua, 2016, Daniele et. al. 2020

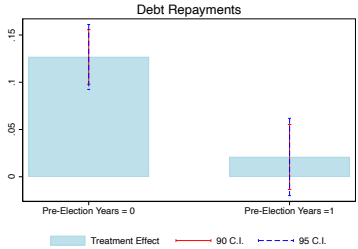
   - Identification of key mechanism behind the enforcement of fiscal rules

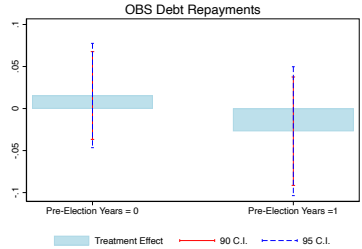
Larger effects for mayors with lower re-election pressures

back

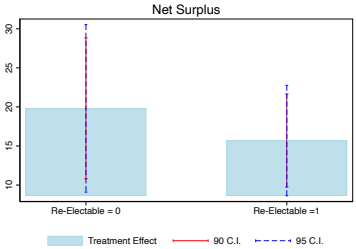
Electoral Cycle:

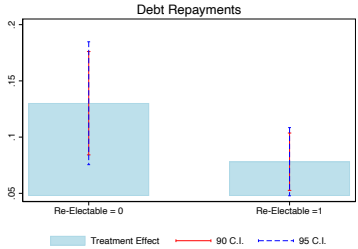


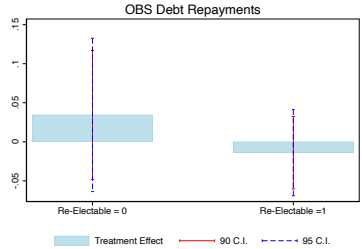




Term Limits:

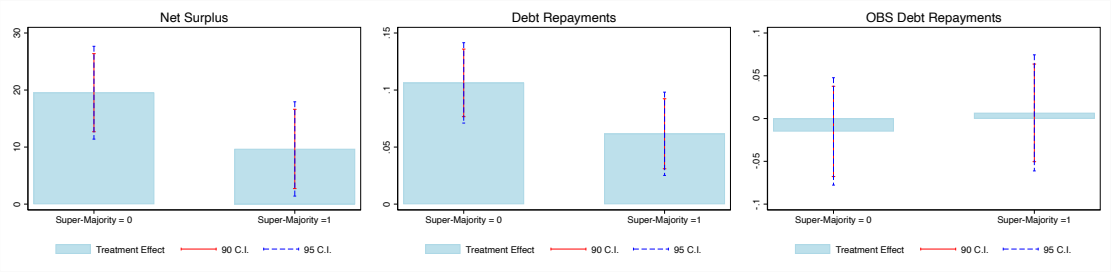






Larger effects for mayors with stronger opposition

back



Large Role played by Deterrence

back

	Net Surplus		Debt Repayments		OBS Debt Repayments	
Panel A: Spillover effects	(1)	(2)	(3)	(4)	(5)	(6)
Treated	11.01***	10.34***	0.0653***	0.0631***	-0.0208	-0.0220
Neighbor=1 × Post=1	[3.848]	[3.843]	[0.0132]	[0.0131]	[0.0243]	[0.0243]
Controls	No	Yes	No	Yes	No	Yes
Dep. Var Mean	-218.5	-218.5	63.47	63.47	2.882	2.882
Observations	83424	83424	83424	83424	83424	83424
Adj. R-sq	0.699	0.699	0.769	0.769	0.405	0.405
Panel B: Excluding spillover effects	(1)	(2)	(3)	(4)	(5)	(6)
Treated	30.94***	29.47***	0.155***	0.151***	-0.00813	-0.0110
Neighbor=1 × Post=1	[4.929]	[4.921]	[0.0182]	[0.0182]	[0.0362]	[0.0363]
Controls	No	Yes	No	Yes	No	Yes
Dep. Var Mean	-218.5	-218.5	63.47	63.47	2.882	2.882
Observations	62263	62263	62263	62263	62263	62263
Adj. R-sq	0.700	0.701	0.768	0.768	0.401	0.401

