Winning by Default: Why is There So Little Competition in Government Procurement?

Karam Kang and Robert A. Miller

Carnegie Mellon University

June 2018, EIEF

Competition in Government Procurement

- US Federal regulations allow restricting entry and negotiations

  - Reforms in the Clinton administration to allow more discretion

  - In FY 2010, \$241 billion (45%) paid for contracts with a single bid

- More competition is costly

  - Sellers (Contractors): Bid preparation

  - Buyer (Procuring agency): Administration, capture, corruption

- Quantify factors determining competition and the value of discretion

  - Develop, identify, and estimate a procurement model

  - Employ data on the IT service contracts of FY 2004-2012

What This Paper Does

- Integrate two important institutional features:

  1 Buyer chooses the extent of competition

  2 Final contract price is often different from initial price

- Competition affects the terms of initial contract and the final price

- We find it is important to study the mechanism through which ex-post price changes occur in conjunction with the buyer's discretion regarding the extent of competition

Key Institutional Feature 1: Endogenous Competition

- Regulations permit contracting without full and open competition

  ❶ Non-discretionary: Statutes, international agreements, set-asides

  ❷ Discretionary: Brand, patents, copyrights, urgency

- Most studies estimate effects of limited competition, *taking policies given* (Krasnokutskaya & Seim, 2011; Athey, Coey & Levin, 2013)

- We study endogenous competition, focusing on buyer preferences

  – Related to empirical studies on government buyer behaviors (Bandeira, Prat & Valletti, 2009; Coviello, Guglielmo & Spagnolo, 2017; Decarolis, Giuffrida, Iossa, Mollisi & Spagnolo, 2018)

Key Institutional Feature 2: Ex-post Price Changes

- Ex-post changes may arise from

    ❶ Ex-post renegotiations

    ❷ Contingencies specified in the original contract

- Ex-post renegotiations and their costs empirically studied (Gagnepain, Ivaldi & Martimort, 2013; Bajari, Houghton & Tadelis, 2014)

- Contingencies received scant attention in the empirical literature

- We fill this gap by exploiting the data *specifying each contract change* to determine each change into the two categories

Preview of Findings

- Negotiations on contract terms extract a large portion of the informational rent from sellers

  - This reduces the benefit of soliciting more bids compared to bidding and competitive solicitation costs

- Giving discretion to procuring agencies reduces government cost, even if they are engaging in rent-seeking behavior

  - Stripping the buyer of her discretion would increase the average number of bids by up to 2 (from 1.5 bids) and the price by up to $35,800 per contract (3%)

Literature Review

- Corruption and regulatory capture in procurement:
  - Bandiera, Prat & Valletti (2009); Coviello, Guglielmo & Spagnolo (2014)

- Ex-post renegotiations:
  - Crocker & Reynolds (1993); Bajari & Tadelis (2001); Gagnepain, Ivaldi & Martimort (2013); Bajari, Houghton & Tadelis (2014)

- Auctioning incentive contracts:
  - Laffont & Tirole (1987), McAfee & McMillan (1987), Riordan & Sappington (1987)

- Identification of principal-agent models:
  - Perrigne & Vuong (2011), Gayle & Miller (2015)

Data

- Source: Federal Procurement Data System - Next Generation

- IT/telecommunications service contracts of FY 2004-2012:

  1. IT strategy & architecture, programming, cyber security, data entry, backup, broadcasting, storage, and distribution, etc.

