

Individuals and Organizations as Sources of State Effectiveness and Consequences for Policy Design

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April 2017

Outline

Introduction

Context & Data

Sources of State Effectiveness

- Theory

- Decomposition Method

- Correlates of Bureaucrat & Organization Effectiveness

Consequences for Policy Design

- “Buy Local” Policy

- Identification

Conclusion

Introduction

- ▶ Same policy → different outcomes in different settings

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 - ▶ VAT in low/high income countries

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- ▶ *How much of variation in policy outcomes due to bureaucracy?*

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- ▶ *How much of variation in policy outcomes due to bureaucracy?*
- ▶ *How does policy affect impact of bureaucratic heterogeneity?*

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- ▶ *How does policy affect impact of bureaucratic heterogeneity?*
- ▶ Towards: *How does optimal policy depend on who implements it?*

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- ▶ *How much of variation in policy outcomes due to bureaucracy?*
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- ▶ Towards: *How does optimal policy depend on who implements it?*
- ▶ **We investigate these questions in the Russian public sector**

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4. Hold bur & org constant and vary task. Study “buy local” policy:
 - ▶ Variation across products and time \Rightarrow Diff in Diff strategy
 - ▶ Interact with bur/org effects \Rightarrow How does impact depend on bur/org effectiveness?

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 2. Subsidizing entry and improving bureaucracy substitutes when state effectiveness low

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Procurement in Russia

- ▶ Decentralized procurement with centralized rules. 104,000 Federal, regional, municipal public bodies procure independently.
- ▶ No centralized civil service, procurement officers hired much like private sector.
- ▶ Majority (52%) of purchases by electronic descending auction.
- ▶ Detailed data on all procurement available in online procurement register – the Unified Register of Federal and Municipal Contracts
- ▶ We collected the data on all auction requests, review protocols, bids, and final contracts 2011–2015
- ▶ Key issue: Lack of entry. Motivates endogenous entry model

Procurement Timeline

1. Organization requesting goods “hires” a bureaucrat for the purchase. Strict rules on internal/external bureaucrat.
2. Together, write documentation (technical specifications, deposit, maximum price, auction date). Bureaucrat publishes and publicizes (“auction SEO”)
3. Bureaucrat blindly checks eligibility of applications to participate
4. If >1 eligible participants, auction is held. If not, award at reservation price.
5. Blind, descending English auction held on independent online platform. Winner is lowest bid / “last man standing” after no bids for 10 minutes
6. Lowest bidder awarded contract, unless bid does not satisfy technical specification

Flow Chart

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Endogenous Entry Auction Model

- ▶ Government buying from 2 potential suppliers, F & L
- ▶ Mechanism: Open outcry descending auction. Reserve price = 1
- ▶ Fulfillment costs: $G_F(v_F) \sim \mathcal{U}[0, 1]$, $G_L(v_L) \sim \mathcal{U}[\mu, 1]$,
 $0 < \mu < 1$.
- ▶ Timing
 1. Suppliers $i = F, L$ learn v_i , decide whether to pay entry cost $c \geq 0$
 2. Government observes entry decisions
 - 2.1 If both enter: Hold auction
 - 2.2 If only 1 enters: Awarded contract at price 1
 - 2.3 If neither enter: Randomly pick supplier, award contract at price 1

Endogenous Entry Auction Model: Equilibrium

- ▶ Open outcry auction \approx 2nd price auction
 \Rightarrow dominant strategy to bid true cost.
- ▶ Enter if $v_i \leq \bar{d}_i$. \bar{d}_F, \bar{d}_L satisfy

$$U(\bar{d}_F; \bar{d}_F, \bar{d}_L) - c = \Pr(\text{L stays out}) \frac{1}{2} (1 - \bar{d}_F)$$

$$U(\bar{d}_L; \bar{d}_F, \bar{d}_L) - c = \Pr(\text{F stays out}) \frac{1}{2} (1 - \bar{d}_L)$$

- ▶ Comparative statics on entrants n and price p

$$\frac{\partial E[n]}{\partial c} < 0 \quad \frac{\partial E[p]}{\partial c} > 0$$

- ▶ Buyers who impose larger entry costs attract fewer entrants and pay higher prices

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Decomposing Variation in Prices Paid

- ▶ Model log price for item i purchased for organization j by bureaucrat $b(i, j)$ as

$$p_i = \mathbf{X}_i \boldsymbol{\beta} + \tilde{\alpha}_{b(i,j)} + \tilde{\psi}_j + \varepsilon_i$$

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 4. *Sampling error* inflates variances

Challenge 1: Measuring Procurement “Output”

- ▶ Outcome: **Quality**-adjusted unit prices paid
- ▶ 2 Approaches
 1. Hedonics: Measure and price quality-relevant attributes, restrict attention to homogeneous goods (Bandiera et al. 2009, Best et al. 2017)
 2. Partitioning: Identify groups without significant within-group quality variation (Syverson, trade/IO literature)
- ▶ Here: Use text analysis methods to group goods at \sim HS-10 level
- ▶ Robustness:
 1. Pharmaceuticals subsample. Barcode-level controls
 2. Trace gradient wrt good homogeneity (Rauch 1999, Khandelwal 2010)

Text Analysis procedure

- ▶ Data contains detailed product descriptions in contracts.
 - ▶ Use these to group purchases into homogenous categories.
1. Train classifier on customs product descriptions
 2. Apply to procurement data
 3. Identify unreliably classified goods
 4. Cluster unclassified goods

Decomposing Variation in Prices Paid

$$p_i = \mathbf{X}_i\beta + \tilde{\alpha}_{b(i,j)} + \tilde{\psi}_j + \varepsilon_i$$

► 4 Challenges

1. ~~Like-for-like comparisons: *quality*-adjusted prices~~
Text classification to control for quality in \mathbf{X}_i
2. Separate identification *within* “connected sets” linked by mobility
⇒ **Can’t identify all bureaucrat & organization effects**
3. Causal identification requires “*exogenous mobility*”
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Challenge 2: Identification Within Connected Sets

- ▶ Abowd et al (1999, 2002): bureaucrat and organization effects only identified *within* “connected sets” linked by mobility

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- ▶ Normalize connected-set means to 0, estimate CS intercepts $\gamma_{s(b,j)}$

$$p_i = \mathbf{X}_i\boldsymbol{\beta} + \alpha_{b(i,j)} + \psi_j + \gamma_{s(b,j)} + \varepsilon_i$$

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- ▶ Lower bounds: $\text{Var}(\alpha_b) < \text{Var}(\tilde{\alpha}_b)$, $\text{Var}(\psi_j) < \text{Var}(\tilde{\psi}_j)$
- ▶ Total effect: $\text{Var}(\tilde{\alpha}_b + \tilde{\psi}_j) = \text{Var}(\alpha_b + \psi_j) + \text{Var}(\gamma_s)$

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2. ~~Separate identification *within* “connected sets” linked by mobility~~
Alternative normalization: $\tilde{\alpha}, \tilde{\psi} \rightarrow \alpha, \psi, \gamma$
3. Causal identification requires “*exogenous mobility*”
 \Rightarrow **Need to rule out key confounders**
4. *Sampling error* inflates variances