The Electoral Consequences of the Reform

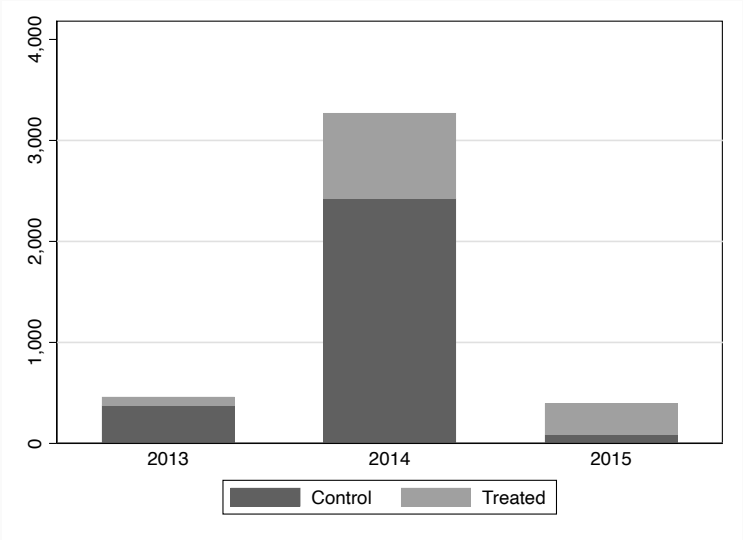
Auditing might affect politics by:

- Informing cititens about collusion $\rightarrow$ electoral punishment for local incumbents.
- Enforcing national at the expense of local interests $\rightarrow$ greater opposition towards national incumbents.

Exploit staggered treatment and variation in electoral cycle:

- DID: compare electoral performance in places who have or have not been treated before the election.

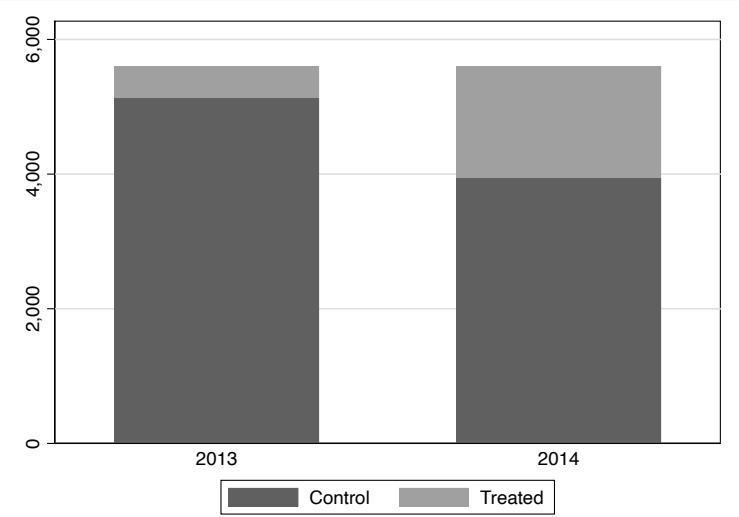
Municipal Elections and Treatment Timing



The Effect of Auditor's Independence on Municipal-level Elections

	Full Sample				Only mayors running for re-election		
	Turnout	Incumbent Re-Elected	Incumbent Running for Re-election	N. Candidates	Incumbent Re-Elected	Incumbent Vote Share	N. Candidates
Indep. Auditor Active	-0.326 [0.381]	-0.0189 [0.0193]	-0.0123 [0.0190]	-0.0409 [0.0384]	-0.0175 [0.0218]	0.0928 [0.864]	-0.00650 [0.0458]
Observations	3436	3436	3436	3436	2162	2162	2162
R-sq	0.217	0.0702	0.0559	0.570	0.0955	0.241	0.614
Region & Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Municipal Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes

National Elections and Treatment Timing



Some evidence of punishment against the national incumbent..

back

The Effect of Auditor's Independence on National-level Elections

(2008 vs. 2013 and 2009 vs. 2014)

	(1) Turnout	(2) Center-Left	(3) Center-Right	(4) Extreme-Left	(5) Extreme-Right
Treat=1 ×	-0.713***	-0.535***	0.171	-0.00411	0.175
Post=1	[0.184]	[0.123]	[0.134]	[0.103]	[0.146]
Observations	22412	22412	22412	22412	22412
R-sq	0.935	0.916	0.923	0.840	0.915

