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The Organization of Public Procurement

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Provision of public goods

Government spending for public goods plays a central role in modern economies.

According to the OECD

- public spending represents 46% of OECD countries GDP.
- government spending for public goods represents 30% of this spending, in 2011.

Provision of public goods is often outsourced to private contractors ➔ public procurement.

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Quest for efficiency

The size of government spending has diminished in OECD member countries since 1995.

This trend is expected to persist due to austerity measures (i.e., fiscal rules) included in present and presumably future budgets.

- More and more countries have at least one fiscal rule: from five in 1990 to eighty in 2012 (Source: *IMF Fiscal Rules Dataset*)

Governments will need to be more **efficient** by re-organizing the provision of scarce public goods.

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This presentation

1. How public goods can be efficiently provided?

2. How fiscal rules affect procurement?

Outline

Overview of four projects based on my old and current research on the organization of procurement in Italy

- Project 1: publicity in public procurement.
- Project 2: discretion in public procurement.
- Project 3: mayoral tenure in office and public procurement.
- Project 4: impact of a fiscal-rule.

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Approach used/Main focus

Estimation of causal effects of interest using quasi-experimental research designs

- projects 1 and 2: regression discontinuity design based on the engineer's size of projects.
- project 3: regression discontinuity design based on competitive mayoral electoral races.
- project 4: difference-in-difference design based on the introduction of the fiscal rule for municipalities with population > 5,000.

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The data

All public works with starting value greater than 150,000 euro in Italy between 2000-2005:

- Outcomes: N. of bidders, Winner's Rebate, Identity of the winners; Work Length,
- Renegotiations: Days of Delays and Cost Overun.
- Engineer' estimate of the value (starting value/reserve price).
- Works's typology (roads, education, art, etc.), technical characteristics.

- Political variables: all Italian mayors between 1985-2013.

- Administrative and geographical variables:
  - Judicial System Efficiency (Length of Trial).
  - Measures of Social Capital (Blood Donation, Referendum Attendance).
  - Population.

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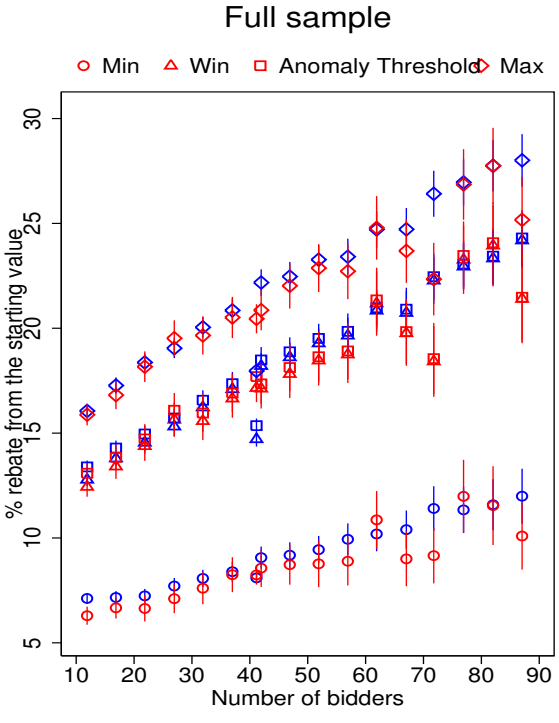
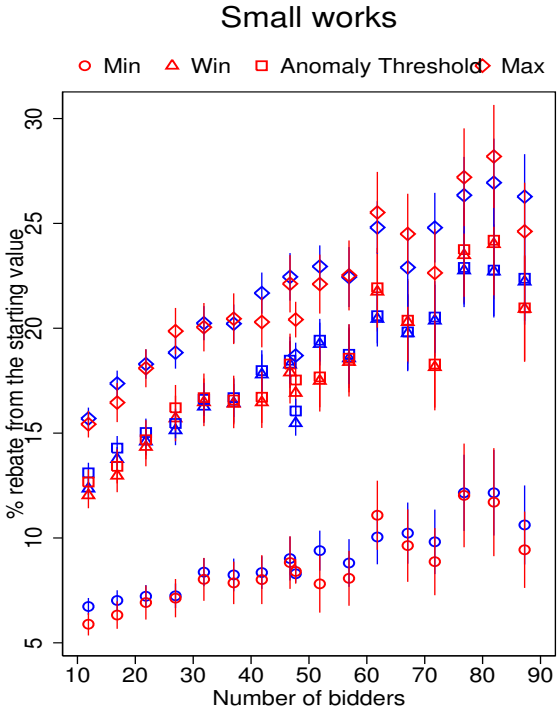
Institution

- Between 2000-2006 sealed bid auctions, single-attribute (price only).
- Winner determined with a non-standard mechanism open to any certified firm.
- Still some competition.
- Engineers' determine size of the projects based on costs.
- Publicity levels and entry requirements are determined by law as function of the starting value.

Competition in these auctions





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Project 1

The Role of Publicity Requirements in Public Procurement

with M. Mariniello (Brugel)

Journal of Public Economics, Vol.109, 2014, pp.76-100

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The Paper

Document the effect of *publicizing* auctions on auctions' outcomes

- Enlarging the pool of potential participants

Use the dataset on auctions for public works in Italy, and for each auction, relate the level of publicity to several outcomes:

- Number of bidders, winning rebate ($) and other rebates
- Type of winners (local origins and size), frequency of wins
- *ex-post* renegotiations (days of delays in delivery, and resales)

Identification: regression discontinuity design (RDD)

Policy debate

Policy makers believe that public procurement auctions need to be publicized more. Regulators,

- both at the national and at the supranational level, have therefore moved to mandate publicity.
- these regulations typically take the form of enhanced publicity requirements for auctions exceeding a certain value threshold.
- the EU mandates such advertising requirements, as does the US Federal Government.

Lack of publicity is seen as a sign of limited competition, insufficient transparency, and possibly of corruption.