Challenge 3: Causal Identification

- Identification comes from *movers*

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- ▶ Identification comes from *movers*
- 1. Moves uncorrelated with confounders: “exogenous mobility”
 - ▶ No moving in response to shocks/drift
 - ▶ No sorting on omitted match effects
 - ▶ NB does *not* rule out sorting on α and ψ

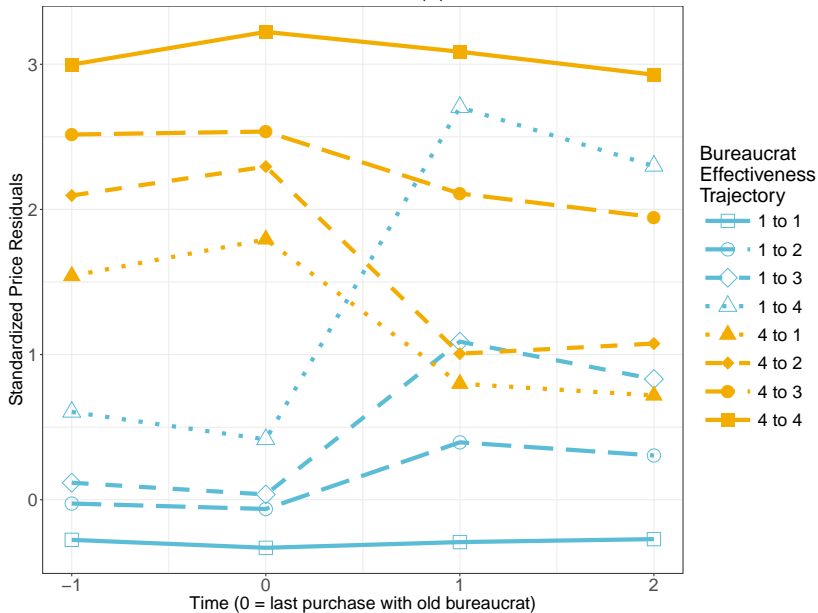
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 - ▶ No (strong) omitted match effects
- ▶ Event study analysis of organizations switching bureaucrats
 - ▶ Time trends
 - ▶ Symmetry

Panel A: Prices (P)



[Bureaucrats Switching Goods](#) [Organizations Switching Goods](#) [3-day spells](#)

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3. ~~Causal identification requires “*exogenous mobility*”~~
Event study evidence consistent
4. *Sampling error* inflates variances
 \Rightarrow **Risk conflating signal variation with noise**

Challenge 4: Sampling Error

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 - ▶ Incidental parameters: $\hat{\alpha}_b, \hat{\psi}_j$ consistent as $\# \text{ obs on } b, j \rightarrow \infty$ (Scott 1948, Lancaster 2000)
- $\Rightarrow \text{Var}(\eta_b), \text{Var}(\eta_j) > 0, ; \Rightarrow \text{overestimate } \text{Var}(\alpha_b), \text{Var}(\psi_j)$

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- $\Rightarrow \text{Var}(\eta_b), \text{Var}(\eta_j) > 0, ; \Rightarrow \text{overestimate } \text{Var}(\alpha_b), \text{Var}(\psi_j)$
- ▶ Limited mobility bias: too few “movers” (Abowd et al 2004, Andrews et al 2008)
- $\Rightarrow \text{Cov}(\eta_b, \eta_j) < 0$, Underestimate $\text{Cov}(\alpha_b, \psi_j)$

How Important are Bureaucrats & Organizations?

- ▶ 2 approaches to correct for sampling error.

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- ▶ $\hat{\sigma}_\alpha^2 = \text{Var}(\hat{\alpha}) - \text{E}_b[s_b^2]$
- ▶ Form minimum mean-squared error linear predictions of α :

$$\hat{\alpha}_b^{Sh} = \frac{\hat{\sigma}_\alpha^2}{\hat{\sigma}_\alpha^2 + s_b^2} \hat{\alpha}_b$$

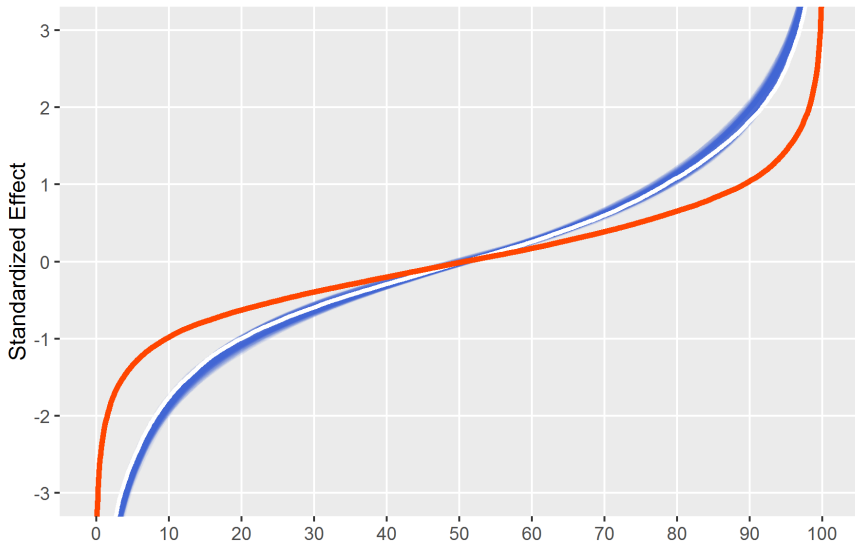
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Text classification to control for quality in \mathbf{X}_i
2. ~~Separate identification *within “connected sets”* linked by mobility~~
Alternative normalization: $\tilde{\alpha}, \tilde{\psi} \rightarrow \alpha, \psi, \gamma$
3. ~~Causal identification requires “*exogenous mobility*”~~
Event study evidence consistent
4. ~~*Sampling error* inflates variances~~
Estimate and adjust for sampling error

Shrinking Bureaucrat Effects



Organization Effects

Pair Effects

Percentile

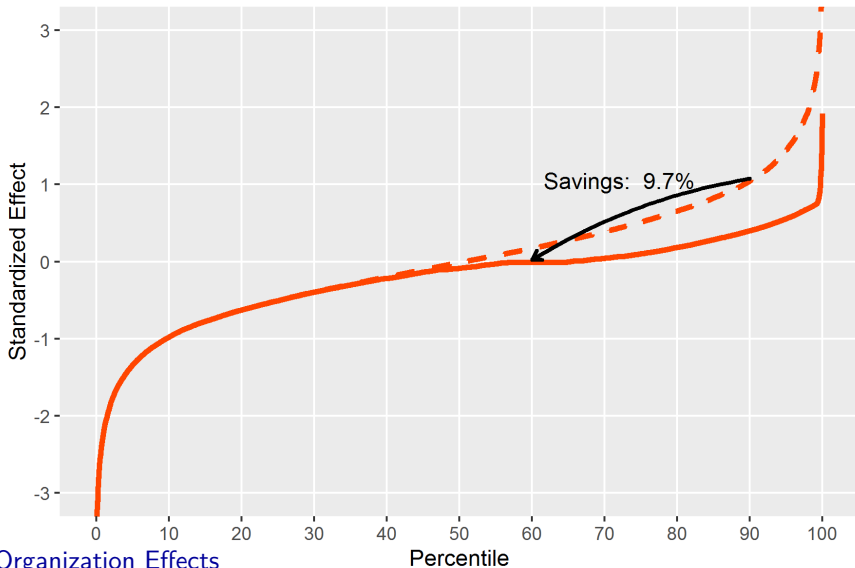
Variance Decomposition Results

	Prices (P) (1)	(s.e.) (2)	Participation (N) (3)	(s.e.) (4)
s.d. of Bureaucrat Effects (across items)	1.031	(0.0462)	0.919	(0.0418)
s.d. of Organization Effects (across items)	1.068	(0.0496)	0.888	(0.0468)
s.d. of Connected Set Effects (across items)	0.555	(0.035)	0.302	(0.0147)
s.d. of Bur + Org Effects Within CS (across items)	0.876	(0.0154)	0.642	(0.00654)
s.d. of Total Bur + Org Effects (across items)	1.036	(0.00126)	0.710	(0.00358)
s.d. of Y	2.417		1.355	
s.d. of Y good, month	1.646		1.241	
Adjusted R-squared	0.955		0.837	
Sample Size	11,228,122		11,228,122	

