



Renegotiation of public contracts: An empirical analysis



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HIGHLIGHTS

- We empirically analyze contract renegotiations in a large dataset of Italian public procurements.
- We document that time and cost renegotiations are systematic, but nearly uncorrelated.
- Factors often suggested to explain renegotiations have opposite effects on price and time renegotiations.
- We find evidence of a linkage between the project design stage and renegotiations during the project execution.

ARTICLE INFO

Article history:

Received 12 August 2014

Received in revised form

22 April 2015

Accepted 23 April 2015

Available online 30 April 2015

JEL classification:

L22

L74

D44

D82

H57

Keywords:

Procurement

Auctions

Renegotiations

Delays

Overruns

ABSTRACT

Using a dataset of public contracts awarded in Italy between 2000 and 2007, we document two facts: (i) both price and time renegotiations are systematic, but nearly uncorrelated to each other; (ii) renegotiations are linked to the project design stage.

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1. Introduction

Public procurement is a fundamental area of the economy representing on average 19% of GDP in developed countries. The majority of public contracts are procured via auctions, but, contrary to other auction markets, auctions for contracts typically only set an initial bid that might differ from what is effectively delivered by the contractor.

This paper presents an empirical analysis of this phenomenon by studying price and time renegotiations in a large dataset of

contracts for public works. We operationalize them as the percentage change of the final price paid to the contractor relative to the awarding price and the percentage change of the number of days taken to complete the work relative to the original contractual length of the job.

Our analysis reveals two main empirical facts. First, both price and time renegotiations are systematic, but they are nearly uncorrelated. Our dataset is particularly appropriate to establish this fact because it was constructed by the Italian Authority for Public Contracts to monitor the universe of contracts for public works above € 150,000. In the sample period 2000–2007, price renegotiations larger than 5% involve 46% of the contracts, while time renegotiations larger than 5% involve 83% of the contracts. Renegotiations are economically relevant averaging around 6% for prices and 70% for time. Surprisingly, however, the association between the two

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Table 1
Descriptive statistics.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Analysis sample				Incomplete data			
	Mean	SD	p50	N	Mean	SD	p50	N
Extra cost	7.22	13.3	3.95	23,855	5.76	16.2	3.30	16,842
Extra time	70.7	78.1	46.5	23,855	69.6	91.8	40	38,512
Reserve price	522	957	305	23,855	998	6259	344	116,263
Negotiation	0.15	0.35	0	23,855	0.20	0.40	0	90,059
Design & build	0.11	0.31	0	16,546	0.11	0.32	0	52,931
External design	0.091	0.29	0	23,855	0.074	0.26	0	124,265
Repairs	0.26	0.44	0	23,699	0.24	0.43	0	118,979
Municipality	0.52	0.50	1	23,855	0.45	0.50	0	124,265

The left hand side of the table reports summary statistics for the Analysis Sample where both extra cost and extra time are available. The right hand side of the table reports statistics for all remaining auctions in the dataset that were not used for the analysis due to missing or incomplete data. The value of the reserve price is expressed in € 1000.

measures is very weak: their linear correlation is only 4.5% and no evidence of a nonlinear relationship is present.

Consistent with the previous result, the second empirical fact presented is that the two renegotiation measures are associated in different, and sometimes opposite, ways with a few likely determinants of renegotiations (contract awarding procedure, characteristics of the contract and the procurer). Although we do not aim to establish the presence of a causal effect for all of them, we analyze their relative importance. The most relevant finding is a statistically significant association with features of the design stage, namely whether the winning firm is in charge of both the design and the execution of the project. We explore the role of design & build contracts (D&B) further, finding evidence suggestive that using this type of contract causes shorter time renegotiations and greater cost renegotiations.