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Our quasi-experimental causality framework

We use the *jump in publicity* determined by the procurement law as function of the size of the project.

Auctions are assigned, by the Italian law, to a publicity level on the basis of the engineer's estimate of the project (starting value/reserve price)

- Publicity: Local ($<$500,000) or Regional ($\geq$ 500,000)

A RDD can then be used to compare auctions which, in terms of value, are **immediately** above or below each discontinuity threshold.

These two groups have different publicity levels, but should otherwise be identical in terms of observable and unobservable characteristics.

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Publicity

Figure 1: **Local Publicity**

Notice boards of a large number of public administrations

- 8,100 Municipalities, 181 Hospitals, 110 Provinces, 20 Regions...

Main concerns in the application of the RDD

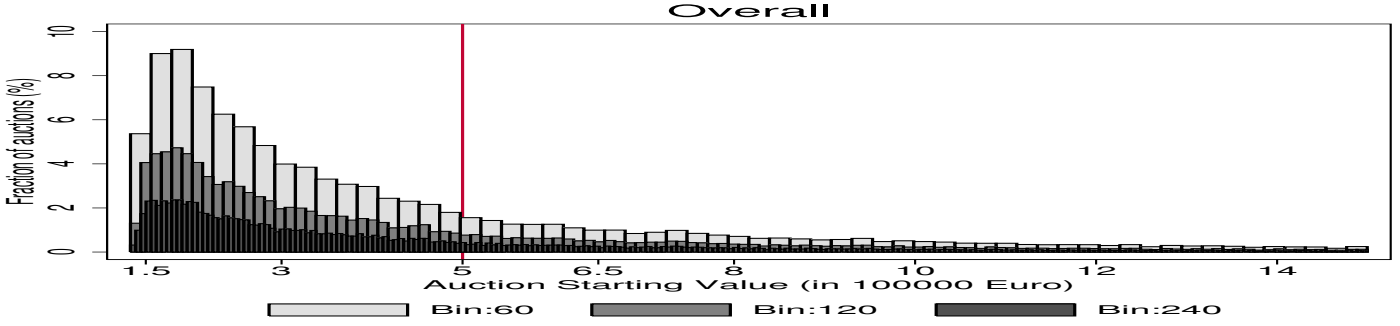
1. Manipulation of the ``running variable" (the starting value, y) which determines exposure to treatment:
   - test for the continuity of the density function of y
   - test on the *pre-treatment* variables

2. At the thresholds, publicity must be the only policy change:
   - Exclude other changes inspecting the law and auctions characteristics\item
   - Focus on the subsample of auctions with y in [2,8]

3. Non-compliance makes actual publicity potentially continuous at the threshold:
   - Use the theoretical level of publicity (publicity requirements) as an instrument, ITTs and fuzzy-RD Design.