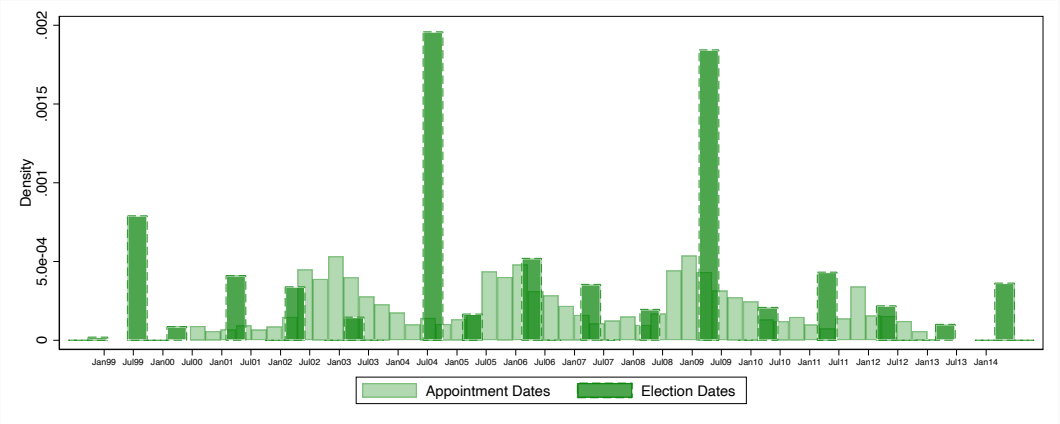
..stronger for places with stronger treatment effects

back

	(1) Turnout	(2) Center-Left	(3) Center-Right	(4) Extreme-Left	(5) Lega	(6) turnout	(7) Center-Left	(8) Center-Right	(9) Extreme-Left	(10) Lega
Treat=1 × Post=1	-0.110	-0.401***	0.238*	0.0687	0.188	-0.222	-0.302**	0.232	0.0312	0.147
	[0.156]	[0.119]	[0.129]	[0.0964]	[0.127]	[0.180]	[0.133]	[0.143]	[0.111]	[0.140]
Treat=1 × Post=1 × Corruption=1	-0.0399	-0.660**	0.0584	-0.205	-0.306					
	[0.421]	[0.295]	[0.365]	[0.249]	[0.281]					
Treat=1 × Post=1 × Fiscally Unsust.(PreRef)=1						0.341	-0.632***	0.0118	0.0551	0.0523
						[0.284]	[0.222]	[0.253]	[0.176]	[0.229]
Observations	22412	22412	22412	22412	22412	22412	22412	22412	22412	22412
R-sq	0.929	0.925	0.927	0.855	0.942	0.929	0.925	0.927	0.855	0.942

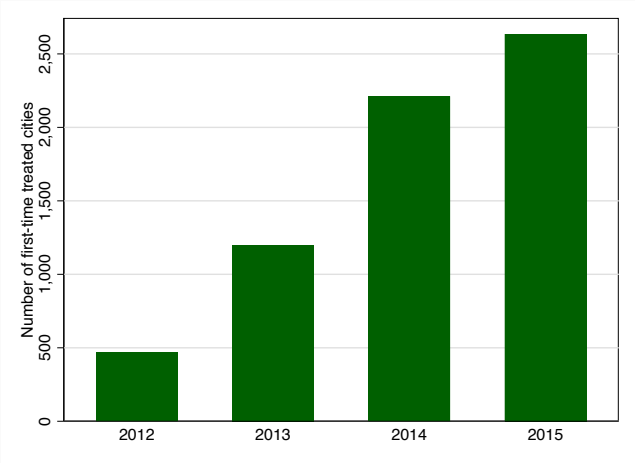
Audit and Election Cycles across Municipalities

back



Staggered Treatment

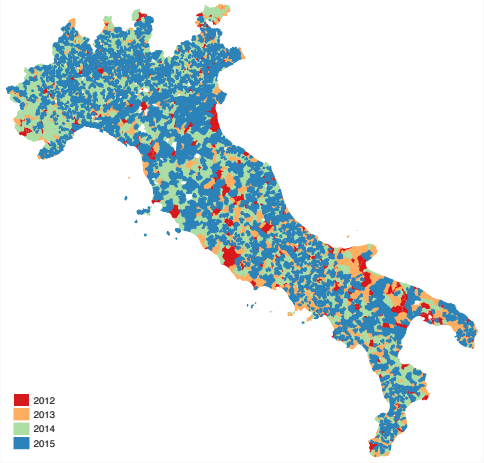
back



Note: The bar graph shows the number of municipalities (y-axis) that had a draft-appointed auditor active in a given year (x-axis).