Robustness:

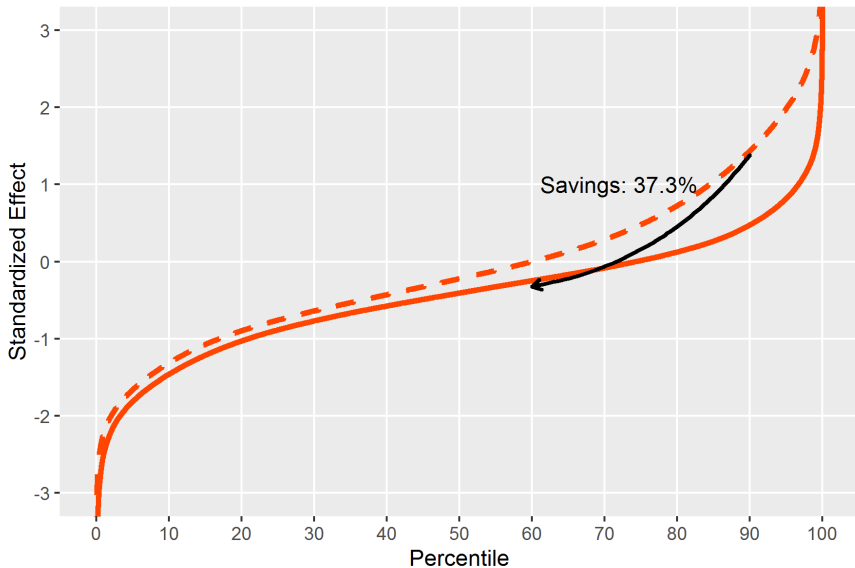
1. Quality: Medicines; Product homogeneity
2. Connected Sets: Largest CS
3. Misspecification: Residuals Heat Map

Crude Counterfactual: Improving Bureaucrats



Organization Effects

Counterfactual: Improving Bureaucrats & Organizations



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Correlates of Bureaucrat/Organization Effectiveness

- ▶ What do good and bad bureaucrats and organizations do differently?
- ▶ What attributes do good and bad bureaucrats have?

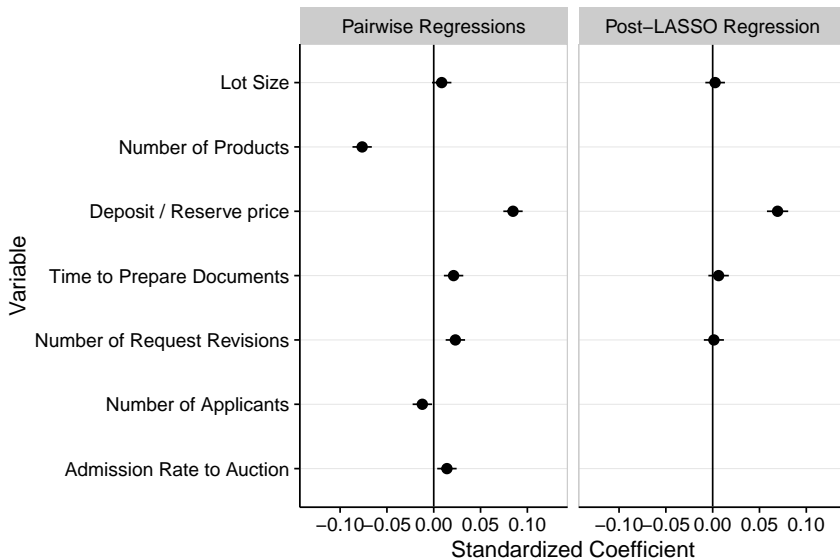
Correlates of Bureaucrat/Organization Effectiveness

- ▶ What do good and bad bureaucrats and organizations do differently?
- ▶ What attributes do good and bad bureaucrats have?
- ▶ Using detailed data on the levers they control at the “qualification stage”, the “auction stage”, and “the contracting stage” – and how firms respond to their behaviors

Correlates of Bureaucrat/Organization Effectiveness

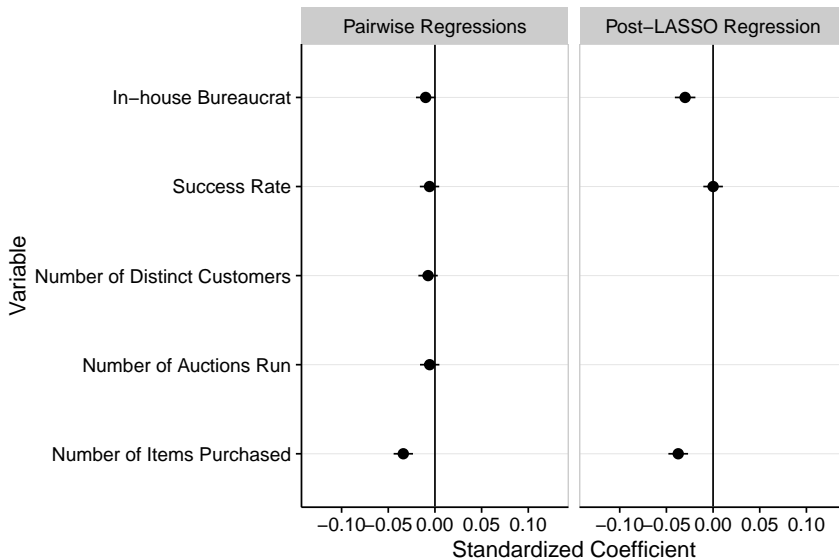
- ▶ What do good and bad bureaucrats and organizations do differently?
- ▶ What attributes do good and bad bureaucrats have?
- ▶ Using detailed data on the levers they control at the “qualification stage”, the “auction stage”, and “the contracting stage” – and how firms respond to their behaviors
- ▶ Large number of rhs variables. For variable selection present
 1. Pairwise regression coefficients (standardized rhs vars)
 2. Post-LASSO coefficients

Figure: Correlates of Bureaucrat Effects: Qualification Stage



Organizations Later Stages

Figure: Correlates of Bureaucrat Effects: Bureaucrat Attributes



Organizations Later Stages

Sources of State Effectiveness: Summary

1. Bureaucrats & organizations explain 60% of variation in state output
2. Effective burs/orgs lower participation costs
 - ▶ Ultimately bureaucrats and organizations implement policies
 - ▶ What are the implications for policy design?
 - ▶ Does impact of bur/org heterogeneity depend on policy?

