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# Contracting Officer Workload and Contingency Contracting: Evidence from the Department of Defense

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May, 2012

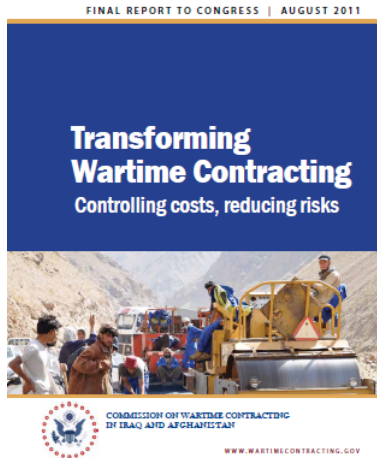
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## Question: The Causes and Effects of Incomplete Contracting

- ① How do procurement contract writers determine how complete a contract to write?
- ② How does that decision affect the other terms of the procurement?
  - Whether the contract is fixed-fee or cost-plus.
  - Whether the contract is fully competed.
  - The price paid.
  - The incidence of renegotiation.
- ③ Policy: What do these results imply about the current size of the contracting workforce?

# Illustration: Wartime Contracting



## Illustration: Wartime Contracting

The agencies have failed to set and meet goals for competition and have repeatedly

- extended contracts and...increased ceilings on cost-type contracts and modified task orders and contracts to add extensive new work
- favored using delivery-order contracts like LOGCAP III over creating more competitive and more targeted contract vehicles; and
- used cost-reimbursable contract types even though simpler, fixed-price contracts could expand the competitive pool.



### **RECOMMENDATION 13**

**Provide adequate staffing and resources, and establish procedures to protect the government's interests**

## Empirical Literature Focuses on Complexity as Driver of Incompleteness

- **Auction/Neg:** Rucker and Munn (Timber-2007), Bajari, Macmillan, Tadelis (Construction-2008), Gil and Oudot (Movies and Defense-2008)
- **FP/CP:** Leffler and Rucker (Timber-1991), Kalnins and Mayer (IT-2004), Crocker and Reynolds (Airforce Engines-1993), **Corts and Singh (Oil Drilling-2004)**
- **Reneg:** Guasch, Laffont, Straub (Concessions & Bureaucratic Quality-2008)
- **Costs:** Bajari, Houghton, and Tadelis (Highway Procurement, 2010)

Our identification strategy is different. Answers are actually quite similar, making us feel more comfortable about both.

## Overview of a Model (Modified Bajari & Tadelis, 2001)

Basic idea: It's costly to write more complete contracts, and even more costly the busier you are. COs will optimally reduce the completeness of their contracts as workload increases and adjust to these less complete contracts in lots of ways.

More complete contracts make:

- ① Renegotiation/Modification less likely (Unforeseen contingencies are rare)
- ② Fixed-Price contracts more attractive (Since renege. FP contracts is more costly)
- ③ Competition more attractive (Since the cost on which firms bid are more likely to matter)
- ④ Prices lower (That's exactly the trade-off, time versus money)

Evidence for all this in the civilian context (Warren(2012)).

## The Data

- 32 DoD contracting offices over 2005-2010 (9 Navy, 8 Army (pre-2009), 8 Air Force, 7 Non-Branch)
- Civilian CO Employment (GS-1102s), by experience.
- Pct. Classified Budget, by branch/year
- Every significant contract with:
  - Extent Competed (Full and Open, Exclusion, Single-Source)
  - Pricing Terms (Firm Fixed, Cost Plus Award, Time and Materials...)
  - Dollars Obligated (Initial or Change)
  - Award Type (Def. Contract, Delivery Order, and Purchase Order)
  - Modification Number and Reason
  - 4-digit Product/Service Code and 6-digit NAICS of contractor
- After dropping micro-purchases (under \$25,000), about 6.9M contractual actions, 2.3M of which are modifications.