Staggered Treatment, Geographic Variation

back



Do municipal observables predict treatment timing?

back

	2012 Cohort	2013 Cohort	2014 Cohort	2015 Cohort
	(1)	(2)	(3)	(4)
1Year	0.00273	0.0405	0.0222	-0.0655**
After Election	[0.0178]	[0.0264]	[0.0281]	[0.0301]
2Years	-0.0235**	-0.0318**	0.0530***	0.00231
After Election	[0.00962]	[0.0143]	[0.0169]	[0.0180]
2Years	0.0110	0.0520*	-0.0646**	0.00158
Before Election	[0.0189]	[0.0266]	[0.0262]	[0.0312]
1Year	0.00352	0.00435	0.0178	-0.0257
Before Election	[0.0154]	[0.0214]	[0.0243]	[0.0261]
Pop. 5-15k	0.0225**	-0.0119	-0.145***	0.134***
	[0.00896]	[0.0127]	[0.0150]	[0.0168]
Pop.	0.104***	0.0491**	-0.200***	0.0472*
15-60k	[0.0189]	[0.0223]	[0.0212]	[0.0263]
Pop. Above	0.202***	0.0959*	-0.224***	-0.0735
60k	[0.0562]	[0.0583]	[0.0452]	[0.0577]
Municipal	-0.00900	0.0100	-0.0182	0.0171
Union	[0.00873]	[0.0141]	[0.0173]	[0.0181]
Mayor Age	0.00816	0.00678	0.0501*	-0.0651**
(log)	[0.0156]	[0.0249]	[0.0302]	[0.0319]
Male Mayor	-0.000330	0.0266*	-0.0102	-0.0161
	[0.0104]	[0.0152]	[0.0203]	[0.0206]
Local	0.00921	0.0299***	-0.0179	-0.0212
Mayor	[0.00778]	[0.0115]	[0.0136]	[0.0143]
Mayor	-0.00275	0.0503**	-0.0374	-0.0101
Resignation	[0.0163]	[0.0255]	[0.0261]	[0.0290]
Mayor	-0.00566	-0.00513	0.0145	-0.00370
Term-limited	[0.00696]	[0.0107]	[0.0130]	[0.0136]
Council	-0.00336	0.0819	-0.0140	-0.0646
Dismissal	[0.0388]	[0.0598]	[0.0564]	[0.0631]
Observations	5603	5603	5603	5603
R-sq	0.0233	0.0128	0.0356	0.0151

Some variables predict treatment assignment, but no consistent patterns. All variables included as controls.

Levels of Oucomes in 2010, by Treatment Timing

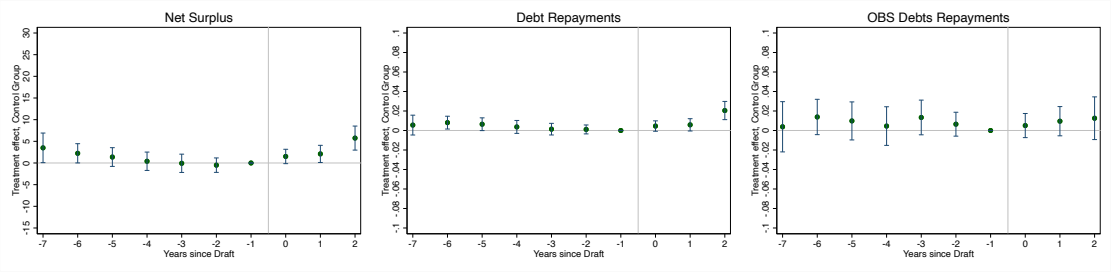
A. Fiscal Sustainability						
	2012 Cohort	2013 Cohort	2014 Cohort	2015 Cohort	Uncond. F-test	Cond. F-test
Net Surplus	-332.48	-336.70	-327.95	-310.64	0.001 ***	0.251
Debt Repayments	60.60	61.92	64.54	62.91	0.413 .	0.959
OBS Debts Repayments	5.85	5.16	2.70	3.36	0.000 ***	0.791