  2. With specified quantity and delivery schedule

  3. Large ($300K–$5M), long ($\geq$ 30 days), and commercially unavailable

  4. Total of $3.2 billion (in 2010 dollars), 2,203 contracts

Example IT Service Project
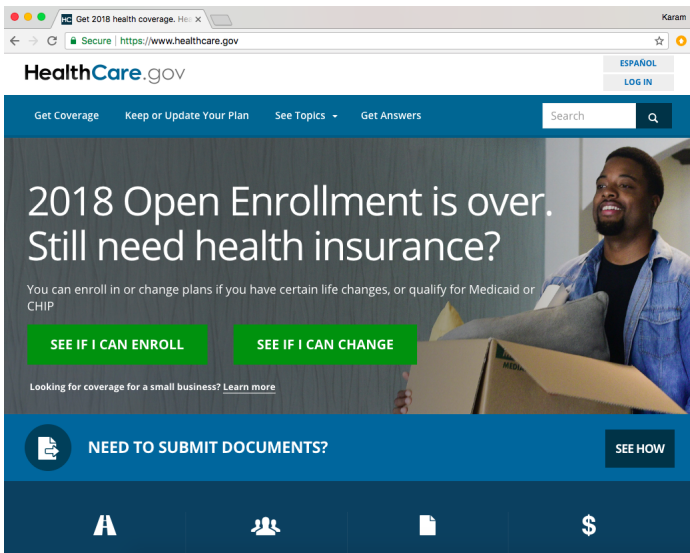
Competition for IT Service contracts

Extent of competition	Obs.	Size ($M)		One Bid Ratio	Num. Bids	
		Mean	SD		Mean	Median
No/limited competition	1,631	1.49	1.20	0.93	1.39	1
Unavailable for competition	796	1.67	1.19	0.98	1.06	1
Set-aside for small business	183	1.71	1.31	0.44	4.20	2
Not competed by discretion	652	1.20	1.12	1.00	1.00	1
Full and open competition	572	1.30	1.10	0.36	4.08	2
Sealed bids	12	2.14	1.22	0.67	1.58	1
Competitive proposals	310	1.38	1.16	0.27	4.55	3
Simplified acquisition	185	1.01	0.84	0.48	2.22	2
Other competitive procedures	65	1.61	1.21	0.37	7.58	2
Total	2,203	1.44	1.17	0.78	2.09	1

Data Feature 1: Competition and Price

1. Contracts awarded by military agencies (Departments of Defense, State, and Homeland Security) tend to be less competitive

2. More competition is associated with higher contract price, even after controlling for observed heterogeneity of each contract

   – Consistent with endogenous determination of number of bids where buyer takes into account *the distribution of seller costs* and *buyer costs of intensifying competition* (both not part of the data)

Data Feature 1: Competition and Price (Cont'd)

	Noncompetitive (1)	One Bid (2)	Log (Final Price)	
			(3)	(4)
Military agency	0.130** (0.055)	0.118*** (0.037)		
Competitive			0.238** (0.094)	0.038 (0.089)
Log (Number of bids)				0.199*** (0.059)
Various FEs†	Yes	Yes	Yes	Yes
N	962	962	962	962
R^2	0.171	0.168	0.317	0.327

Note: The standard errors, in parentheses, are clustered at the 4-digit product and service code level, and provided in parentheses; $^*p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$. † product and service codes, location of the contract performance (state), year of award, and month of the award, respectively. Agency fixed effects are included for (3) and (4).

Data Feature 2: Price and Duration Changes

1. Price changes are frequent (70%) and considerable in size (43%)

   - Ex-post negotiations (additional work, change order, supplemental agreement) or following the original contract (administrative actions, exercise of options)

2. Price changes and delays are positively correlated

3. Price changes occur regardless of contract type as stated in the data

   - Firm-fixed price contracts supposedly make the seller fully responsible for the performance costs and resulting profit or loss (FAR 16)

   - 64% of firm-fixed price contracts have price changes, although less price changes associated with administrative actions

Data Feature 2: Price and Duration Changes (Cont'd)

| | Price | | | | Duration | | Corr.‡ |
| | All | | Firm-Fixed | | All | | |
	Amount	Freq.	Amount	Freq.	Days	Freq.	
Base	712.2		690.9		433.4		
Final	1,256.6		1,112.7		787.1		
Change							
Any	543.6	0.69	421.5	0.64	353.7	0.57	0.41
Added work	23.1	0.07	16.9	0.08	10.4	0.04	0.44
Change order	41.0	0.13	37.1	0.11	21.5	0.09	0.35
Supplemental	52.0	0.19	37.0	0.18	33.2	0.16	0.31
Use options	211.6	0.30	169.7	0.28	141.1	0.26	0.42
Administrative	215.8	0.52	160.8	0.47	147.5	0.38	0.29

Note: Unconditional average price (in 1,000 dollars, CPI-adjusted to 2010). Based on all contracts in the final sample (962 obs), among which 653 contracts are firm-fixed price contracts.