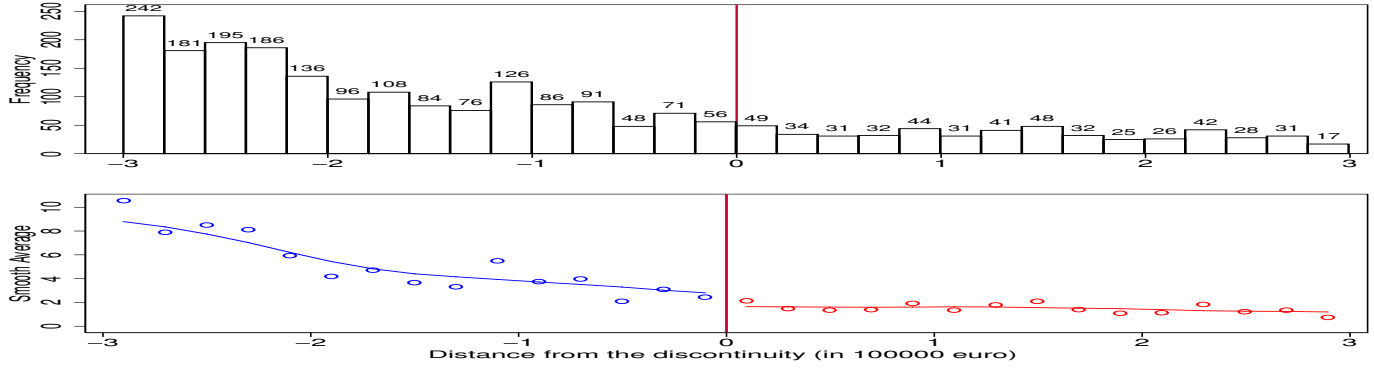
No sorting around the threshold

Figure 4: Overall distribution of the Auctions Starting Value

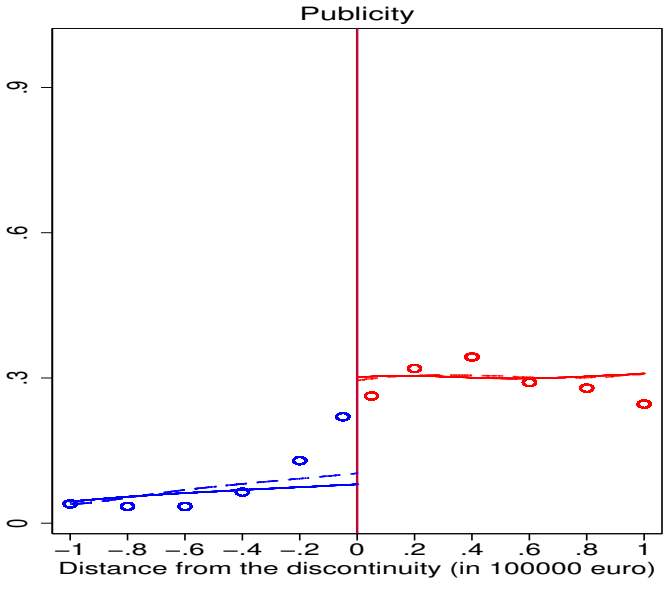


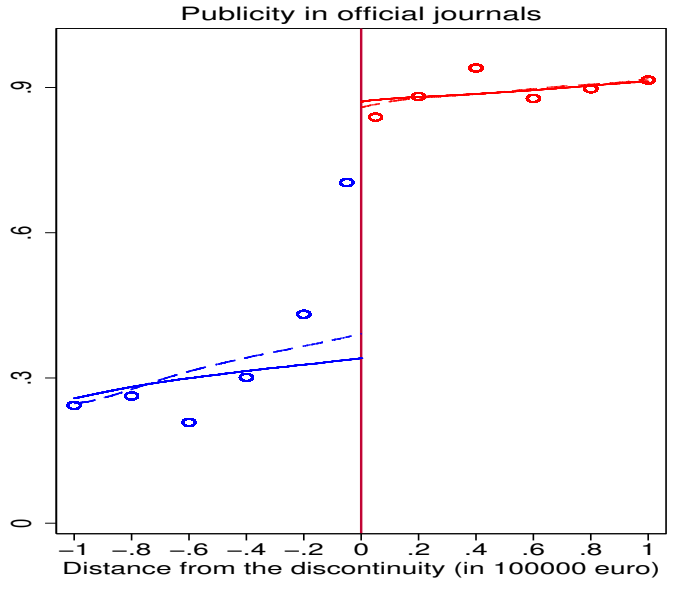
Notes. The (red) vertical line denotes the 500,000 euros discontinuity.
Source: Statistics for the 31,610 public procurements works tendered between 2000 and 2005, with starting value $y \in [1.5, 20]$, in 100,000 euros (2000 equivalents) of Table 2.

Figure 5: Density of the Auctions Starting Value Around the Threshold



Compliance to the publicity law





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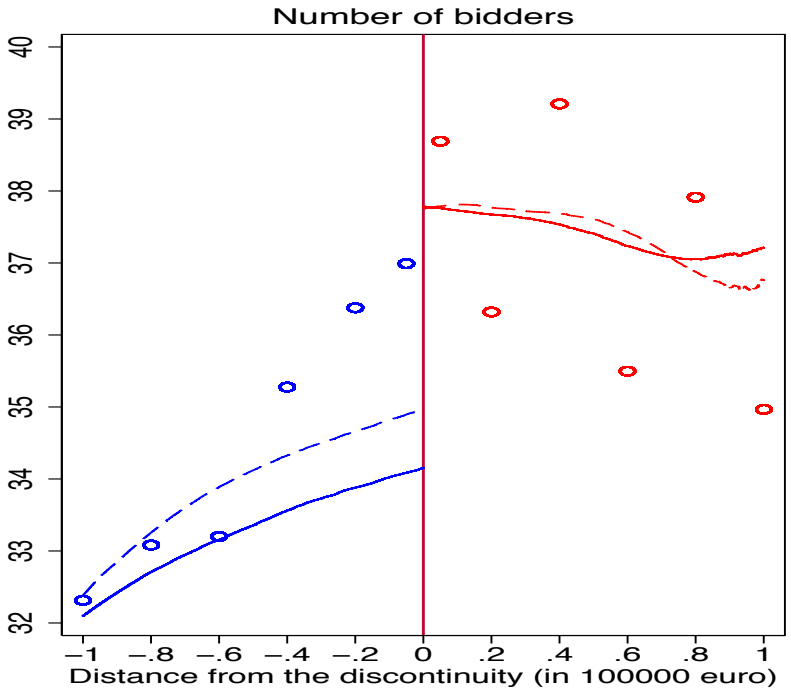
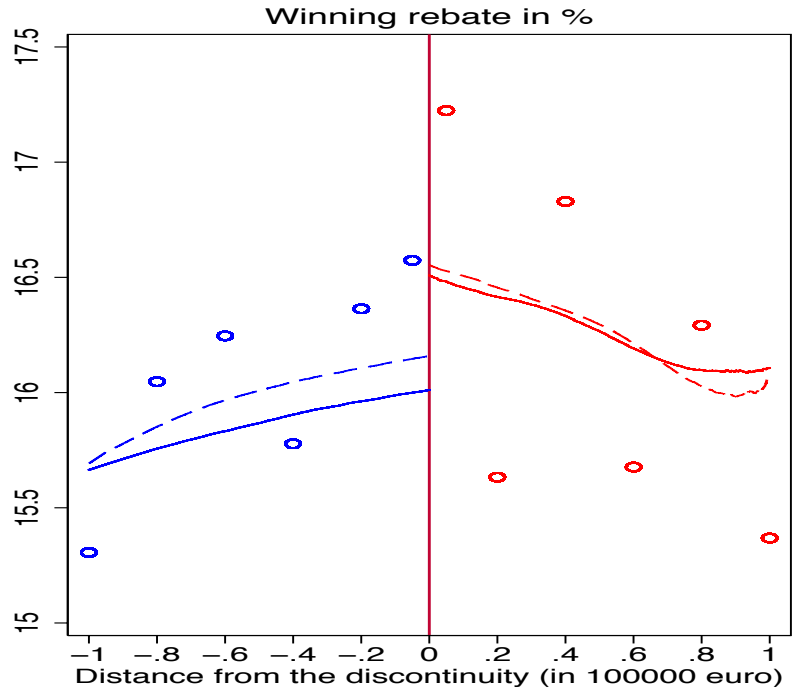
Impact of publicity on competition and prices