B. Revenue and Spending Choices						
	2012 Cohort	2013 Cohort	2014 Cohort	2015 Cohort	Uncond. F-test	Cond. F-test
Current Exp.	895.74	885.98	907.66	871.69	0.044 **	0.406
Capital Exp.	505.93	544.56	543.26	507.68	0.367 .	0.678
Property Tax	126.03	119.58	144.18	144.77	0.000 ***	0.384
Income Tax	40.05	36.82	40.61	41.11	0.001 ***	0.233
Capital Rev.	458.40	471.34	460.69	427.97	0.295 .	0.735
New Debt	122.87	150.55	131.16	126.59	0.115 .	0.718

No significant difference in the pre-treatment levels of outcomes across cohorts, conditional on covariates back

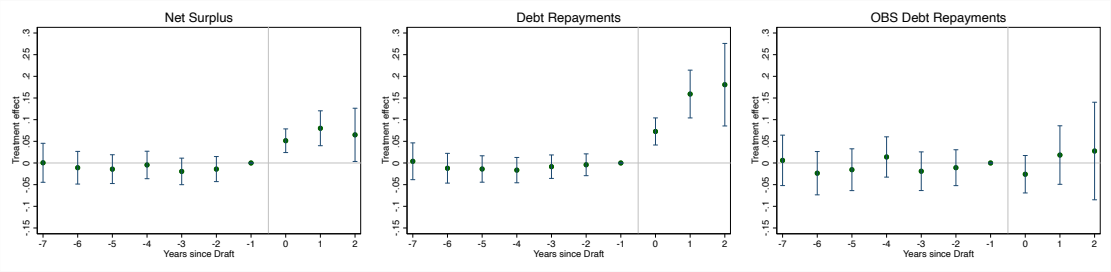
Testing Anticipation Effects: Event Studies for the Control Group

back



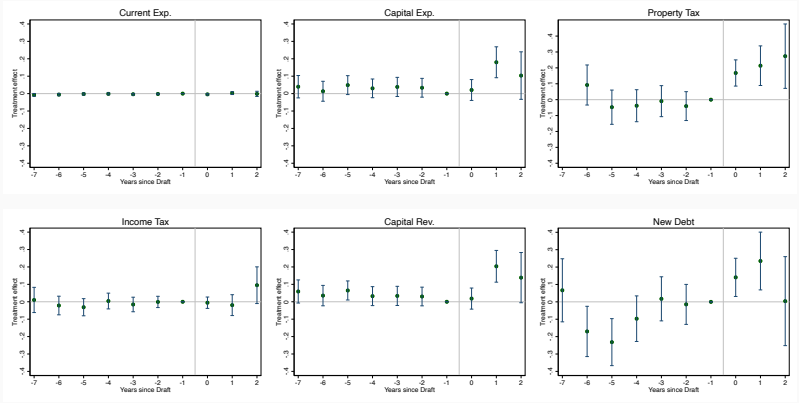
Event Studies - Fiscal Sustainability (Standardized outcomes)