Data Feature 2: Price and Duration Changes (Cont'd)

	Added Work	Change Order	Supp. Agmt.	Options	Admin.
Firm-fixed price contract	-1.649	8.685	-33.21	-52.59	-181.7***
	(11.68)	(16.05)	(20.30)	(41.52)	(47.60)
Fixed effects†	Yes	Yes	Yes	Yes	Yes
N	962	962	962	962	962
R^2	0.404	0.385	0.281	0.314	0.289

Note: The dependent variables are the amount of price changes in 1,000 dollars (CPI-adjusted to 2010) for each of the six categories of reasons for modification. All contracts in the final sample are included; standard errors are provided in parentheses; $^*p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$. † 4-digit product and service codes, procurement agency, location of the contract performance (state), year of award, and month of the award, respectively.

Repeated Interactions?

- Sellers who win multiple contracts do NOT face less competition
- We observe number of losing bids, but not their identities

	Num. Sellers	Num. Contracts	Competed	Num. Bids
Non-repeat sellers	284	284	0.33	2.38
	46.0%	29.5%	(0.03)	(0.54)
Repeat sellers (≤ 10)	282	405	0.28	1.69
	45.6%	42.1%	(0.02)	(0.10)
Repeat sellers (> 10)	52	273	0.37	2.57
	8.4%	28.4%	(0.03)	(0.40)
Total	618	962	0.32	2.14

Notes: Seller groups based on the seller's history of winning any of the definitive IT and telecommunications contracts with a contract size greater than or equal to $300,000 (8,199 contracts in total)

From Data to Model: Overview

- Key features of the data:

  1. Extent of competition affected by the buyer

  2. Winner selection and contract negotiations occur simultaneously

  3. Ex-post price changes from contingencies in/out of the initial contract

- Key features of the model:

  1. There is a default seller; buyer chooses whether to solicit bids

  2. If soliciting bids, buyer chooses the extent of efforts for more bids

  3. Contract negotiations are a screening device (menu of contracts)

  4. Bidders' contract choice reveals their type and determines the winner

Buyer's Payoff and Choices

- Final contract price = Base price (p) + Ex-post price change (Δ)

- Buyer's total cost:

$$\underbrace{p + \Delta}_{Transfer} + \underbrace{\kappa(n)}_{Bidding} + \underbrace{\eta}_{\substack{Competitive \\ solicitation}}$$

- Buyer decides

  ❶ Whether to solicit *extra* bids

  ❷ Bidder arrival rate λ: Number of *extra* bids $\sim$ *Poisson*(λ)

 ❸ Menu of contracts and the winner

Sellers' Payoff and Choice

- Cost of completing a project:

  1 Deterministic (hidden): Low-cost (α) and high-cost ($\alpha + \beta$)

  2 Stochastic (revealed to both parties): Ex-post cost change (ϵ)

- Payoff from contract (p, Δ) and realized ϵ for a low-cost seller:

$$\underbrace{p - \alpha}_{deterministic} + \psi \underbrace{(\Delta - \epsilon)}_{stochastic}$$

  - Liquidity concerns, or the cost of working capital: $\psi' > 0, \psi'' < 0$, $\psi(0) = 0$, and $\psi'(0) = 1$

- Upon participation, sellers choose a contract from a menu

Timeline
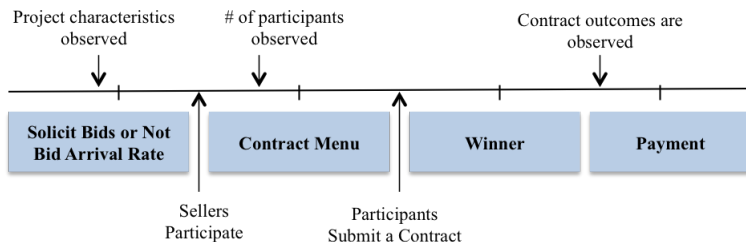
- Project characteristics: Ratio of low-cost sellers (π) and η

- Stochastic contract outcomes: ϵ and s

  1 Uninformative: ϵ is independent of type

  2 Informative: $s \sim \underline{F}(\cdot)$ or $\overline{F}(\cdot)$ on common support, $\underline{F}(s) \neq \overline{F}(s)$ for some s with positive measure