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Bid Preferences for Domestic Products

- ▶ Motivation: classic mercantilist “support local business”
- ▶ Each spring presidency issues list of goods receiving preferences
 - ▶ Winner supplying foreign good receives 85% of winning bid
 - ▶ Winner supplying domestic good receives 100% of winning bid

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- ▶ Do preferences affect impact of bureaucratic heterogeneity?

Bid Preferences in Endogenous Entry Auction Model

- ▶ Introduce bid preferences favoring L . $\gamma = \text{price}/\text{bid}$ if F wins.
- ▶ \Rightarrow bid shading by F : $b_F = v_F/\gamma$, $b_L = v_L$.
- ▶ Impact of $\gamma < 1$:
 1. $E[p|\gamma] - E[p|\gamma = 1] \leq 0 \leftrightarrow c \geq \tilde{c}(\gamma)$
 2. $\partial (E[p|\gamma] - E[p|\gamma = 1]) / \partial c < 0$
- ▶ Intuition:
 - ▶ $\gamma = 1$: Higher c buyers attract fewer bidders
 - ▶ $\gamma < 1$ encourages entry by L , discourages F
 - ▶ Bigger boost to L 's prospects in auction when face fewer F
 - ▶ Net entry up for high c buyers

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Heterogeneous Impacts of Policy Change

- ▶ Sources of time \times product variation:

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$$p_{it} = \beta \text{BuyLocalGood}_{it} \times \text{BuyLocalPeriod}_t + \mathbf{X}_{it}\beta + \varepsilon_{it}$$

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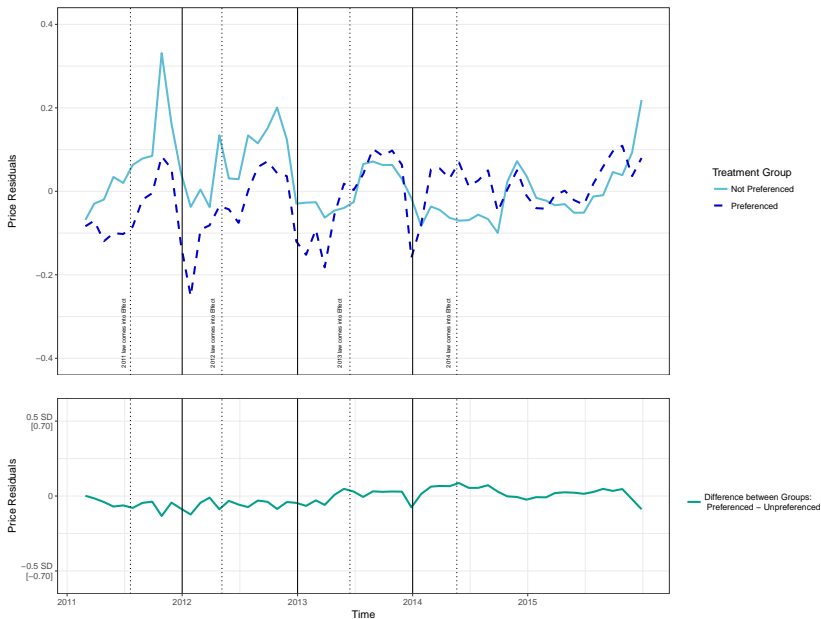
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- ▶ \mathbf{X}_a still includes log quantity, good and month FEs
- ▶ Does policy impact depend on the bureaucrat/organization implementing it?
- ▶ Interact $\text{BuyLocalGood}_i \times \text{BuyLocalPeriod}_i$ with $\hat{\alpha}_b, \hat{\psi}_j$ from regular auctions

Average Policy Impact

	Prices (P)		Participation (N)	
	Analysis Sample (1)	Largest Connected Set (2)	Analysis Sample (3)	Largest Connected Set (4)
log Standardized Quantity	-0.510*** (0.027)	-0.552*** (0.019)	0.032*** (0.003)	0.036*** (0.004)
Preferred (Good on list)	-0.050* (0.028)	-0.043 (0.047)	-0.145*** (0.040)	-0.195*** (0.053)
Preferred (Good on list) * Policy Active	-0.012 (0.025)	-0.007 (0.045)	-0.050 (0.047)	-0.029 (0.062)
Outcome Mean	5.69	6.26	1.64	1.68
Month, Good FEs	Yes	Yes	Yes	Yes
Year×Product×Size×Region FEs	Yes	Yes	Yes	Yes
Observations	21,017,045	3,973,832	21,017,045	3,973,832
R ²	0.592	0.620	0.276	0.272

Average Policy Impact: Graphical Analysis

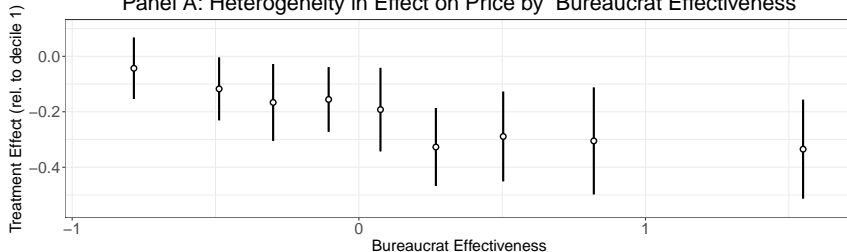


Policy Impact Depends on Bur/Org Ability

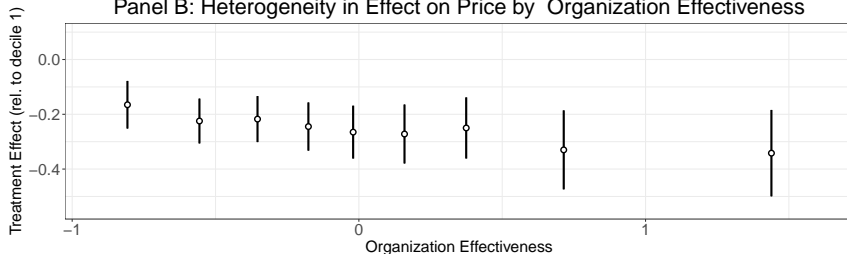
	Prices (P)		Participation (N)	
	Analysis Sample (1)	Largest Connected Set (2)	Analysis Sample (3)	Largest Connected Set (4)
Bureaucrat FE * Preferred (Good on list) * Policy Active	-0.183*** (0.028)	-0.119*** (0.033)	-0.279*** (0.055)	-0.286*** (0.064)
Organization FE * Preferred (Good on list) * Policy Active	-0.164*** (0.029)	-0.111*** (0.040)	-0.307*** (0.060)	-0.295*** (0.075)
Outcome Mean	5.69	6.26	1.64	1.68
Month, Good FEs	Yes	Yes	Yes	Yes
Year×Product×Size×Region FEs	Yes	Yes	Yes	Yes
Connected Set FEs	Yes	Yes	Yes	Yes
Observations	15,957,594	3,973,832	15,957,594	3,973,832
R ²	0.645	0.692	0.372	0.364

Policy Impact Depends on Bureaucratic Effectiveness

Panel A: Heterogeneity in Effect on Price by Bureaucrat Effectiveness



Panel B: Heterogeneity in Effect on Price by Organization Effectiveness



Buy Local Policy: Summary

- ▶ On average, the Buy Local policy has ~ 0 effect on prices achieved
- ▶ Contrary to US evidence on SME preferences: SMEs win, but prices go up (Krasnokoutsckaya & Seim 2009, Roberts & Sweeting 2010, Marion 2007)
- ▶ The lower baseline bureaucrat/organization effectiveness, the more prices *decrease*. Prices decrease by up to 15 percent, similar magnitude price *increase* for those with high effectiveness.
- ▶ \rightarrow optimal policy: 0 penalty if high effectiveness, >0 penalty if low effectiveness.
- ▶ \rightarrow industrial policies, while costly when states have high effectiveness, can be a second-best optimal policy when state effectiveness is low.