back



Event Studies - Margins of adjustment

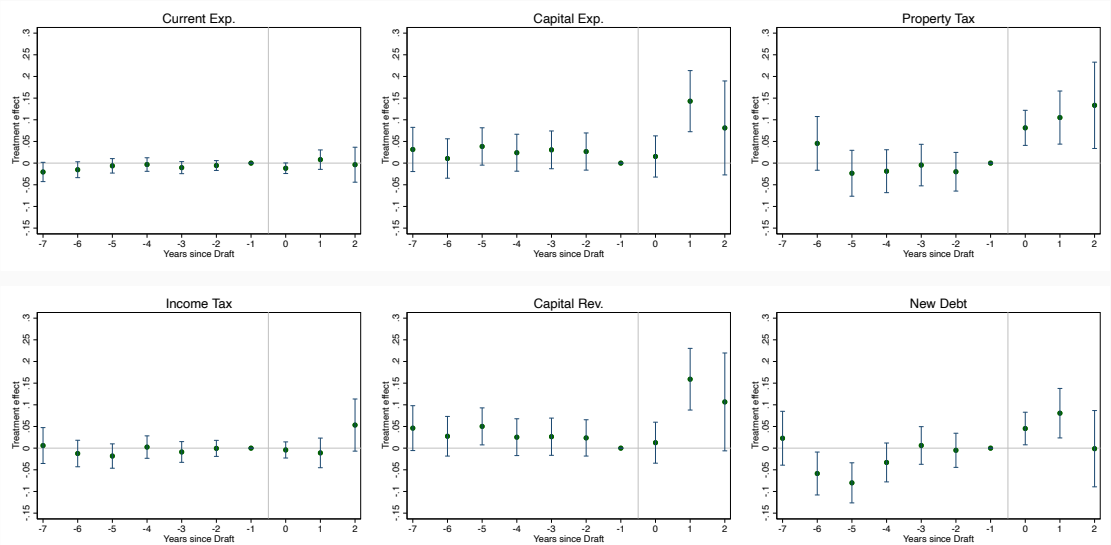
back



standardized outcomes

Event Studies - Margins of adjustment (Std. Outcomes)

back



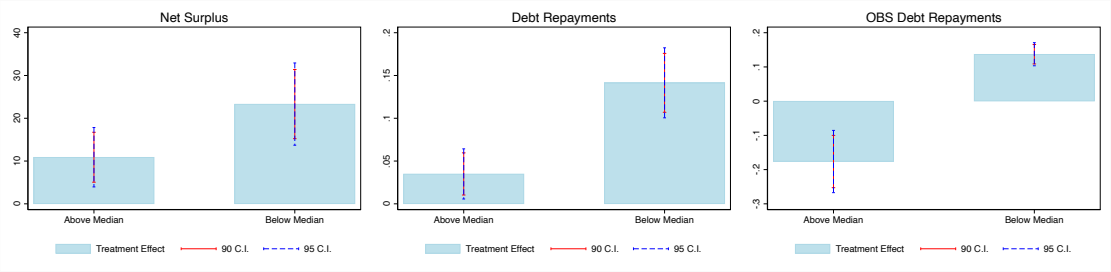
Capital Expenditures, by Investment type

	Investment							
	(1) admin	(2) police	(3) education	(4) culture	(5) tourism	(6) transport	(7) local public goods	(8) social
Treated	0.0719*	-0.0334	0.0952**	0.0726**	-0.0211	0.00414	0.0362	0.0726*
× Post	[0.0375]	[0.0396]	[0.0441]	[0.0319]	[0.0265]	[0.0451]	[0.0436]	[0.0392]
Dep. Var Mean	65.86	22.24	35.04	14.36	17.72	128.6	170.3	27.34
Observations	112320	60500	113004	113025	113024	112909	112756	113004
R-sq	0.485	0.471	0.343	0.365	0.431	0.386	0.453	0.318

back

Stronger effects for municipalities with worse pre-reform financial conditions

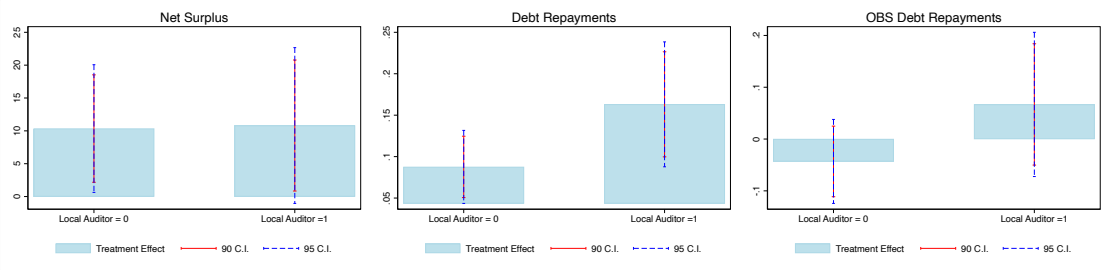
back



Below Median: indicator flagging whether the outcome was below the median value in 2010