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Estimates

Dependent variable	Publicity	Number of bidders	Number of bidders	Winning rebate	Winning rebate
Method	OLS-ITT	OLS-ITT	IV-LATE	OLS-ITT	IV-LATE
	(1)	(2)	(3)	(4)	(5)
Mean outcome	0.10	35.77		16.06	
Theo. Publicity	0.209***	3.348**		1.103***	
	(0.020)	(1.632)		(0.399)	
Publicity			16.015**		5.274***
			(7.976)		(2.005)
F-first stage			185.4		185.4
Year effects	yes	yes	yes	yes	yes
4^{th} order poly.	yes	yes	yes	yes	yes
$y \in [2, 8]$	yes	yes	yes	yes	yes
Observations	17,512	17,512	17,512	17,512	17,512

Notes. Coefficient (and SE in parenthesis) of the effect of publicity. In column 1 the *Dep.Var.* is the observed level of publicity (first stage), while the number of bidders in columns 2-3, and the winning rebate in columns 4-5. The first row reports the mean outcome of each dependent variable. *Theo. Publicity* is the theoretical level of publicity determined by the starting value, $y \geq 5$. *Publicity* is the observed level of publicity. *F-first stage* is the

Ex-post outcomes

Table 6: Type of Winners, Incumbency, and *ex-post* execution of the works

Dependent variable	Winner non-local	Winner non-local	Winner small company	Winner small company	Max (%) wins	Max(%) wins	Works delivered with delay	Works delivered with delay	Resales	Resales
Method	OLS-ITT	IV-LATE	OLS-ITT	IV-LATE	OLS-ITT	IV-LATE	OLS-ITT	IV-LATE	OLS-ITT	IV-LATE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Mean outcome	.34		.44		.35		.54		.64	
Theo. Publicity	0.040*		-0.047*		0.045***		-0.018		0.032	
	(0.024)		(0.025)		(0.016)		(0.031)		(0.027)	
Publicity		0.169		-0.202*		0.190***		-0.076		0.135
		(0.103)		(0.107)		(0.070)		(0.131)		(0.117)
F-first stage		253.5		253.5		253.5		153.7		153.7
Year effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
4^{th} order poly.	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
$y \in [2, 8]$	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Observations	16,606	16,606	16,606	16,606	16,606	16,606	9,994	9,994	9,994	9,994

Notes. Coefficient (and SE in parenthesis) of the effect of publicity. In column 1-2 the *Dep.Var* is an indicator of whether the winner is non-local (coming from outside the region); in 3-4 the winner is a small company (a limited liability company); in 5-6 is the highest percentage of works assigned to the same firm within a year (the market share); in 7-8 an indicator of whether works were interrupted; in 9-10 whether to contract was resold to a subcontractor. The first row reports the mean outcome of each dependent variable. *Theo. Publicity* is the theoretical level of publicity determined by the starting value, $y \geq 5$. *Publicity* is the observed level of publicity. *F-first stage* is the first-stage F-statistics for the excluded instrument. All the regressions include the 4^{th}-order polynomial in the difference of the starting value from the threshold, and five year indicators. Odd columns report OLS-ITT estimates; even columns the IV-LATE using *Theo. Publicity* as instrument for *Publicity*. SEs adjusted for heteroskedasticity. Significance at the 10% (*), at the 5% (**), and at the 1% (***).
Source: Statistics for the public procurements works tendered between 2000 and 2005, with starting value $y \in [2, 8]$, in 100,000 euros (2000 equivalents) included in the estimation sample of Table 4, which have no missing values.

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Robustness

We repeat the analysis:

- Changing the Baseline Model:
  - Including additional controls (Provincial Fixed Effects, Population, Judicial System Efficiency)
  - The order of the polynomial in y (Quartic)

- Include Interaction between Discontinuity and Polynomial (Linear and Quadratic)
  - Nonlinear specification for binary outcome

- Try different bandwidths including optimal bandwidths
  - Considering different Discontinuity Sample

- Running Falsification exercise at simulated threshold.

Summary of the findings

An exogenous increase in publicity from **Local** to **Regional**:

1. Increases the number of bidders and the winning rebate
   - higher entry and lower costs of procurement
   - shifts the distribution of the bids toward higher rebates (higher min, winning, anomaly threshold, excluded bidders, max rebates).

2. Selects different winners
   - Higher probability that the winner hails from outside the region, is a bigger company, and wins repeated auctions

3. Has not effects on *ex-post* renegotiations
   - No delays in delivery of the works, No subcontracting.

Project 2

The Effect of Discretion on Procurement Performance

with A. Guglielmo (AG) and G. Spagnolo (Stockholm)

Management Science, 2017.

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The Paper

Document the effect of discretion on auctions' outcomes

- Possibility of inviting to the auction at least 5 bidders (Trattativa Privata).

To do so we,

- use the data on auctions for public works in Italy between 2000-2005

For each auction, relate the level of discretion to several outcomes

- Number of bidders and winning rebate (price paid);
- Type of winners (origins and size), frequency of wins;
- Completion time, delays in delivery, cost overrun (ex-post eciency).

Identification: use the jump in discretion determined by the procurement law that is function of the size of the project (RDD)

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Policy debate

Administrative rules of many countries and the recommendations of international organizations prescribe the use of open competitive auctions.

- Discretion reduces open competition between bidders and might harm the functioning of procurement (e.g., corruption)

In the US, for example, the Federal Acquisition Reform Act of 1995 substantially increased discretion in US procurement.

Discretion might be a tool to establish long-term preferential relationships with performing contractors (i.e., value reputation)

Main empirical challenges:

- Limited data to evaluate the impact on overall procurement outcomes,
- Lack of Identification.

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Our Quasi-experimental Causality Framework

We use the jump in discretion determined by the procurement law as function of the size of the project

Auctions are assigned, by the Italian law, to a discretion level on the basis of the engineer's estimate of the project (starting value/reserve price)

- Select 15 bidders if <300,000, or open auction if 300,000

- A RDD can then be used to compare auctions which, in terms of value, are immediately above or below each discontinuity threshold

- These two groups have different discretion levels, but should otherwise be identical in terms of observable and unobservable characteristics

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Robustness

We repeat the analysis:

- Changing the Baseline Model:
  - Including additional controls (Provincial Fixed Eects, Population, Judicial System Efficiency)
  - The order of the polynomial in y (Quartic)

- Include Interaction between Discontinuity and Polynomial (Linear and Quadratic)
  - Nonlinear specification for binary outcome

- Try different bandwidths
  - Considering different Discontinuity Sample

- Running Falsification exercise at simulated threshold.