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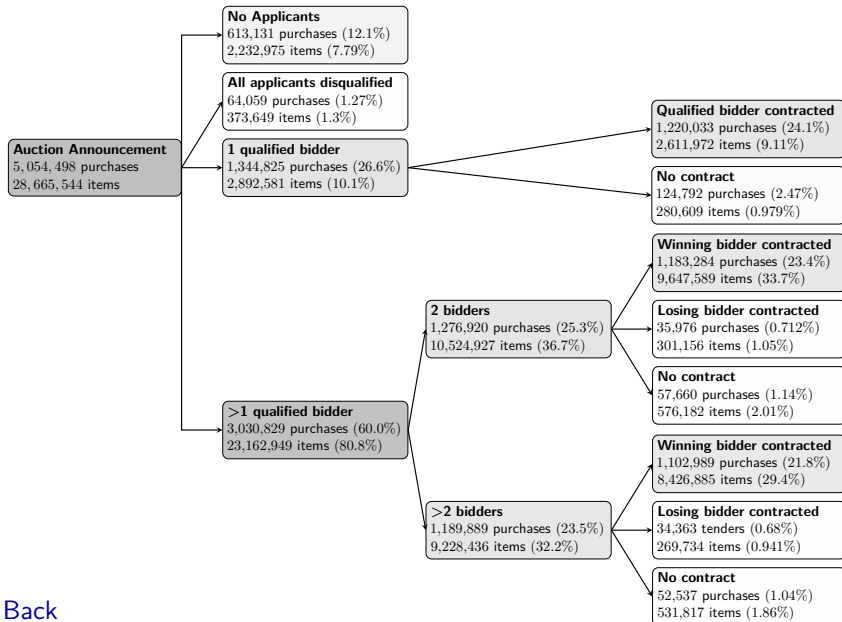
- Identification

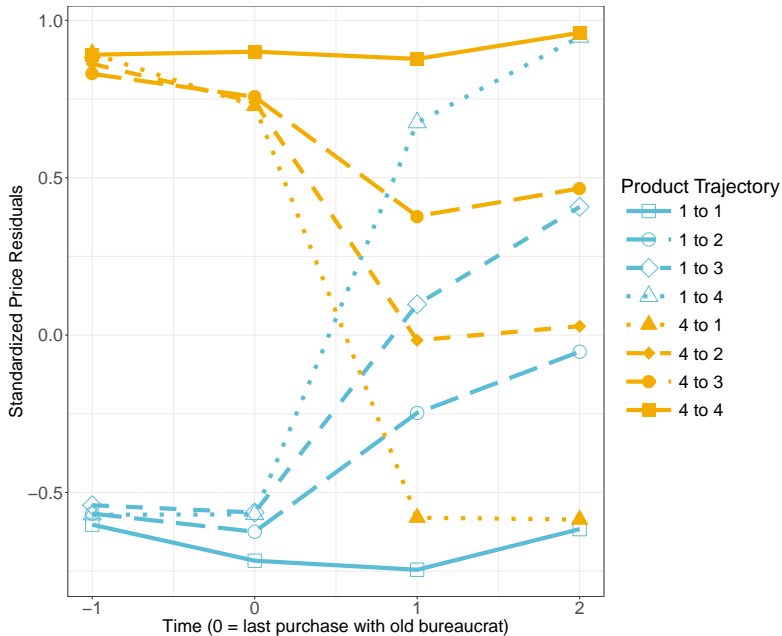
Conclusion

Conclusion

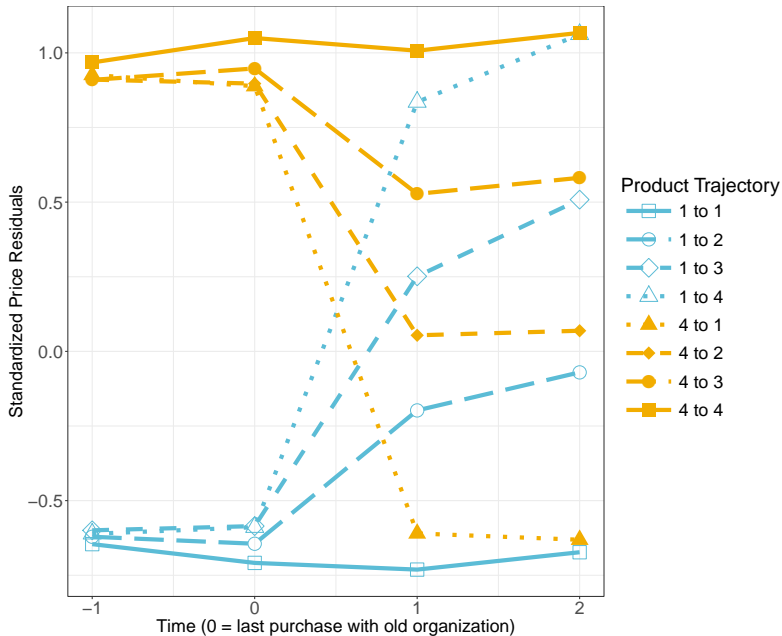
- ▶ Procurement as window into determinants of state's effectiveness
- ▶ Sources of State Effectiveness
 - ▶ Weber (1922) *"Bureaucracy develops the more perfectly, the more it is 'dehumanized'... The individual bureaucrat cannot squirm out of the apparatus into which he has been harnessed"*
 - ▶ $\sim 1/2$ of variation in prices paid due to bureaucrats & organizations. Far from Weberian ideal.
 - ▶ Effective burs/orgs encourage entry
- ▶ Consequences for Policy Design
 - ▶ No average effect of bid preferences on prices.
 - ▶ Prices *decrease* for low effectiveness buyers; *increase* for effective
 - ▶ Optimal policy decreasing in bureaucratic effectiveness
- ▶ Low effectiveness \Rightarrow policy lowers prices. Like raising effectiveness.
- ▶ Tailoring policy to capacity substitute for raising capacity.