Equilibrium

1. Menu of contracts and a winner selection rule, *as a function of a number of bids*

   – All equilibrium menus induce a separating BNE

   – Winner selection: Bidder choosing a contract for low-cost ones is preferred

2. Extent of competition:

   – If soliciting bids, choose the effort to attract bids (λ) to minimize

   $$U(\lambda, \eta) = \sum_{j=0}^{\infty} \frac{\lambda^j e^{-\lambda}}{j!} \left[\underbrace{T(j+1)}_{Transfer} + \underbrace{\kappa(j+1)}_{Bidding} \right] + \underbrace{\eta}_{Solicitation}$$

   – Solicit bids if and only if $U(\lambda^*, \eta) \leq U(0,0)$

Equilibrium Menu of Contracts

Theorem (4.1, p.15)

The minimal number of items on an optimal menu is two. All optimal menus induce a separating equilibrium amongst the sellers: low-cost sellers submit fixed contracts and high-cost sellers submit variable contracts. The optimal menu containing two items is uniquely defined by the price of the fixed contract $(\underline{p}_n)$ and and the variable contract $(\overline{p}, q(\cdot))$:

$$
\begin{aligned}
\underline{p}_n &= \alpha + \frac{\pi (1-\pi)^{n-1}}{1-(1-\pi)^n} \left(\beta - \int \psi[q(s)] \left[1 - I(s)\right] \overline{f}(s) ds \right), \\
\overline{p} &= \alpha + \beta - \int \psi[q(s)] \overline{f}(s) ds, \\
q(s) &= \begin{cases} h\left(\frac{1 - \min\{\pi, \tilde{\pi}\}}{1 - \min\{\pi, \tilde{\pi}\} I(s)} \right) & \text{if } I(s) \leq \tilde{l}(\min\{\pi, \tilde{\pi}\}), \\ M & \text{if } I(s) > \tilde{l}(\min\{\pi, \tilde{\pi}\}). \end{cases}
\end{aligned}
$$

Equilibrium Menu of Contracts (Cont'd)

Given a number of bids (n):

- Optimal menu containing two items is *uniquely* defined

- Low-cost sellers for contracts that only depend on ϵ ("*fixed*")

$$\underline{p}_n + \epsilon$$

- High-cost sellers for contracts that depend on both ϵ and s ("*variable*")

$$\overline{p} + q(s) + \epsilon$$

- Winner selection: Bidder choosing the fixed contract is preferred

Notation: Uninformative (ϵ)/informative outcomes (s) of seller type

Buyer's Problem (A Cut-down Version)

- Ex-ante symmetric n bidders; low cost with probability of π

$$\min_{\underline{p}_n, \overline{p}, q(\cdot)} \quad \underbrace{(1 - (1 - \pi)^n)}_{\substack{\text{Prob. of having} \\ \text{at least 1 low-cost} \\ \text{seller}}} \quad \underline{p}_n + (1 - \pi)^n (\overline{p} + \int q(s) \overline{f}(s) ds)$$

Subject to: $\quad \overline{p} + \int \psi[q(s)] \overline{f}(s) ds - (\alpha + \beta) \geq 0$ (IR: High-cost)

$$\underline{\phi}_n \left\{ \underline{p}_n - \alpha \right\} \geq \overline{\phi}_n \left\{ \overline{p} + \int \psi[q(s)] \underline{f}(s) ds - \alpha \right\} \text{ (IC: Low-cost)}$$

Equilibrium Menu of Contracts (Cont'd)

$$Fixed: \qquad \underline{p}_n = \alpha + \frac{\pi(1-\pi)^{n-1}}{1-(1-\pi)^n} \left\{ \beta - \int \psi[q(s)] \left[\overline{f}(s) - \underline{f}(s) \right] ds \right\}$$

$$Variable: \quad Base \quad \overline{p} = \alpha + \beta - \int \psi[q(s)]\overline{f}(s)ds$$

$$Change \quad \psi'[q(s)] \left[1 - \pi\underline{f}(s)/\overline{f}(s) \right] = 1 - \pi$$

- Likelihood ratio $(\underline{f}(s)/\overline{f}(s))$ ↑: Contingency price $(q(s))$ ↓

- Ratio of low-cost sellers (π) ↑: More volatile $q(\cdot)$, Fixed price $(\underline{p}_n)$ ↓

- More bidders: Fixed price $(\underline{p}_n)$ ↓ (Competition effect!)