Stronger effects for municipalities that appointed a local auditor

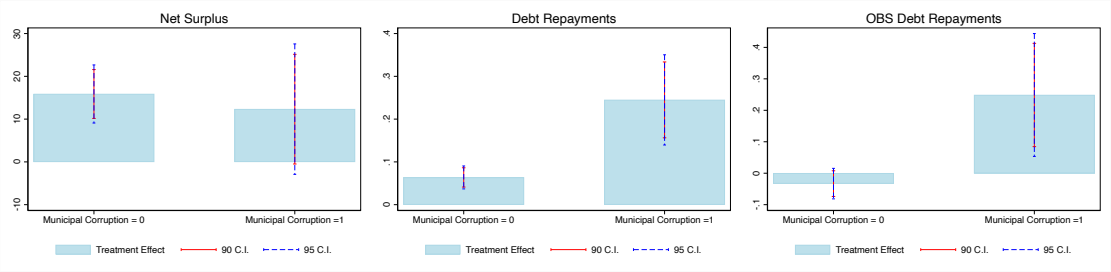
back



Local auditor: indicator flagging whether any of the pre-reform appointed auditors was either born or resident in the municipality.

Stronger effects for corrupt municipalities

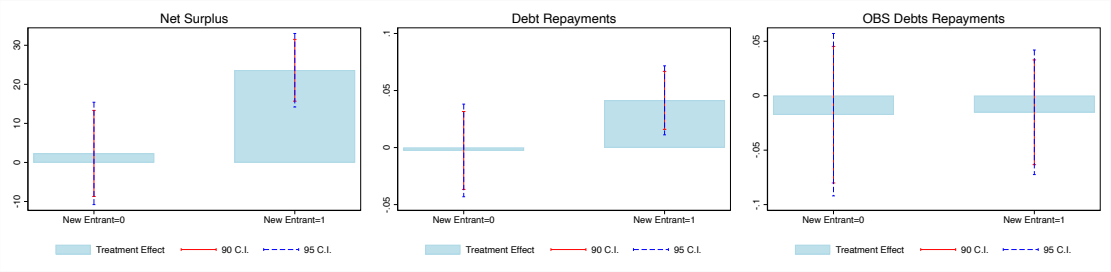
back



Municipal Corruption: indicator flagging whether, in any given municipality, there was at least one investigation for corruption-related crimes (Decarolis et al. 2020)

Effects are driven by municipalities that are randomly assigned a new entrant..

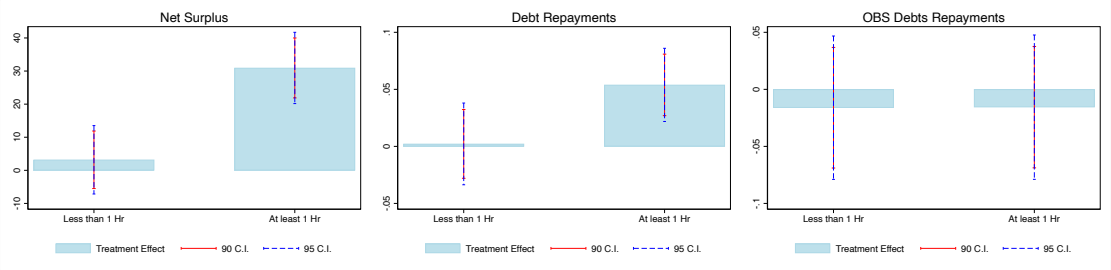
back



New entrant: indicator flagging whether the assigned auditor has never been a municipal auditor before the reform. Sample is limited to municipalities below 5000 inhabitants, as new entrants can't be appointed for larger municipalities

..or a more distant auditor

back



Distance: indicator flagging whether the appointed auditor resides at least 1 hour away

Empirical Models - Naive DID using Two-Way Fixed-Effects back

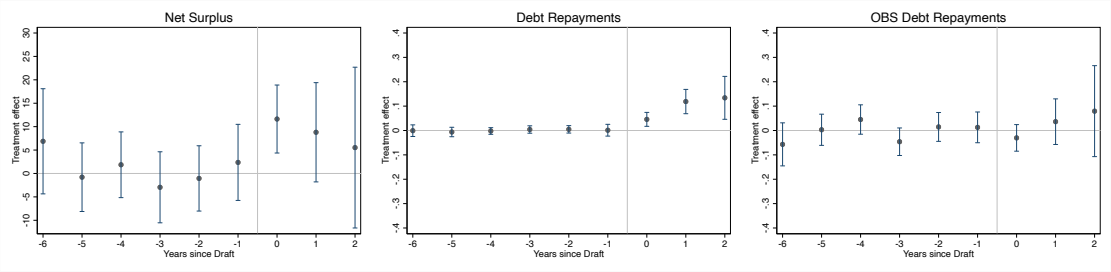
$$Y_{mt} = \alpha_m + \delta_t + \beta_{twfe} Treatment_{mt} + \epsilon_{mt}$$