Appendix Slides

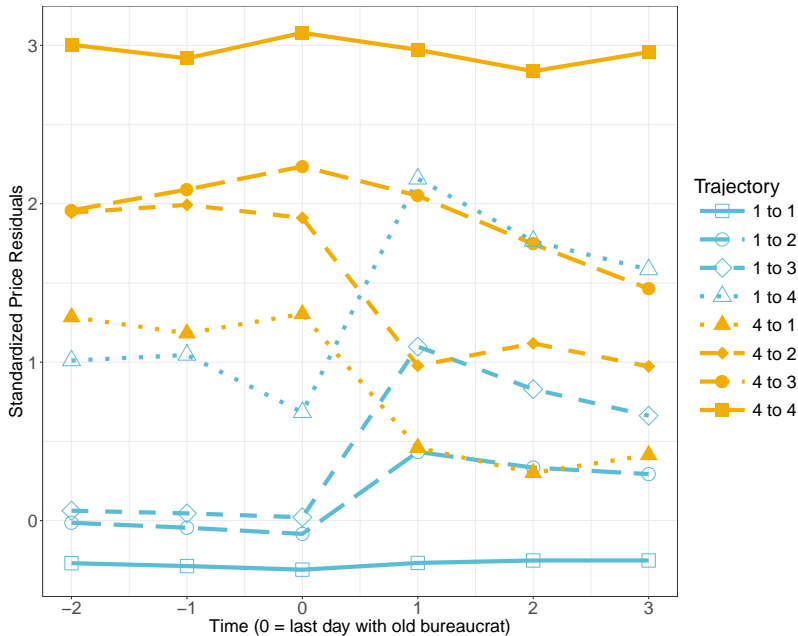




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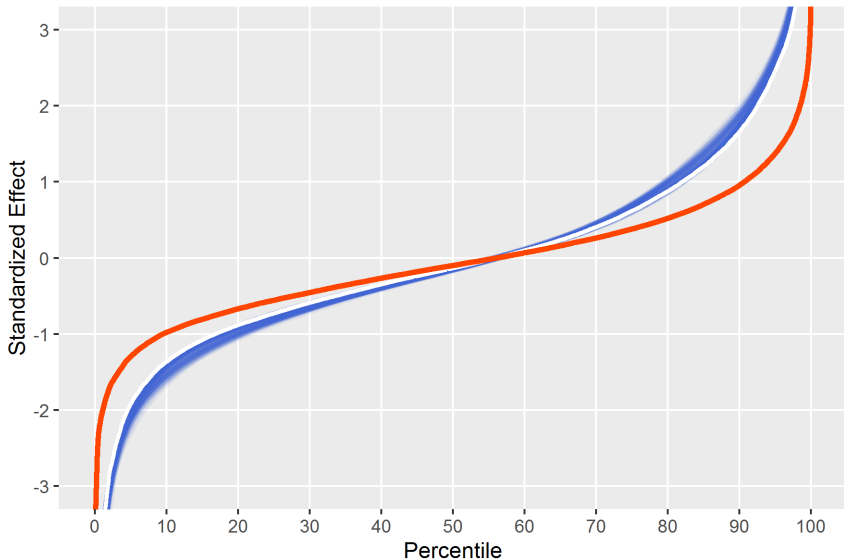


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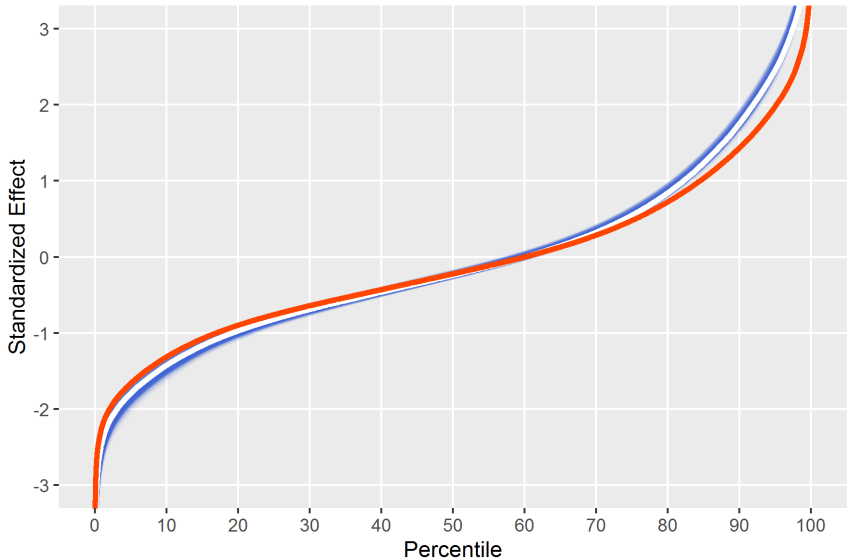
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Shrinking Organization Effects



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Shrinking Pair Effects



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Robustness: Homogeneity

- ▶ Use Sutton (1998) measure of differentiation
- ▶ Using more homogenous sample does not reduce bur/org effects

	(1) Quintile 1	(2) Quintile 2	(3) Quintile 3	(4) Quintile 4	(5) Quintile 5	(6) 10-Digit Codes
(1) s.d. of Bur + Org Effects Within CS (across items)	0.789	0.801	0.863	0.865	0.847	0.817
(2) s.d. of Total Bur + Org Effects (across items)	0.927	0.966	1.053	1.007	1.027	1.008
(3) s.d. of log P	1.752	2.175	2.291	2.390	2.433	2.388
(4) s.d. of log P good, month	1.271	1.444	1.532	1.574	1.599	1.526
(5) s.d. of Bur+Org Within Efs / s.d. of log P good, month	0.621	0.555	0.564	0.549	0.530	0.535
(6) s.d. of Bur+Org Total Efs / s.d. of log P good, month	0.729	0.669	0.687	0.640	0.643	0.660
(7) Sample Size	1,097,233	2,275,959	3,231,115	4,300,461	5,222,931	7,055,150

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Robustness: Medicines Subsample

- ▶ Contract contains active ingredient, dosage, packaging, manufacturer
- ▶ Construct barcode-level FE

	Prices (P) 1	(s.e.) 2	Participation (N) 3	(s.e.) 4
(1) s.d. of Bureaucrat Effects	0.330	(0.0168)	0.786	(0.00907)
(2) s.d. of Organization Effects	0.282	(0.0134)	0.572	(0.00457)
(3) s.d. of Connected Set Effects	0.387	(0.0245)	0.217	(0.0028)
(4) s.d. of Bur + Org Effects Within CS (across pairs)	0.225	(0.00723)	0.626	(0.0022)
(5) s.d. of Total Bur + Org Effects (across pairs)	0.279	(0.0181)	0.628	(0.00427)
(6) s.d. of Bureaucrat Effects (across items)	0.191	(0.0149)	0.520	(0.00915)
(7) s.d. of Organization Effects (across items)	0.194	(0.0149)	0.449	(0.00911)
(8) s.d. of Connected Set Effects (across items)	0.201	(0.0133)	0.0823	(0.00224)
(9) s.d. of Bur + Org Effects Within CS (across items)	0.162	(0.00672)	0.518	(0.00193)
(10) s.d. of Total Bur + Org Effects (across items)	0.251	(0.0152)	0.519	(0.00467)
(11) s.d. of Y	2.048		1.204	
(12) s.d. of Y good, month	0.404		1.066	
(13) Adjusted R-squared	0.997		0.849	
(14) Sample Size	200,816		200,816	

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Variance Decomposition Results: Largest Connected Set