Characterization of the Menu: Variable Contract

$$Base\ price: \qquad \overline{p} = \alpha + \beta - \int \psi[q(s)]\overline{f}(s)ds$$

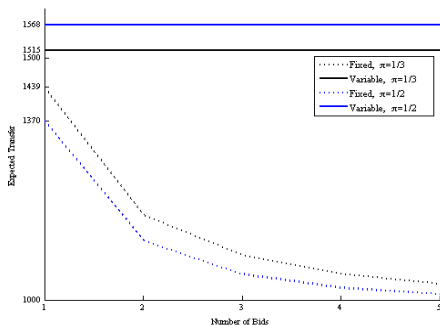$$Price\ change: \qquad \psi'[q(s)]\left[1 - \pi\underline{f}(s)/\overline{f}(s)\right] = 1 - \pi$$
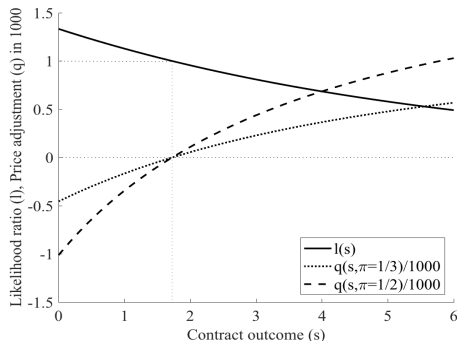
- Low-cost ($\alpha = 1000$)
- High-cost ($\alpha + \beta = 1500$)
- Ratio of the low-cost type: $\pi = 1/3,\ 1/2$
- Outcome s dist: $\underline{\underline{F}}(\cdot) \sim Gamma(1, 1.5)$, $\overline{F}(\cdot) \sim Gamma(1, 2)$

Characterization of the Menu: Expected Transfer

$$Fixed: \qquad \underline{p}_n = \alpha + \frac{\pi(1-\pi)^{n-1}}{1-(1-\pi)^n} \left\{ \beta - \int \psi[q(s)] \left[\overline{f}(s) - \underline{f}(s) \right] ds \right\}$$

$$Variable: \qquad \overline{p} + \int q(s)\overline{f}(s)ds = \alpha + \beta + \int \left\{ q(s) - \psi[q(s)] \right\} \overline{f}(s)ds$$

- Low-cost ($\alpha = 1000$)

- High-cost
  ($\alpha + \beta = 1500$)

- Ratio of the low-cost
  type: $\pi = 1/3, 1/2$

- Outcome s dist:
  $\underline{F}(\cdot) \sim Gamma(1, 1.5)$,
  $\overline{F}(\cdot) \sim Gamma(1, 2)$

Identification

- Observe the joint distribution of (solicitation, number of bids, contract type, base price, ex-post price changes, and contract outcomes)

- π as a project-specific unobserved heterogeneity

    - More competition, higher price conditional on project attributes

    - We assume that (π, s, ϵ, η) are mutually independent

- Allow project costs and bidding costs to vary with π

- We identify (i) the distribution of (π, s, ϵ, η); (ii) project costs and bidding costs as functions of π; and (iii) liquidity cost function

Identification of Seller Primitives

Lemma (5.2, p.21)

$f_{\pi|c,n,v}(\pi|c,n,v)$ is identified.