Summary of the findings

Increasing discretion for contracting authorities generates:

- An increase in the probability of incumbent winning;
- No effect on the number of bidders, rebate, location of winner;
- No evidence of higher ex-post renegotiations.

Results are robust to:

- Model and sample selections;
- The inclusion of indicators of Corruption, Social Capital and Judicial Efficiency.

Remark the benefits of a certain degree of discretion in public procurement.

- Banfield (1975), Kelman (1990), Bandiera et al. (2009).

Project 3

Tenure in Office and Public Procurement

with S. Gagliarducci (U. of Tor Vergata)

American Economic Journal: Economic Policy, 2017.

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The paper

Document the effect of the politicians' tenure in office on public procurement.

What we do:

• Collect and match a data set on the politics of Italian municipal governments with a data set on municipal auctions for public works.

- For each auction, relate mayor's tenure (number of terms) in office to several outcomes of procurement:
  - Number of bidders, Winning rebate/Price paid ($)
  - Probability that the winner is local and wins repeated auctions

- Two identification strategies to estimate the causal effects of tenure in office
  - use the variation in tenure induced by a quasi-experimental change in the electoral law (the introduction of two-term limit)
  - close race elections

- Conclude that the effect of tenure in office is compatible with the prediction of model where collusion increases with tenure.

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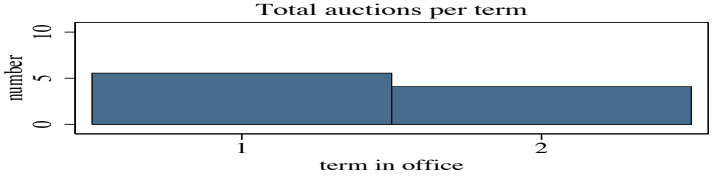
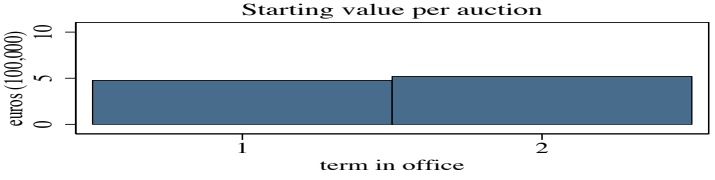
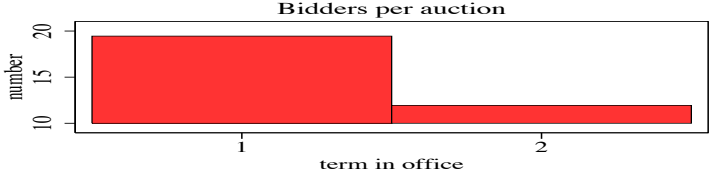
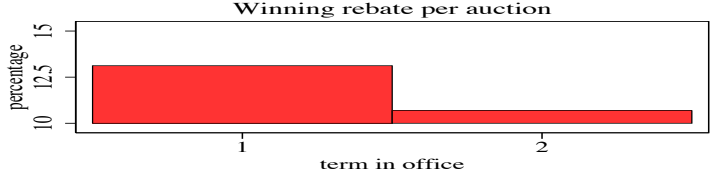
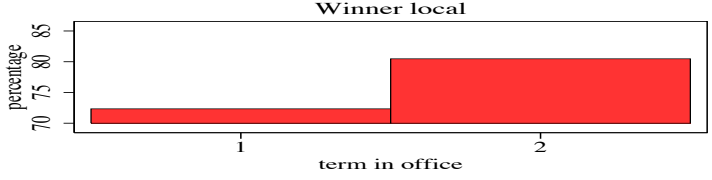
Main findings

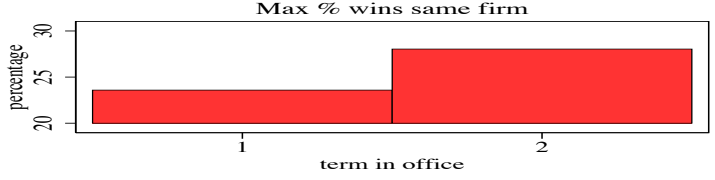












Mechanism?Quality?

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The broader question

Whether the length of an agency relationship (political) progressively affects its functioning.

It arises, in several contexts, as an issue of rotation of agents:

- Consulting firms (rotate associates), Banks (loans officers),...
- In politics, the debate is whether term limits increase accountability:
  - A longer tenure increases the likelihood of a protected elite.
- In political economics, agency models highlight the importance of elections:
  - A lame duck politician has lower incentives to avoid rent-seeking.
- Main empirical challenges:
  - Find meaningful outcomes of the political agency relationship.
  - Disentangle the effects of tenure in office (past) from the finite political horizon (future) when there are term limits.

The specific setting

Public procurement auctions:

- Have precise monetary outcomes: Winning rebate/Price paid.
- Suggest a mechanism to distribute favors: ex-post renegotiations.
- Are a large fraction of countries GDPs: OECD, 14.5%; ITA, 12.5%.

The electoral reform:

- Allows to separate tenure (past) from horizon effects (future).

Our findings suggest presence of repeated but informal (non-functional) interactions between government officials and contractors.

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Political data

We merge the following data for Italy:

- Mayoral terms between 1985-2008, and careers at higher offices.
- Municipal procurement auctions for public works between 2000-2005.

They contain:

- Mayoral and term characteristics: demographics, political affiliation and (past-future) experience, electoral results, terms duration and reasons for early terminations.
- Auction characteristics: number of bidders, reserve price/starting value, winning rebate (BUT NOT the distribution of the bids), identity of the winner, typology of the work, days of delay in delivery of the works.
- City characteristics: demographics, budget, efficiency of the judicial system.