	Prices (P) (1)	(s.e.) (2)	Participation (N) (3)	(s.e.) (4)
(1) s.d. of Bureaucrat Effects	1.803	(0.187)	1.282	(0.0564)
(2) s.d. of Organization Effects	1.499	(0.291)	0.970	(0.0689)
(3) s.d. of Bur + Org Effects (across pairs)	1.577	(0.00414)	1.155	(0.00281)
(4) s.d. of Bureaucrat Effects (across items)	1.287	(0.244)	0.883	(0.0813)
(5) s.d. of Organization Effects (across items)	1.241	(0.271)	0.792	(0.0823)
(6) s.d. of Bur + Org Effects (across items)	1.063	(0.00287)	0.656	(0.00216)
(7) s.d. of Y	2.683		1.364	
(8) s.d. of Y good, month	1.773		1.231	
(9) Adjusted R-squared	0.959		0.828	
(10) Sample Size	2,858,982		2,858,982	

Residuals Heat Map

Figure: No Correlation Between Effects and Residuals

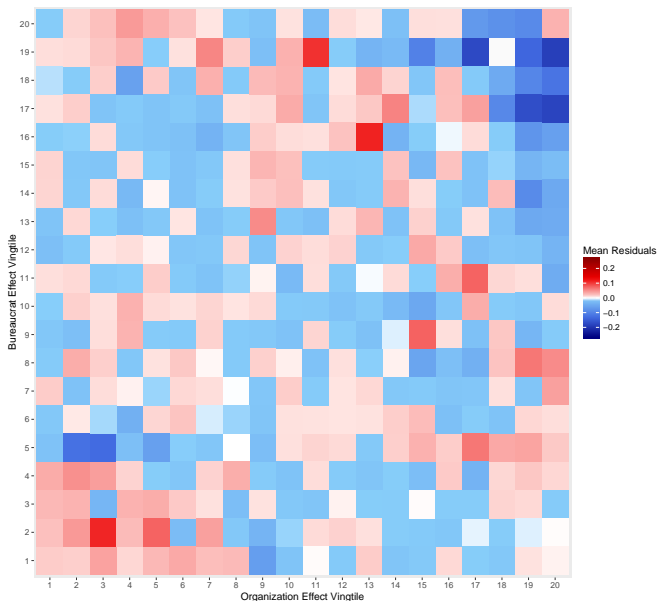
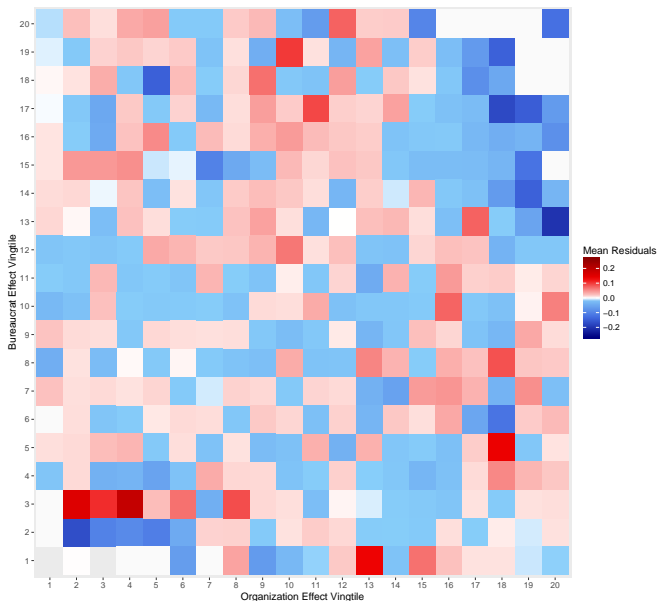
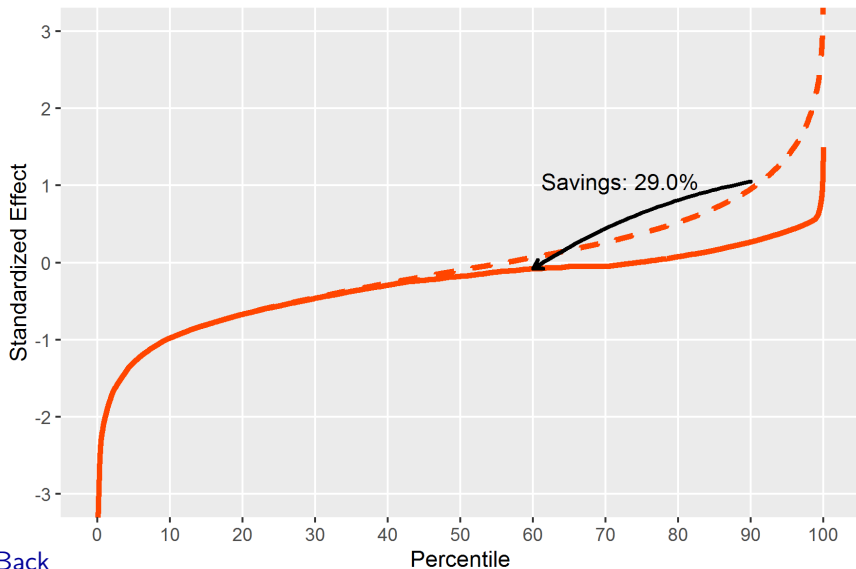


Figure: No Correlation Between Effects and Residuals

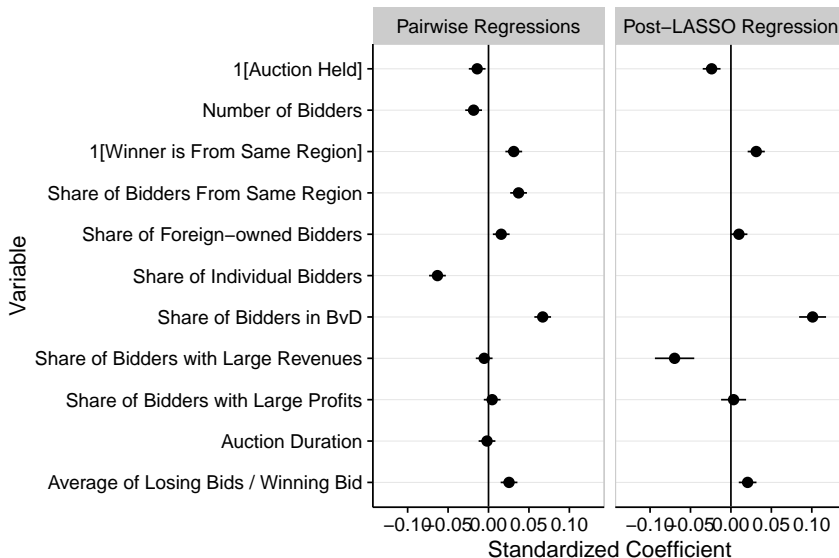


Crude Counterfactual: Improving Organizations



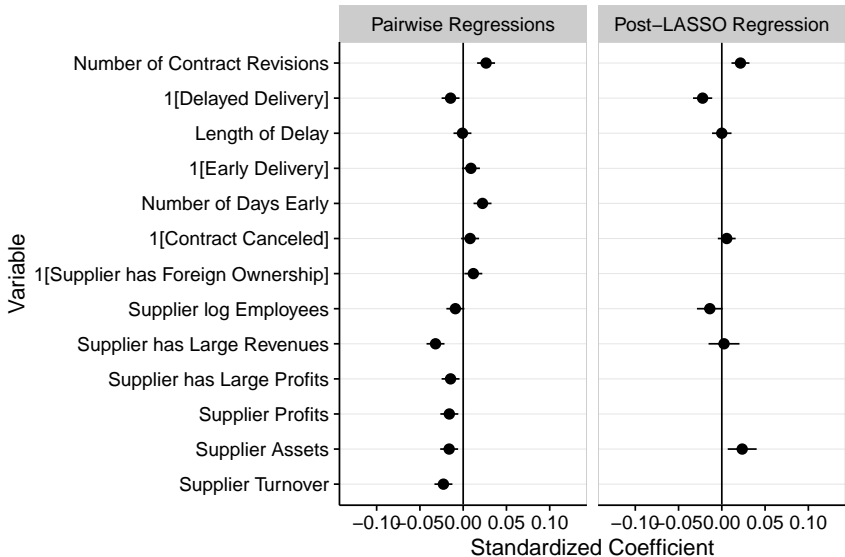
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Figure: Correlates of Bureaucrat Effects: Auction Stage