Theorem (5.1, p.21)

$\psi(q)$, $\alpha(\pi)$ and $\beta(\pi)$ are identified, and for $n \in \{2, 3, \ldots\}$:

$$
\begin{aligned}
\alpha(\pi) &= \frac{1-(1-\pi)^n}{1-(1-\pi)^{n-1}} \underline{p}_n^*(\pi, c) - \frac{\pi(1-\pi)^{n-1}}{1-(1-\pi)^{n-1}} \underline{p}_1^*(\pi, c), \\
\beta(\pi) &= \overline{p}(\pi) + \int \psi\left(h\left[\frac{1-\pi}{1-\pi l(t)}\right]\right) \overline{f}(t)\, dt - \alpha(\pi).
\end{aligned}
$$

Sketch of the Proof for Identification of Seller Primitives

- Lemma 5.1: monotone relationships in π (ratio of low-cost sellers)

  ① Higher π, more volatile ex-post price changes $(\partial |q(s; \pi)| / \partial \pi > 0)$

  ② Higher π, lower fixed price values $(\partial \underline{p}_n(\pi) / \partial \pi < 0)$

  ③ Higher π, lower base price for variable contracts $(\partial \overline{p}(\pi) / \partial \pi < 0)$

- Equilibrium of the model is separating: Seller type is observed by contract type (low-cost= fixed; high-cost =variable)

- With these two equilibrium restrictions and the optimality conditions, we nonparametrically identify (i) liquidity cost function, (ii) the distribution of π conditional on contract type, number of bids, and solicitation, and (iii) project costs

Identification of Seller Primitives (1/4)

- Given the separating equilibrium, the distribution of s for fixed contracts is $\underline{f}(s)$, and that of variable ones is $\overline{f}(s)$ (and hence $l(s) \equiv \underline{f}(s)/\overline{f}(s)$ is identified)

- We start with the FOC wrt q:

$$\psi'[q(s)]\left[1 - \pi l(s)\right] = 1 - \pi$$

- The following first-order ODE is derived from the above FOC

$$\psi''(q) = \left[\frac{1 - \psi'(q)}{1 - l^*(q, \overline{p})}\right] \psi'(q) \frac{\partial l^*(q, \overline{p})}{\partial q}$$

where $l^*(\overline{p}, q)$ is $l(s)$ for the corresponding $(\overline{p}, q)$

- We can solve $\psi(\cdot)$ uniquely using $\psi'(0) = 1$ and $\psi(0) = 0$

Identification of Seller Primitives (2/4)

- π corresponding to each variable contract $(\overline{p}, q, s)$ is identified from the FOC by:

$$\pi_{q,s} \equiv \frac{1 - \psi'[q(s)]}{1 - \psi'[q(s)]\, l(s)}$$

  - Identify π distribution for variable contracts: $f_{\pi|c,n,v}(\cdot|c, n, 1)$

- Using the theoretical prediction on the probability of having a fixed-contract conditional on (π, n):

$$f_{\pi|c,n,v}(\pi|c, n, 0) = \frac{[1 - (1 - \pi)^n]\Pr(v = 1|c, n)}{(1 - \pi)^n \Pr(v = 0|c, n)} f_{\pi|c,n,v}(\pi|c, n, 1)$$

Identification of Seller Primitives (3/4)

- Joint probability that a contract is fixed and $\pi \leq \pi^*$:

$$\begin{aligned}
\Pr\{\pi \leq \pi^*, v = 0 \,|\, n\} &= F_{\pi|v,n}(\pi^* \,|\, 0, n) \Pr(v = 0 \,|\, n) \\
&= \int_{\pi=\underline{\pi}}^{\pi^*} f_{\pi|n}(\pi \,|\, n) \left[1 - (1-\pi)^n\right] d\pi.
\end{aligned}$$

- By taking the first order derivative with respect to π^*:

$$f_{\pi|v,n}(\pi^* \,|\, 0, n) \Pr(v = 0 \,|\, n) = f_{\pi|n}(\pi^* \,|\, n)\left[1 - (1-\pi^*)^n\right].$$

- Note that

$$\Pr(v = 1 \,|\, \pi^*, n) = (1-\pi^*)^n = \frac{f_{\pi|v,n}(\pi^* \,|\, 1, n) \Pr(v = 1 \,|\, n)}{f_{\pi|n}(\pi^* \,|\, n)}$$

Identification of Seller Primitives (4/4)

- Using the monotonicity between the fixed-price ($\underline{p}_n$) and π:

$$\underline{p}_n^*(\pi, c) = G_{\underline{p}_n|c}^{-1}\left(\int_\pi^{\pi_{\max}} f_{\pi|c,n,v}\left(x\,|\,c,n,0\right)dx\,\bigg|\,c\right).$$