## Award Types- DC and DO for presentation

**Original** A new contract. Not a modification of some extant agreement.

Three types

- **Definitive Contract** For a specified quantity. Not an order for supplies/services placed against an established contract or with Government sources or the creation of such a IDV. (EX:Non-Nuclear Ship Repair, Communications Equipment, Ammunition)
- **Purchase Order** A definitive contract that is for a small enough (usually < \$150k) to use simplified acquisitions procedures. (EX: Electronic Modules, Recreational and Gymnastic Equipment, Valves)
- **Delivery Order** A contract for supplies/services that does not specify a firm quantity and that provides for issuance of orders for the delivery of supplies/services during the period of the contract. (Ex: Operation of Government-Owned Facility (Ammunition), Highway Maintenance, Medical Supplies)

## Measuring Workload in a Regression: Outcomes

Problem: If simple contracts take less time, and are easier to compete, an agency with lots of simple contracts will have a large contracts/CO and a high fraction competed.

$$\underline{y_{ipst}} = \beta \text{officers}_{st} + \gamma' \mathbf{E}_{st} + \sum_{j=1}^{55} (\alpha_j N_{jst}) + \delta_{\text{pst}} + \kappa_s * \text{year}_t + \epsilon_{ipst}, \quad (1)$$

Representative outcomes for contract  $i$ , in product/service class  $p$ , in agency  $s$ , in fiscal year  $t$ :

- Does this contract experience a substantive modification?
- Is the contract Full-and-Open competed?
- Is this a firm fixed-price contract?
- How much is obligated on this contract (Log of Real 2009\$)

## Measuring Workload in a Regression: Employment

$$y_{ipst} = \beta \text{officers}_{st} + \gamma' \mathbf{E}_{st} + \sum_{j=1}^{55} (\alpha_j N_{jst}) + \delta_{\text{pst}} + \kappa_s * \text{year}_t + \epsilon_{ipst}, \quad (2)$$

- Log of employment of contracting officers in agency  $s$  in at the end of fiscal year  $t$ .
- Fraction of COs with 10-20 years, and 20+ years of experience.

## Measuring Workload in a Regression: Work

$$y_{ipst} = \beta \text{officers}_{st} + \gamma' \mathbf{E}_{st} + \underbrace{\sum_{j=1}^{55} (\alpha_j N_{jst})}_{\text{workload}} + \delta_{\text{pst}} + \kappa_s * \text{year}_t + \epsilon_{ipst}, \quad (3)$$

- Log of number of original contracts in each of 55 produce/service classes. Ex: Chemical Products, ADP, Tools, Clothing.

## Measuring Workload in a Regression: Fixed-Effects

$$y_{ipst} = \beta \text{officers}_{st} + \gamma' \mathbf{E}_{st} + \sum_{j=1}^{55} (\alpha_j N_{jst}) + \underline{\delta_{pst} + \kappa_s * year_t} + \epsilon_{ipst}, \quad (4)$$

- 3 sorts of Fixed Effects: office, year, product class.
- Agency-specific time trends.

Note:

- ① **Intuitive Regression:** Compare two years where an office has the same mix of product/services but where the number of COs differ from trend in different ways and see if the contractual provisions differ from trend too.

## Summary Stats- Definitive Contracts .38\$T/1.45\$T

	Variable Price(16%)		Firm Fixed Price	
	No Mod.	Mod.	No Mod.	Mod.
Iraq or Af.	0	0.00168	0.118	0.0357
Full and Open Comp.	0.281	0.396	0.416	0.392
Excl. of Sources	0.410	0.434	0.278	0.231
Not Comp.	0.0571	0.117	0.204	0.168
Init Oblig (\$M2009)	0.809	2.808	0.365	2.439
	(8.471)	(40.61)	(2.680)	(34.82)
Final Oblig (\$M2009)	1.066	14.90	0.390	4.883
	(8.724)	(188.9)	(3.076)	(51.60)
Modifications	0	4.806	0	3.438
	(0)	(29.47)	(0)	(6.393)
C. Officers	1105.2	1051.0	1346.9	940.6
	(977.0)	(913.6)	(1024.8)	(745.1)
n	6794	11306	57394	37665
pctmod		63		40

