Markups and Public Procurement

Evidence from Czech Construction Tenders

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Motivation

- Public procurement accounts for approximately 12% of GDP in OECD countries, representing a significant share of government expenditure.
- Firm-level market power, reflected in markups, influences procurement efficiency and can lead to higher government costs.
- Existing literature highlights inefficiencies in public procurement due to:
  - Lack of transparency and competition.
  - Procurement discretion and political favoritism.
- The link between market power in the private sector and public procurement projects remains underexplored.
- **Research Question**: How does public procurement influence markups in the Czech construction sector?

This Paper

- Analyzes markup trends in the Czech construction sector (2006–2021) using firm-level financial data.
- Investigates the relationship between public procurement and markups by comparing public and private market participants.
- Employs a structural framework to infer the distribution of markups.
- Key causal effects findings:
  1. positive, statistically and economically significant
  2. declining over time

Background

Public Procurement and Market Power

- Government contracts with private firms play a significant role in sectors like construction.
- Markups, defined as price-to-marginal-cost ratios, serve as a proxy for market power and competition.
- Relevant literature highlights factors affecting procurement efficiency:
  - Discretion and political favoritism lead to inefficient allocation (e.g., Palguta and Pertold, 2017; Szucs, 2024).
  - Transparency, competitive bidding, and oversight improve efficiency in European procurement systems (e.g., Titl, 2023; Decarolis et al., 2020).

Data

Data Overview

- Data sources:
  - Financial data on Czech construction firms (2006–2021).
  - Public procurement data from Czech government records.
- Sample:
  - Covers 1,297 firms with at least two consecutive years of data.
  - Focuses on firms with contracts in both public and private sectors.
- Key variables:
  - Markup (μ_{it}):
    The ratio of sales revenue ($P_{it}Q_{it}$) to the cost of goods sold ($P_{it}^{V}X_{it}^{V}$), adjusted by the output elasticity of variable inputs (θ_{it}^{V}) obtained from production function estimation.
  - Public Procurement (W_{it}):
    Indicator denoting whether a firm derived sales from the government in a given year.

Results

Main Findings

- Evolution of markups:
  - Aggregate markups declined from 1.4 in 2006 to 1.3 in 2021.
  - Decline primarily driven by firms with higher initial markups.
- Impact of public procurement:
  - Firms participating in public procurement exhibit significantly higher markups compared to private sector counterparts.
  - Results derived using unconfoundedness-based and causal panel methods.
- Implications:
  - Estimated average treatment effect on government contractors is approximately 15%, indicating increased pricing power in public procurement.
  - Temporal analysis reveals a decline in treatment effects, from 30% in 2006 to 10% in 2021, aligning with institutional improvements in the Czech Republic.

Evolution of Markups

Figure 1: The Distribution of Markups $\hat{\mu}_{it}$ Over Time

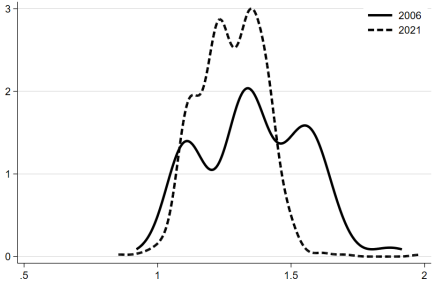


Figure 2: *

Higher Markups in Early Years

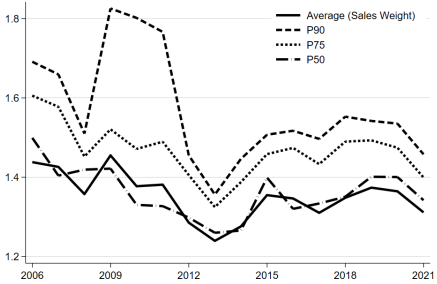


Figure 3: *

Declining Markups by 2021

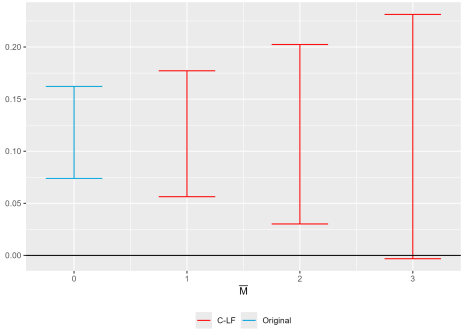
Unconfoundedness

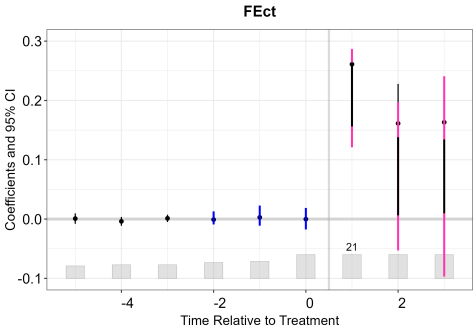
Table 1: ATT Given Unconfoundedness and Placebo Estimates