- Project costs are identified from the IR and IC conditions:

$$\alpha(\pi) = \frac{1 - (1-\pi)^n}{1 - (1-\pi)^{n-1}}\underline{p}_n^*(\pi, c) - \frac{\pi(1-\pi)^{n-1}}{1 - (1-\pi)^{n-1}}\underline{p}_1^*(\pi, c)$$

$$\beta(\pi) = \overline{p}^*\left(h\left[\frac{1-\pi}{1-\pi I(s)}\right], s\right) + \int \psi\left(h\left[\frac{1-\pi}{1-\pi I(t)}\right]\right)\overline{f}(t)\,dt - \alpha(\pi)$$

where $\overline{p}^*(q, s)$ is identified directly from data

Sketch of the Proof for Identification of Buyer Primitives

- Recall buyer's total cost:

$$\textit{Transfer}(n, \pi) + \underbrace{\kappa(n, \pi)}_{\textit{Bidding}} + \underbrace{\eta}_{\substack{\textit{Competitive} \\ \textit{solicitation}}}$$

- Transfer and the joint distribution of (*competitive or not*, n, π) have been identified

- Bidding costs, $\kappa(n, \pi)$ are partially identified from the FOC regarding the bid arrival rate, $\lambda(\pi)$

- Exploiting variation in π, assumed to be exogenous to the cost of competitive solicitation (η), probability of solicitation conditional on π helps partially identify the distribution of η

Summary Statistics

| (Prices in $K) | Competitively Solicited? | | | |
| | Yes | | No | |
	Mean	SD	Mean	SD
Number of bids	4.55	10.50	1.00	-
Fixed contract	0.44	-	0.42	-
Price of fixed contracts ($\underline{p}_n$)	1186.87	974.43	825.62	866.65
Base price of variable contracts ($\overline{p}$)	549.14	639.22	534.88	678.26
Cost change independent of seller type (ϵ)	167.34	506.07	189.08	508.11
Contingency price change (q)	683.10	831.01	604.81	729.07
Delay/Base duration (s): fixed contracts	0.03	0.17	0.05	0.18
Delay/Base duration (s): variable contracts	1.75	2.46	1.33	2.20
Awarded by a military-related agency	0.25	-	0.38	-

Estimation

- We estimate a parametric model using a simulated GMM estimator

- Estimated cost components for median contracts:

| (Costs in $K)	Non-military		Military	
	Estimate	SE	Estimate	SE
Project cost for low-cost sellers (α)	884.1	40.4	910.8	45.8
Project cost difference (β)	271.3	32.1	235.3	32.1
Ex-post cost changes ($\mathbb{E}(\epsilon)$)	139.1	15.8	265.2	36.7
Bidding cost with two bidders ($\kappa(2)$)	52.1	8.9	52.1	8.9
Cost of competitive solicitation ($\mathbb{E}(\eta)$)	20.5	4.8	33.6	7.6

Notes: The numbers in this table are evaluated at the unconditional median value of π_{med}, 0.38.

Estimated Endogenous π Distribution
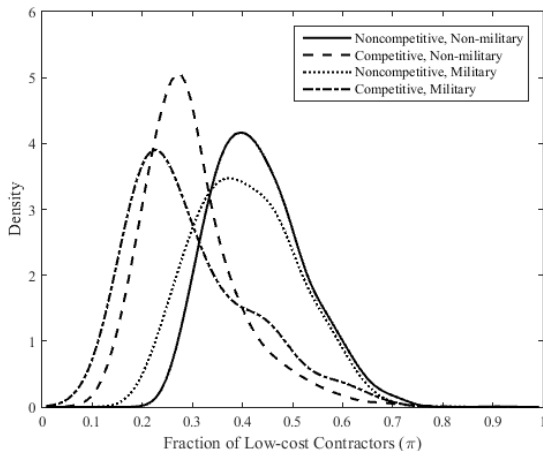
Why So Little Competition: Effective Contract Negotiations