## Summary Stats- Delivery Orders .79\$T/1.45\$T

	Variable Price(16%)		Firm Fixed Price	
	No Mod.	Mod.	No Mod.	Mod.
Iraq or Af.	0.000367	0.00580	0.00329	0.00355
Full and Open Comp.	0.695	0.625	0.702	0.594
Excl. of Sources	0.162	0.145	0.161	0.227
Not Comp.	0.114	0.138	0.0955	0.110
Init Oblig (\$M2009)	0.203	1.277	0.0920	0.728
	(6.431)	(16.05)	(1.169)	(8.833)
Final Oblig (\$M2009)	0.225	3.168	0.0939	1.004
	(6.508)	(50.02)	(1.201)	(12.79)
Modifications	0	2.446	0	1.846
	(0)	(3.813)	(0)	(2.385)
C. Officers	1811.2	808.5	2090.4	1046.8
	(1027.6)	(773.5)	(901.1)	(829.9)
n	422k	77k	2.3M	241k
pctmod		15		9

## Summary Stats- Iraq and Afghan (0.05\$T)

	Variable Price(1%)		Firm Fixed Price	
	No Mod.	Mod.	No Mod.	Mod.
Definitive	0	0.0409	0.163	0.290
Purch Order	0.00641	0.00430	0.656	0.525
Delivery	0.994	0.955	0.181	0.185
Full and Open Comp.	0.801	0.845	0.992	0.971
Excl. of Sources	0.128	0.0774	0.000960	0.00497
Not Comp.	0.0256	0.0624	0.00693	0.0186
Init Oblig (\$M2009)	6.156	19.62	0.211	1.433
	(16.30)	(72.64)	(2.754)	(6.182)
Final Oblig (\$M2009)	8.524	86.14	0.210	1.928
	(33.29)	(573.6)	(3.080)	(11.12)
Modifications	0	5.065	0	2.064
	(0)	(7.449)	(0)	(6.007)
n	156	465	42k	4631
pctmod/FFP		75		10



## Renegotiation I- Substantive Changes (Pre-2009)

	Def. Contract	Del. Order
Panel A: Any Substantive Modifications		
C. Officers	-0.39*** (0.11)	-0.64** (0.27)
C. Officers x IorA	0.09* (0.05)	0.15*** (0.06)
Iraq or Af.	-0.48 (0.35)	-0.95** (0.39)
Pct. 10-20	-0.80*** (0.17)	-1.13*** (0.23)
Pct. 20+	0.39*** (0.15)	-0.82 (0.64)
n	89k	2.7M

## Renegotiation II- Termination

	Def. Contract	Del. Order
Panel B: Termination		
C. Officers	-0.08** (0.04)	-0.03* (0.02)
C. Officers x IorA	0.03* (0.02)	0.01 (0.01)
Iraq or Af.	-0.11 (0.08)	-0.05 (0.05)
Pct. 10-20	0.14* (0.08)	-0.11*** (0.01)
Pct. 20+	-0.10* (0.06)	-0.09* (0.05)
n	89k	2.7M

## Renegotiation III- Number of Changes

	Def. Contract	Del. Order
Panel C: Number of Substantive Modifications		
C. Officers	-2.16*** (0.21)	-1.17** (0.53)
C. Officers x IorA	0.16* (0.09)	0.14 (0.11)
Iraq or Af.	-0.88 (0.59)	-0.71 (0.74)
Pct. 10-20	0.51 (0.65)	-0.78*** (0.31)
Pct. 20+	1.89*** (0.25)	-1.86 (1.31)
n	89k	2.7M

## Workload and Renegotiation

- Consistent effects of workload on modification and termination in expected direction.
- No major differences for I/A on marginal effects, but may weaken estimates slightly.
- Experienced COs have similar effects, except for # of mods in definitive contracts.

# Measures of Competition I: Full and Open Competition

	Def. Contract	Del. Order
Panel A: Full and Open Competition		
C. Officers	0.37*** (0.13)	0.18*** (0.04)
C. Officers x IorA	0.11** (0.05)	0.02 (0.06)
Iraq or Af.	-0.37 (0.34)	0.18 (0.43)
Pct. 10-20	0.32 (0.40)	0.18* (0.10)
Pct. 20+	-0.01 (0.35)	0.15* (0.08)
n	113k	3.03M

## Measures of Competition II: Exclusion of Bidders

In the data, most exclusions take the form of limiting the bidders to specialized groups— Small Businesses, Veteran-Owned Firms, Minority-Owned Firms, etc.