Effect on Markups	**Contract**	**Pre-Contract Average**
Difference-in-Means	0.12 (0.02)	0.03 (0.02)
Regression	0.16 (0.01)	-0.00 (0.01)
Oaxaca Blinder	0.15 (0.01)	0.00 (0.02)
GRF	0.13 (0.01)	0.03 (0.01)
NN Matching	0.15 (0.01)	0.01 (0.01)
PS Matching	0.13 (0.01)	-0.00 (0.01)
IPW	0.14 (0.02)	0.01 (0.02)
CBPS	0.15 (0.02)	0.00 (0.02)
Entropy Balancing	0.15 (0.03)	-0.00 (0.02)
DML-ElasticNet	0.16 (0.01)	-0.01 (0.01)
AIPW-GRF	0.15 (0.01)	0.00 (0.01)

Causal Panel 1

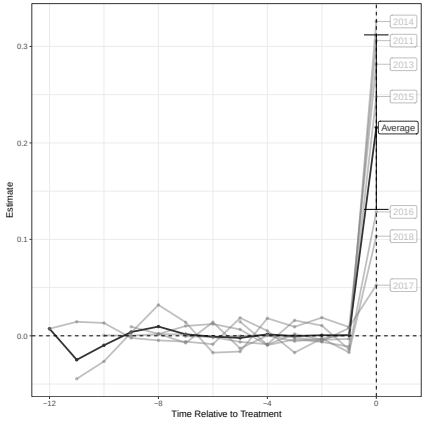
Figure 4: Balanced Panel Absorbing Treatment Sensitivity Analysis





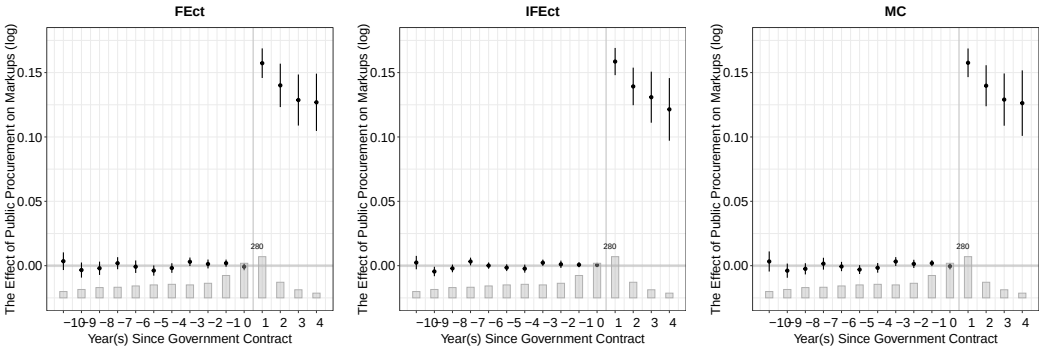
Causal Panel 2

Figure 5: Augmented Synthetic Control: Cohort Aggregated On-impact ATTs



Causal Panel 3

Figure 6: Non-absorbing Treatment Counterfactual Estimator Event Study



Causal Panel 4

Table 2: Matrix Completion Year-Aggregated ATT Estimates

Year	ATT	Standard Err.	No. Treated
2006	0.294	0.016	12
2007	0.282	0.022	7
2008	0.300	0.014	8
2009	0.337	0.010	18
2010	0.273	0.017	9
2011	0.241	0.012	11
2012	0.236	0.013	18
2013	0.262	0.010	18
2014	0.301	0.008	20
2015	0.219	0.008	31
2016	0.092	0.008	34
2017	0.105	0.008	77
2018	0.100	0.006	68
2019	0.101	0.006	74
2020	0.118	0.007	78
2021	0.098	0.008	58

Conclusion

Conclusion

- **Summary:**
  - Findings serve as a benchmark for assessing the competitiveness of government projects relative to those in the private sector.
  - Estimation indicates that firm markups increase during contract years and suggest that treatment effects decline over time.
- **Policy Implications:**
  - There is scope to enhance the design and governance of procurement tenders in order to maximize taxpayer value.
  - Evidence supports the effectiveness of reforms aimed at eliminating single-bidding practices and increasing transparency.
- **Future Research:**
  - Extend the analysis to other sectors and perform cross-country comparisons.
  - Combine results from observational data with quasi-experimental designs (e.g., policy reforms).
  - Incorporate theory to provide insights into the mechanisms–firms maximize the payoffs from public procurement in a dynamic game, where competing in and providing tenders are choice variables.