Institutional details

- Mayors:
  - The 1993 electoral reform introduced:
    - The two-terms limit.
    - Individual-ballot elections and anticipated elections, if resignation. – Different length of the legislature (4 instead of 5 years but till 2000).
- Auctions:
  - Managers directly appointed by the mayor (replaced 88% of times when turnover, against 33%). They check documentations and guarantees.
    - Sealed, single-attribute (price only) and reserve price (≥ 150,000 euros).
    - Two auction formats: Pubblico incanto (open to any certified firm) and Licitazione privata (competition between 10 invited firms).
- Assignment with a non-standard mechanism:
- "As if" first-price if there are competing cartels. Conley and Decarolis (2010), theory and evidence of local fighting non-local bidders.

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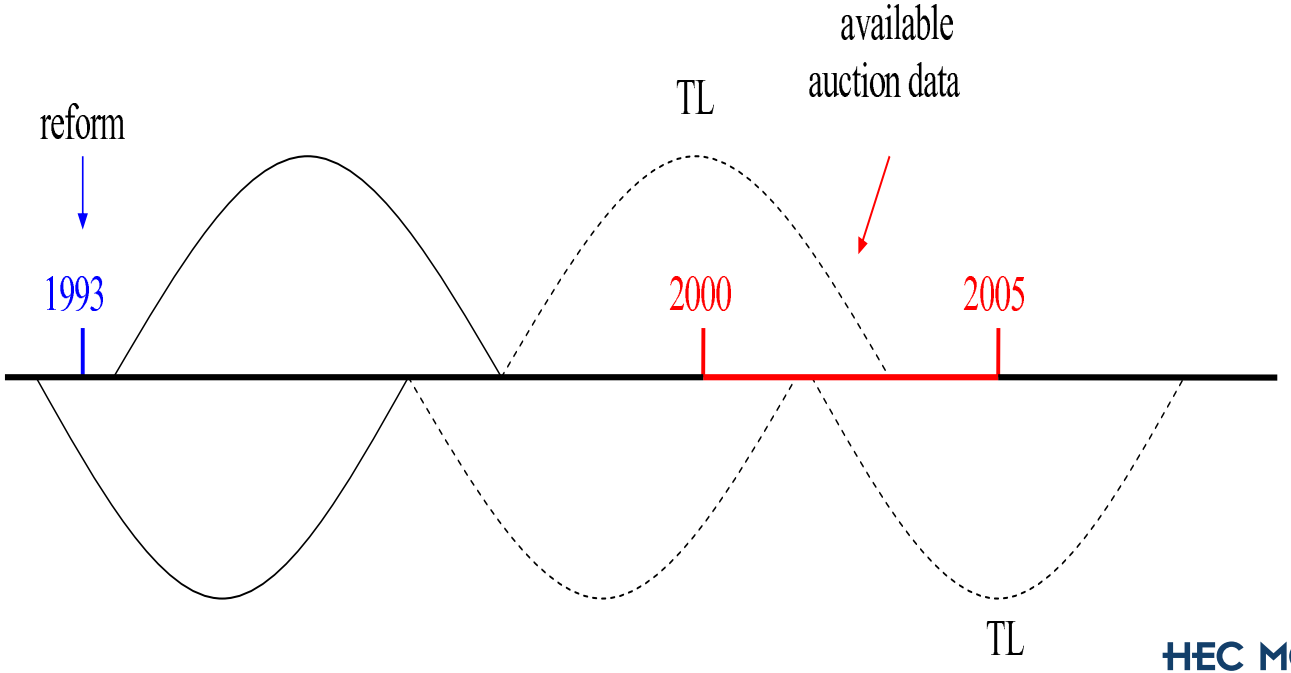
The introduction of the term-limit



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Mechanism and alternative interpretations

i. **Equivalent explanation**: Mayors learn the quality of the contractors.

- We consider a small subsample of municipal purchases of goods/services, Bandiera et al. 2009.
- Purchases of chairs and desks, pencils, papers, phone contracts,.. are:
  - **Standardized** across similar PAs.
  - Account for 8% of ITA GDP.

Finding:

- The price increases by about 16%** at each additional term.

ii. **Mechanism**: Mayors favor local contractors with *ex-post* renegotiations:

- We consider a subsample of auctions where we observe the **delays** (78%) in public works' delivery (177 days).

Finding:

- Each additional term in office increases the days of delay by 32%**.

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Summary of conclusions

We find that when politicians stay in power longer:

- The functioning of procurement auctions deteriorates.
- Public spending increases.

Our findings are:

- Compatible with the idea that tenure in office progressively leads to collusion between government officials and few local bidders (elites).
- Show that mayors systematically rotate bureaucrats
- Preliminary invalidate the “learning” (quality) explanation and highlights a strategic role of ex-post renegotiations.
- Remark the benefits of political turnover.

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Project 4

Direct Propagation of a Fiscal Shock: Evidence from Italy's Stability Pact

with I.Marino (U. Naples), T.Nannicini (Bocconi), N.Persico (Kellogg)

Mimeo, available here: http://tintin.hec.ca/pages/decio.coviello/research_files/patto.pdf

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Firm-level effects of fiscal-austerity

- When countries get worried about public debt, they introduce fiscal rules restricting government spending.

- More and more countries have at least one fiscal rule: from five in 1990 to eighty in 2012 (see Schaechter et al. 2012).

The paper

- Document the channels through which a fiscal shock propagates through local governments, and the corresponding reaction by firms in the affected upstream sector (municipal procurement).

- The shock is provided by an Italian fiscal rule, called *Patto di stabilita' dei comuni,* which was tightened unexpectedly in 2008 and applied only to municipalities with population greater than 5,000.