	Def. Contract	Del. Order
Panel B: Competition with Exclusion		
C. Officers	-0.13 (0.14)	-0.09*** (0.03)
C. Officers x IorA	-0.02 (0.03)	0.01 (0.02)
Iraq or Af.	-0.04 (0.21)	-0.33*** (0.13)
Pct. 10–20	-0.59 (0.40)	-0.31*** (0.08)
Pct. 20+	0.07 (0.33)	-0.05 (0.06)

## Measures of Competition III: Not Competed

	Def. Contract	Del. Order
Panel C: Not Competed		
C. Officers	-0.18** (0.08)	-0.10** (0.04)
C. Officers x IorA	-0.06 (0.05)	-0.05 (0.05)
Iraq or Af.	0.37 (0.35)	0.36 (0.37)
Pct. 10-20	-0.04 (0.17)	0.16** (0.08)
Pct. 20+	0.03 (0.17)	-0.12* (0.07)
n	113k	3.03M

## Workload and Competition

- Busier COs decrease use of Full-and-Open Competition and instead limit the universe of firms who can participate or close competition.
- Effect may be stronger in Iraq/Afghanistan
- Effect of more experienced COs seems to be similar to effect of more COs.



# Contract Pricing

	Def. Contract	Del. Order
Use of Firm-Fixed-Price Contracts		
C. Officers	-0.19** (0.09)	-0.16 (0.13)
C. Officers x IorA	0.04 (0.04)	-0.16** (0.08)
Iraq or Af.	-0.29 (0.27)	1.02** (0.51)
Pct. 10-20	-0.02 (0.14)	-0.33 (0.33)
Pct. 20+	-0.05 (0.14)	-0.46 (0.29)
n	113k	3.03M

## Workload and Pricing

- Busier COs *DECREASE* the use of Firm-Fixed-Price contracts.
- Very strong for Iraq/Afghan delivery orders.
- Inconsistent with our model- something else must be going on.

# Obligations I: Initial Obligation

	Def. Contract	Del. Order
Panel A: Initial Dollars Obligated		
C. Officers	-0.65*** (0.24)	-0.12 (0.17)
C. Officers x IorA	0.17 (0.17)	0.41* (0.24)
Iraq or Af.	0.24 (1.13)	-0.64 (1.61)
Pct. 10-20	-1.42** (0.67)	-0.61 (0.80)
Pct. 20+	0.11 (0.53)	-0.76 (0.65)
n	113k	3.03M

## Obligations II: Total Obligation (so far)

	Def. Contract	Del. Order
Panel B: Total Dollars Obligated		
C. Officers	-0.55** (0.26)	0.06 (0.18)
C. Officers x IorA	0.07 (0.21)	0.43 (0.27)
Iraq or Af.	0.58 (1.40)	-0.75 (1.82)
Pct. 10-20	-1.03 (0.74)	0.16 (0.81)
Pct. 20+	-0.09 (0.62)	-0.26 (0.65)
n	113k	3.03M

## Workload and Obligations

- Busier contracting officers obligate more on definitive contracts, both at first and overall.
- Effect is slightly weaker in Iraq and Afghanistan
- Weak evidence that busier contracting officers actually obligated more on delivery orders in Iraq/Afghanistan.
- Inconsistent with our model- something else must be going on.

## Workload and Award Type

	Def. Contract	Del. Order
C. Officers	0.18*** (0.06)	-0.14** (0.06)
C. Officers x IorA	-0.04** (0.02)	0.15*** (0.05)
Iraq or Af.	0.32*** (0.12)	-0.94*** (0.33)
Pct. 10-20	-0.19 (0.14)	0.01 (0.20)
Pct. 20+	-0.04 (0.09)	-0.09 (0.13)
n	113k	3.03M

## Workload and Award Type

- Busier COs use more delivery orders and fewer definitive contracts.
- Not true for contracts in Iraq/Afghan, where there is little evidence of substitution.

## Summary

- Agencies that have a higher workload have more renegotiations, use less competitive acquisitions procedures, use fewer definitive contracts, and obligate more money. They also seem to use more fixed-price contracts.
- With the exception of the substitution to FP, these patterns are consistent with a model of endogenously incomplete contracts, in which the marginal cost of writing more complete contracts increases in workload.
- They are also consistent with a broad constellation of papers that use a different source of variation in the degree of incompleteness-complexity.
- Model seems to work better for definitive contracts, but contracts in Iraq and Afghanistan do not seem especially subject to these workload effects.
- Possible savings by increasing the acquisitions workforce.