- Negotiating contract terms helps the buyer extract a large portion of informational rent
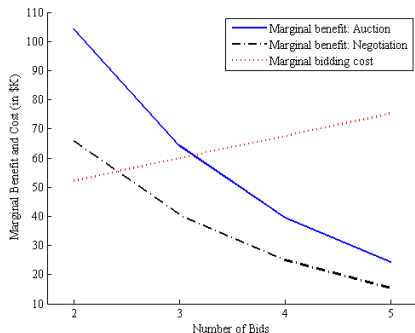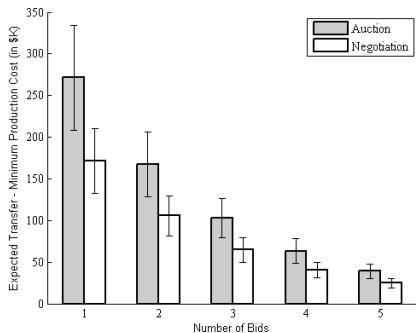
Why So Little Competition: Effective Contract Negotiations

- What if only fixed price contracts are allowed?

    (3) Full delegation regarding competition

    (4) Mandated competitive solicitation

(Costs in $K)	Current	(3)	(4)
Number of bids	1.5	+0.7	+1.0
Transfer	1,209.5	+35.8	+12.0
Cost components			
A. Project	1,201.9	-30.3	-45.7
B. Liquidity	3.4	-3.4	-3.4
C. Bidding	16.2	+31.4	+49.7
D. Competitive solicitation	2.5	+6.7	+22.5
Aggregate costs			
A+B	1,205.3	-33.7	-49.0
A+B+C	1,221.5	-2.2	+0.6
A+B+C+D	1,223.9	+4.4	+23.2

Why So Little Competition: Large *Passive* Waste

- Making welfare comparisons hinges on the nature of bidding cost and competitive solicitation cost

- Suppose

    ❶ Bidding costs reflect market/regulatory frictions, using resources (*passive* waste)

    ❷ Competitive solicitation costs might reflect corruption or quality (if the former, *active* waste)

- Bandiera, Prat & Valletti (2009) estimate for Italy active waste is up to 11% of transfer; passive waste 15-43%

- We estimate for the US active waste is at most 1-4%; passive 14%

Why So Little Competition: Large *Passive* Waste

- What if more competition is mandated?

    (1) Mandated competitive solicitation

    (2) At least two bids

(Costs in \$K)	Current	(1)	(2)
Number of bids	1.5	+0.3	+0.8
Transfer	1,209.5	-16.8	-45.7
Cost components			
A. Project	1,201.9	-16.9	-45.0
B. Liquidity	3.4	-0.5	-1.0
C. Bidding	16.2	+14.3	+50.1
D. Competitive solicitation	2.5	+22.5	+22.5
Aggregate costs			
A+B	1,205.3	-17.3	-46.0
A+B+C	1,221.5	-3.0	+4.1
A+B+C+D	1,223.9	+19.5	+26.6

Value of Discretion: What if No Discretion?

- Competitive solicitation & first-price sealed bid auctions

    (5) Unconditionally optimal rate of promotion ($\lambda = 1.06$)

    (6) Same as (5) except that bidding costs are halved ($\lambda = 2.48$)

(Costs in \$K)	Current	(5)	(6)
Number of bids	1.5	+0.6	+2.0
Transfer	1,209.5	+30.5	-36.4
Cost components			
A. Project	1,201.9	-27.2	-67.6
B. Liquidity	3.4	-3.4	-3.4
C. Bidding	16.2	+46.0	+63.2
D. Competitive solicitation	2.5	+22.5	+22.5
Aggregate costs			
A+B	1,205.3	-30.6	-70.9
A+B+C	1,221.5	+15.4	-7.7
A+B+C+D	1,223.9	+37.9	+14.8

Conclusion

- Develop and identify a procurement model and estimate it using the IT/telecommunications procurement contract data

  - Integrate (1) endogenous competition and (2) ex-post price changes

  - Identify model with unobserved costs and observed project attributes

- Empirical findings:

  - Negotiations on contract terms extract a large portion of the informational rent

  - This reduces the benefit of soliciting more bids compared to bidding and competitive solicitation costs

  - Giving discretion to procuring agencies reduces government cost, even if they are engaging in rent-seeking behavior