- We study how affected municipalities reacted to this fiscal shock and then how their reaction propagated to the upstream sector (municipal procurement companies).

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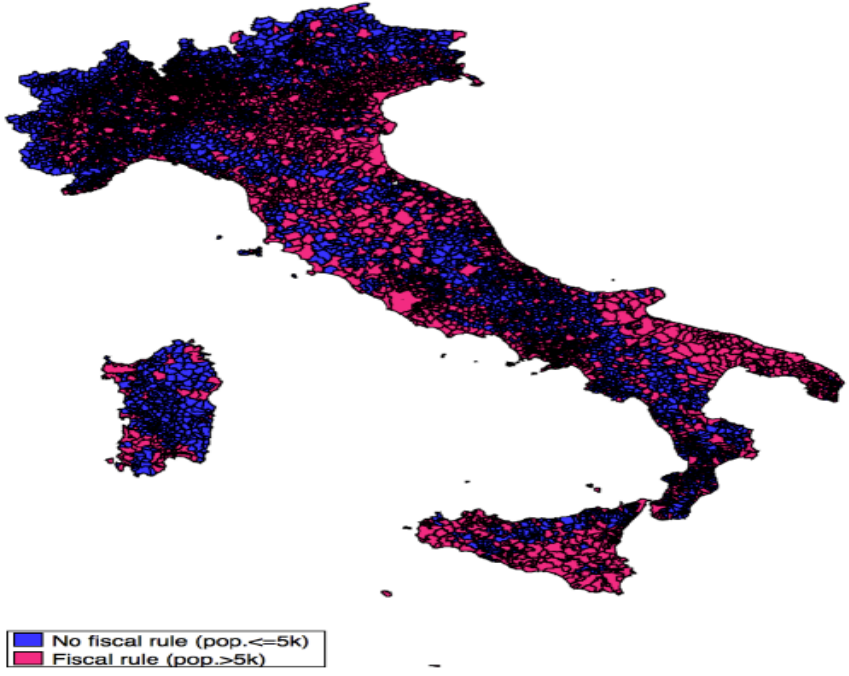
The data

- We collect a database containing all the Italian municipal balance-sheet for 20 years.
- We also collect a database contains information on all Italian firms that are required to le a balance sheet (1.5M every year)
- In partnership with *Telemat S.p.A.* I obtained a database containing all the procurement contracts run by Italian municipalities
  - *Telemat S.p.A.* is private company which alerts procurement firms to upcoming tenders.
- We use fiscal identifiers and build a precise measure of exposure to public procurement.

Identification strategy

Figure 1: Italian municipalities with and without fiscal rule



Notes: Municipalities with population measured in 2008. Source: Authors' calculation on National Institute of Statistics (ISTAT) data.

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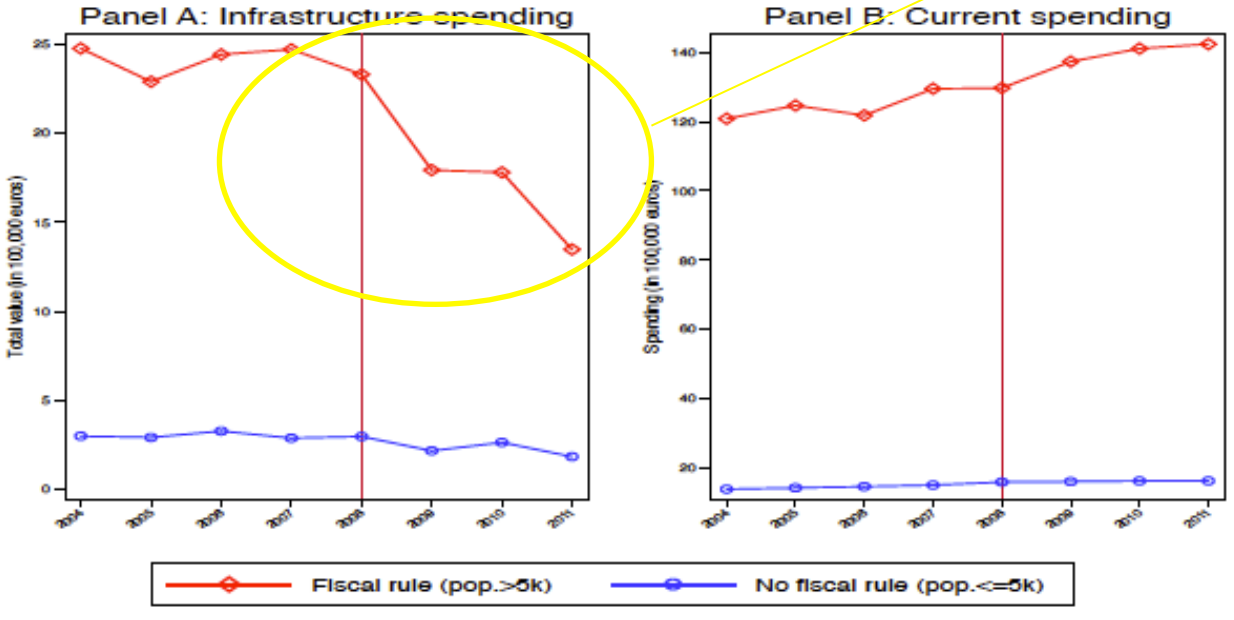
How municipalities reacted?