Literature—This paper contributes to a small literature that looks at renegotiations from an empirical perspective. Possibly because of the lack of data, only a handful of earlier studies (Ashenfelter et al., 1997 and Cameron, 2000) analyze renegotiations in competitively procured contracts. A renewed interest, however, is showed by two recent works focusing the attention respectively on time renegotiations, Lewis and Bajari (2011), and price renegotiations, Bajari et al. (2014). Relatedly, Decarolis (2014) exploits an instance of change in the awarding procedure in Italy to quantify its effects on both price and time renegotiations. The same data on Italian contracts is used by other authors to study renegotiations. Coviello and Gagliarducci (2010) find that time renegotiations are larger the longer the mayor is in office. Coviello and Mariniello (2014) and Moretti and Valbonesi (2015) study, respectively, the effects of tender publicity and mandatory subcontracting on renegotiations without finding supporting evidence. D'Alpaos et al. (2013) and Coviello et al. (2013) analyze firm's strategic behavior with respect to time overruns in public procurement.

Relative to this literature, this study is less focused on quantifying the causal effect of a specific determinant of renegotiations and, instead, uses a larger dataset than the ones previously used to describe some broad patterns in the data.² Nevertheless, we also present the first step of a causal analysis focusing on the relationship with the project design stage, that appears to be important but whose relevance has not been previously quantified.³

² Relative to other studies that have looked at renegotiations in the same market, this paper uses a more complete version of the data. For instance, Guccio et al. (2012) look only at the period 2000–2004 and focus exclusively on price renegotiations. Both Decarolis (2014) and Coviello et al. (2014) look at both types of renegotiations but in narrowly defined subset of the data.

³ Our research was initiated on behalf of the Bank of Italy. See Decarolis and Palumbo (2011) (in Italian) for a more in depth discussion of the regulatory aspects. For these aspects, see also D'Alpaos et al. (2013) and Coviello et al. (2013).

2. Data and empirical strategy

2.1. Data

The database of the Italian Authority for Public Contracts covers the awarding and the completion stages of the universe of contracts for public works with a reserve price above € 150,000 awarded in Italy. Our sample includes all contracts awarded between 2000 and 2007 and allows us to assess the final price and time as long as the contract was completed by August 2011.

Table 1 presents summary statistics dividing the sample between complete (left panel) and incomplete (right panel) data. We perform the rest of the analysis on the former subset of data that we indicate as Analysis Sample. Although the statistics in Table 1 are quite similar for the two groups of data, the possibility of selection issues requires interpreting the descriptive analysis that follows as conditional on the contracts being part of the Analysis Sample and is a major caveat for our preliminary causal analysis of D&B.

2.2. Empirical strategy

Our descriptive analysis of the two renegotiation measures uses both a graphical and a regression-based approach. The latter entails estimating by OLS separately for each of the two renegotiation measures the model:

$$Y_{ist} = a + b_t + cX_{ist}^{Job} + dX_{ist}^{Procedure} + eX_{st}^{Procurer} + \varepsilon_{ist},$$

where the index i indicates the auction, s the procurer and t the year. The goal is to compare the signs and magnitudes of the conditional correlations across the two variables when the set of covariates includes controls for the type of job (X_{ist}^{Job}), award procedure ($X_{ist}^{Procedure}$) and procurer characteristics ($X_{st}^{Procurer}$).

In particular, based on the previous literature, we included in X_{ist}^{Job} the (log of the) reserve price, a dummy for whether the job entails a new construction or the maintenance of an existing structure, the type of construction (i.e., roadworks, buildings, etc.), whether it is a D&B or exclusively a building contract and whether part of the project design was contracted outside the government agency. In $X_{st}^{Procurer}$ we include an indicator analogous to that of Bandiera et al. (2009) for the degree of centralization of the government agency: high – for agencies depending from the central government –, medium – for local administrations –, and low – for semi-autonomous entities like universities. Finally, $X_{ist}^{Procedure}$ is a set of dummy variables for the type of awarding procedure: negotiations and three types of auctions: economically most advantageous tender, first price and average price. Furthermore, to assess the robustness of the estimates we estimate a model inclusive of fixed effects for either the procurer or the winner of the contract.

Finally, we present the results obtained through a matching estimator as a first step of a causal analysis of the effect of

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