Paying over the odds at the end of the fiscal year

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Motivation

- End of year spending has been observed in many countries including the United States [1], the United Kingdom [2], Germany [3] and across other OECD countries [4].
- This end of year spending is regarded as a problem as it is generally believed to be wasteful.
- There is some empirical evidence for this from United States government procurement data [1] and anecdotal evidence from the UK [5].
- This pattern of end of year spending may present an opportunity for firms. If governments are more willing to spend why not increase prices?

Research Questions

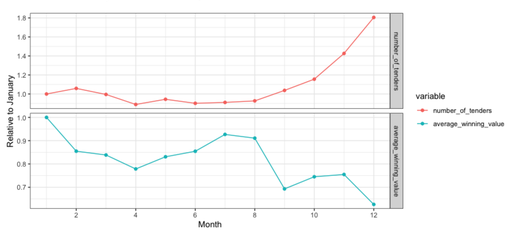
1. How does the end of fiscal year impact the prices government departments pay in procurement?
2. How can governments change how they budget and procure to reduce year-end waste?

Mechanisms

- Government departments are willing to spend more at year-end so firms bid higher.
- Firms experience less competition in bidding at year-end and so bid higher at the end of fiscal year.
- More jobs and less competitive auctions results in a better outside option for a firm that loses an auction. Firms need to be paid more to take a job and give up this outside option.

Data

All Ukrainian government procurement auctions between January 2016 and December of 2019 ($>$ 3.7 million procurements). Fiscal year ends in December.



We can see there are more tenders at the end of the year and they are of generally lower value.

Inferring Costs from bids

We use a **neural network** to estimate the probability of a bidder winning an auction as a function of the auction attributes and a bidders bid, b. We assume:

$$\text{Probability of winning}(b) = k \exp\left(-\theta(b)^{\eta} + s\right)$$

and then use a neural network to estimate the parameters k, θ, η, s for every bidder in every auction. We can then use the first order conditions of our demand function together with the bid chosen b to get the inferred costs of bidder:

$$\text{cost} = b(1 - \frac{b^{-\eta}}{\theta\eta})$$

We can then see how the margin, $\frac{b}{\text{cost}}$, varies with the month of the fiscal year. We ran a series of regressions exploring how margin is affected by whether it is the last month of the year and the number of auction participants.

Main Findings

1. At the end of the year bidders charge around 2.5% more in margin.
2. The goods chosen by departments at year-end tend to be higher margin goods. Total margins paid rises by 7%.
3. Small changes to spending and budgetary rules can lower prices paid by more than 5%.

	(1)	(2)	(3)	(4)
last month	0.016***	0.024***	0.071***	0.076***
	(0.005)	(0.005)	(0.005)	(0.005)
number participants	0.041***	0.041***	0.041***	0.041***
	(0.001)	(0.001)	(0.001)	(0.001)
log expected auction value	−0.020***	−0.021***	−0.032***	−0.032***
	(0.001)	(0.001)	(0.001)	(0.001)
Good FEs	Yes	Yes	No	No
Year FEs	Yes	No	Yes	No
Observations	56,116	56,116	56,121	56,121
R^2	0.204	0.203	0.078	0.077

This indicates that at the end of the fiscal year firms charge higher margins. In addition government departments procure higher margin goods.

Model

Government departments can choose to advertise jobs each month. If they list a job they can choose an expected value E for the job. The number of firms that respond to a job advertisement is drawn from a Poisson distribution:

- If zero firms respond or if only one firm responds for a high expected value (over some "competitive threshold" where procurement rules require a competitive auction) the job fails.
- If one firm responds for a low expected value (below the competitive threshold) then bargaining takes place.
- If two or more firms respond then there is a second price auction.

Firms face an opportunity cost of accepting a job in month m of Ω_m. Costs for a job of expected value E, are drawn from a beta distributions with domain $[0, E]$.

Departments have a dynamic programming problem of:

$$V_m(B_m) = \epsilon_m E_m^{\delta} - DV_{m'}(B_{m'})$$

$$\text{Where : } B_{m'} = B_m \quad \text{if job fails}$$

$$B_{m'} = 1 \quad \text{if } m'(\text{the next month}) == 1$$

$$B_{m'} = B_m - p_m \quad \text{if job succeeds with price } p_m$$

$\epsilon_m \sim LN(0, \sigma^2)$ is a stationary stochastic process.

We calibrate our model to fit the monthly spending profile, the monthly number of advertised jobs, the distribution of expected values and the prices offered by firms. We can fit the data well and in particular can replicate the bunching below the competitive threshold as government departments choose to undercut the threshold in order to avoid the requirement for a competitive tender process.

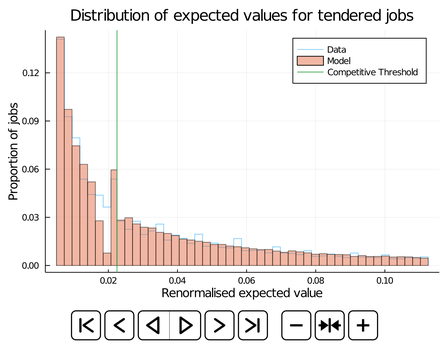


Figure 1:Model vs data - distribution of expected values of procurement auctions

Policy Implications

Given the calibration we perform a series of simulations to assess various policy implications:

- Prices paid in procurement can fall by 5.6% if rollover is allowed (saving funds across fiscal years).
- Prices paid in procurement can fall by 1.5% by reducing the competitive threshold to zero so that all jobs face a competitive tender process.

References

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