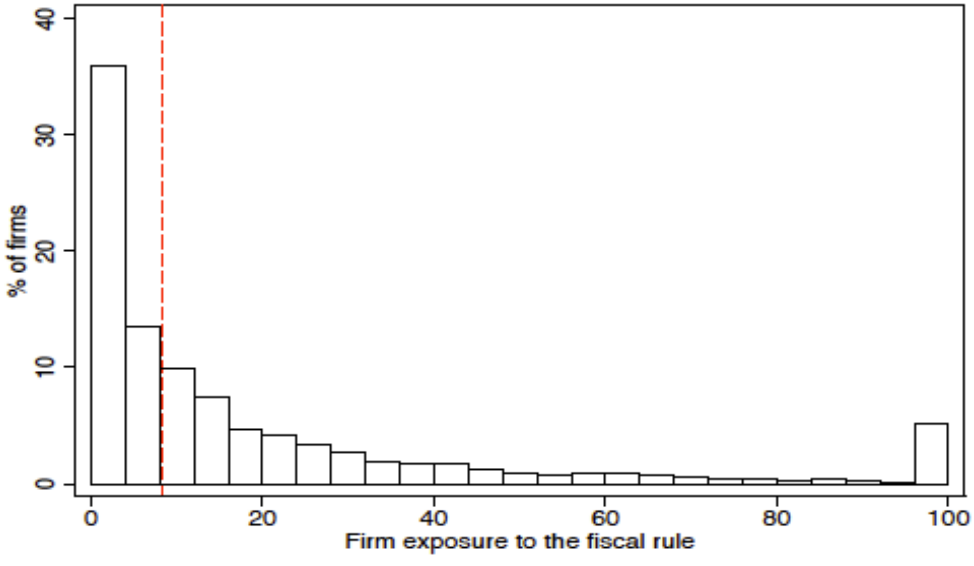
Figure 2: Fiscal shock associated with drop in infrastructure spending (inves
with drop in current spending (consumption)

- 26%



How firms in procurement reacted?

Figure 5: Heterogeneity in firm exposure to the fiscal demand shock



Notes: A firm's exposure to the fiscal demand shock is defined as the value of procurement won by a firm in municipalities with population greater than 5,000, as a percentage of the firm's total revenues, before 2009. The sample median is 8% (vertical dashed line) and the standard deviation is 24%. Source: Authors' calculation on public works data and AIDA data.

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Results (2)

Table 6: Effect of the fiscal demand shock on capital and labor

Dep.Var	Capital	Capital	Capital	Labor	Labor	Labor	N.Workers	N.Workers	N.Workers	O.Services	O.Services	O.Services	Sev. Fund	Sev. Fund	Sev. Fund
Method	OLS	FE	FE-HT	OLS	FE	FE-HT	OLS	FE	FE-HT	OLS	FE	FE-HT	OLS	FE	FE-HT
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Fisc.Rule.Exp.XPost	-4.067***	-4.504***	-1.491***	0.239	0.012	0.447***	0.069*	-0.016	-0.031	2.920	1.947	0.832	-0.056***	-0.078***	-0.024**
	(0.694)	(0.597)	(0.298)	(0.326)	(0.204)	(0.160)	(0.037)	(0.019)	(0.043)	(1.805)	(1.471)	(1.173)	(0.015)	(0.013)	(0.011)
Fisc.Rule.Exp.	-6.656***			-5.446***			-0.335***			-17.404***			-0.332***		
	(0.609)			(0.612)			(0.048)			(1.970)			(0.032)		
Post	371.035***			6.408			-1.643			-100.628			8.323***		
	(45.677)			(18.419)			(1.876)			(88.409)			(0.708)		
N.Firms	4,317	4,317	4,317	4,317	4,317	4,317	4,095	4,095	4,095	4,317	4,317	4,317	4,305	4,305	4,305
Observations	27,764	27,764	27,764	27,764	27,764	27,764	16,135	16,135	16,135	27,764	27,764	27,764	26,471	26,471	26,471
Company FE	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Year FE	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Mean Y	584.4	584.4	584.4	397.2	397.2	397.2	24.63	24.63	24.63	1156	1156	1156	27.09	27.09	27.09
St.Dev.Fisc.Rule	23.91	23.91	23.91	23.91	23.91	23.91	23.91	23.91	23.91	23.91	23.91	23.91	23.91	23.91	23.91
Eff.Fisc.Rule.Exp. (%)	-16.64	-18.43	-6.101	1.441	0.0751	2.691	6.706	-1.568	-3.018	6.039	4.026	1.721	-4.917	-6.885	-2.120

Notes: The table reports estimates of the effects of exposure to the fiscal demand shock on firms capital accumulation and labor: *Capital* are the firm total annual physical assets (in 1,000 euros); *Labor* are the firm total personnel costs (in 1,000 euros); *O.Services* are the firm total costs for outsourced services (in 1,000 euros); *Sev. Fund* is the firm's total funds accumulated for severance pays (in 1,000 euros). Financial variables are deflated using KLEMS deflators.*Fisc.Rule.Exp.* represents the exposure to the fiscal demand shock computed as the ratio between the firm's value won in municipalities hit by the demand shock and the firm's pre-demand shock revenues. In each of the rows, *Post* is an indication for the years after 2008. Odd (even) columns report OLS (FE) [FE-HT] estimates (with firm and year fixed effects) [firm-specific linear trends]. Mean Y is the sample mean for each dep.var. *Eff.Fisc.Rule.Exp (%)* is the ratio between the estimated coefficient of *Fisc.Rule.Exp.***Post**St.Dev.Fisc.Rule and Mean Y. Significance at the 10% (*), at the 5% (**), and at the 1% (***). Source: Statistics for procurement companies that won at least one auction before 2009 and observed between 2004 and 2011.

Summary of the results

- A fiscal shock propagates through the public sector and onto the private sector.
- Two different types of organizations local governments and procurement firms that both use capital investment as the primary channel of shock absorption.
- In the procurement sector, shocks are propagated disproportionately by those firms which are most exposed to the shocked sector.

Conclusions

- I have presented four projects that use Italian procurement data and
- For every project, I have highlighted the **economic research question**, the **data** used and the **identification strategy** implemented to claim causal effects.
- I have preliminary answered the following two questions

1. How public goods can be efficiently provided?
   Competition, and rotating bureaucrats

2. How fiscal rules affect procurement?
   Mild effects that are function of exposure

More needs to be done.

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Thanks!

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