- $Treatment_{mt} = 1$ if in municipality m has an independent auditor is active in year t
- β_{twfe} is weighted average of all possible 2x2 DDs Goodman-Bacon, 2019, de Chaisemartin and D'Haultfoeuille, 2020
  - Treated earlier as T vs. treated later as C
  - Treated earlier as C vs. treated later as T $\rightarrow$ *changes* in treatment effects of already-treated units enter negatively in DD
  - Potential bias in presence of heterogeneous treatment effects across groups/ time
- Solution: limit attention only to DDs where not-yet-treated units serve as controls.

“Naive” DID: tests for negative weights (de Chaisemartin&D’Haultfoeuille 2020)

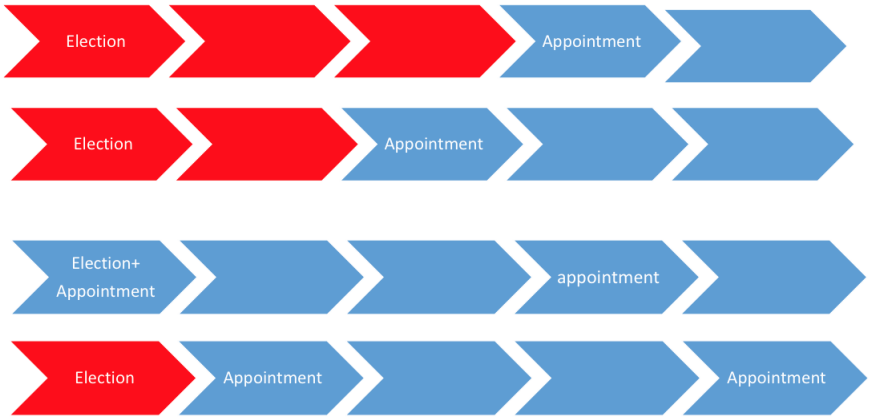
	Net Surplus		Debt Repayments		OBS Debt Repayments			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Indep. Auditor=1	2.875 [1.984]	2.149 [1.985]	17.81*** [3.233]	16.12*** [3.038]	0.0866*** [0.0123]	0.0804*** [0.0125]	-0.0100 [0.0229]	-0.0115 [0.0232]
Dep. Var Mean	-9.753	-9.753	-205.8	-205.8	64.47	64.47	3.435	3.435
Observations	50427	50427	50427	50427	50427	50427	50427	50427
Adj. R-sq	0.114	0.119	0.603	0.624	0.713	0.720	0.362	0.363
% ATTs with negative weights	29.5	29.5	29.5	29.5	29.5	29.5		
Sum of negative weights	-0.106	-0.106	-0.106	-0.106	-0.106	-0.106		
$\underline{\sigma_{fe}}$		12.62		0.06		0.009		
$\underline{\underline{\sigma_{fe}}}$		50.35		0.26		0.04		

Alternative Estimator (de Chaisemartin&D'Haultfoeuille 2020)



back

Auditors' Appointment Control in Pre-Reform Period



When mayors have control of appointment, municipalities run higher deficits and decrease their debt repayments

	Net Surplus		Debt Repayments		OBS Debts Restatements	
	(1)	(2)	(3)	(4)	(5)	(6)
Control of Appointment	-7.417*** [2.785]	-7.360** [3.198]	-0.0152* [0.00885]	-0.0179* [0.0100]	0.0199 [0.0247]	0.0244 [0.0291]
Second-Term Mayors	Yes	No	Yes	No	Yes	No
Dep. Var Mean	-205.8	-208.2	64.50	64.45	3.427	3.678
Observations	39329	24442	39329	24442	39329	24442
R-sq	0.727	0.760	0.789	0.813	0.457	0.515

Estimating equation:

$$Y_{mt} = \alpha_m + \delta_t + \beta Control_{mt} + X'_{mt}\zeta + \epsilon_{mt}$$

back