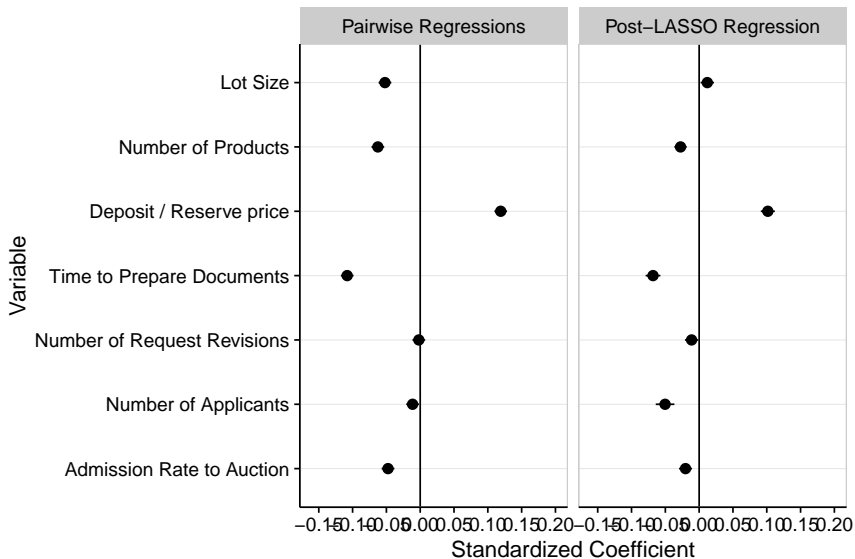
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Figure: Correlates of Bureaucrat Effects: Contracting Stage



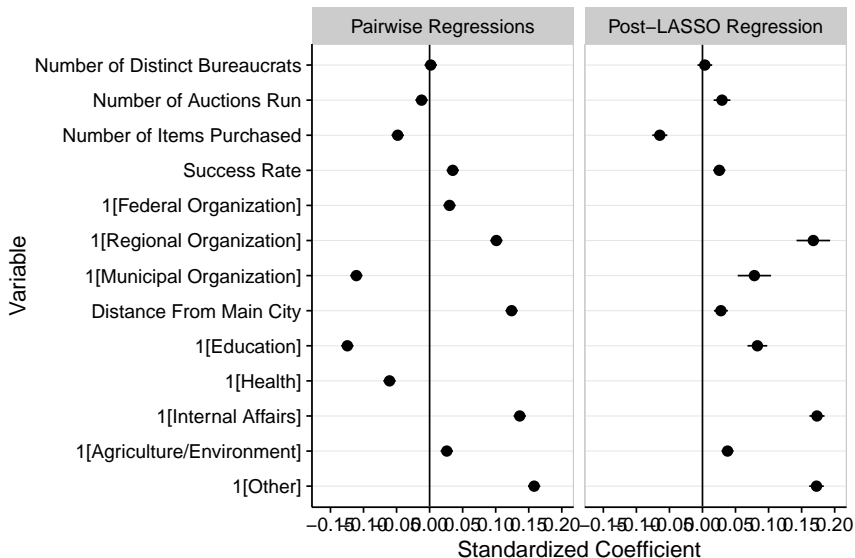
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Figure: Correlates of Organization Effects: Qualification Stage



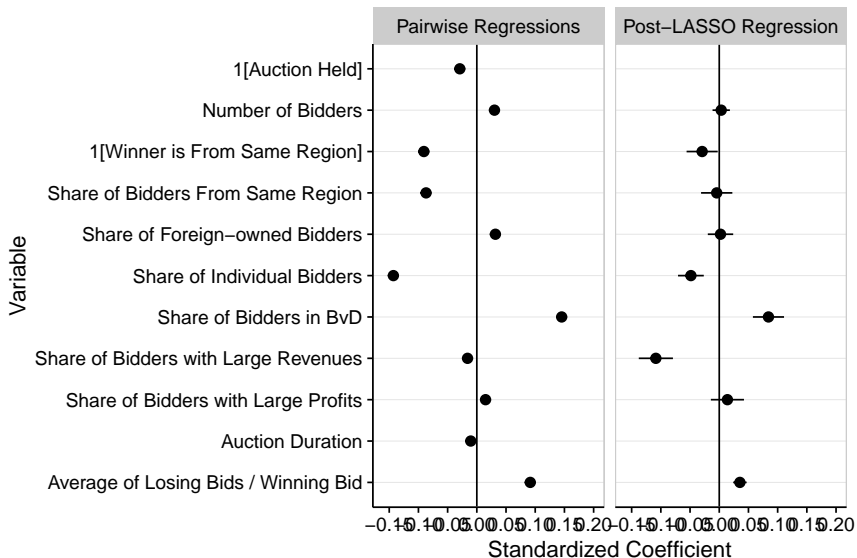
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Figure: Correlates of Organization Effects: Organization Attributes



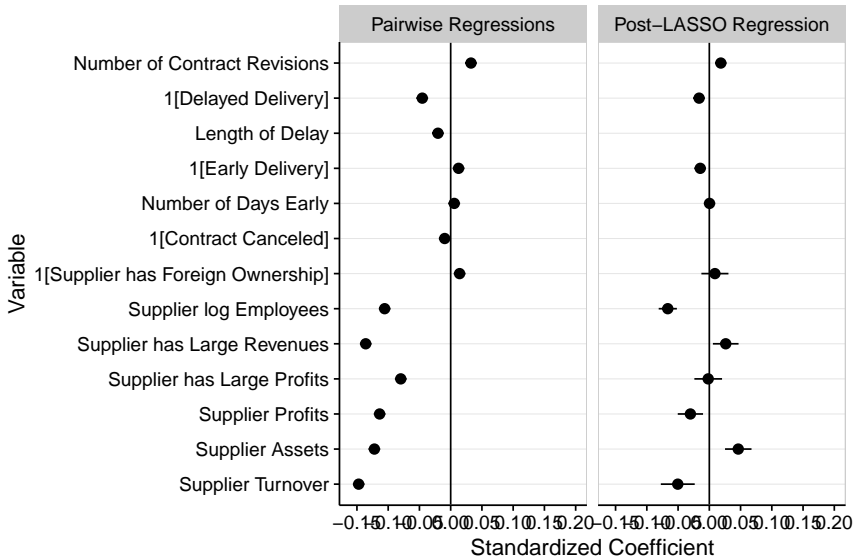
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