Rigidity and renegotiation initiative in public contracts

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1 Introduction

Past works have found that public contracts are renegotiated more frequently than equivalent private ones [Beuve et al., 2021]. One explanation for this is rigidity, namely the fact that public contracts are governed by stricter and more formal procedures.

Renegotiations are often seen suspiciously in public procurement contexts, because they can be a way for the private party to *ex post* circumvent the competitive tendering process. Moreover, in general, renegotiations *penalize* ex-ante incentives by making profits uncertain. Hence, the normative question we seek to answer here is : should we consider the high rates of renegotiation in public contracts as potentially harmful ?

The goal of this paper is to take a more precise look into who benefits from rigidity-induced renegotiations : does rigidity give more incentives to the private party to renegotiate in order to capture quasi rents ? Or, on the other hand, is it associated with more renegotiations due to purely exogenous events ?

Because it is impossible from an external standpoint to obtain information on how renegotiation affects each party's welfare, we use a proxy for who has an interest in renegotiating the contract, namely initiative of the amendment.

Standard industrial organization theory posits that renegotiation is harmful for competitively awarded public contracts. However, third-party opportunism [Spiller, 2008] argues that rigidity leads to more renegotiation, because formal renegotiations replace informal ones that exist in private contracts, making frequent renegotiations an irremediable constraint in the sense of Williamson [1999]. The normative implications of this are that renegotiations are a natural part of public contract life and should not be seen with such a critical eye as Guasch [2004].

We seek to study the normative implications of rigidity by looking at how it affects, qualitatively, the renegotiation process through the variable of renegotiation initiative. Using a database from the French parking lot sector, we find that rigidity decreases the likelihood of buyer-initiated renegotiation, while it increases the probability of exogenous renegotiation.

2 Literature and motivation

2.1 Renegotiation in public contracts : an overview

Renegotiation occurs when a contract is no longer adapted to the state of the world. In this sense, it is a consequence of contractual incompleteness : if contracts could be perfectly contingent, they would predict an outcome for every possible state of nature, making revision pointless.

Incomplete contracting models show that renegotiations increase *ex-post* efficiency by allowing the contract to adjust to unforeseen contingencies, however they generate *ex ante* inefficiency : if the parties are aware of potential renegotiation, the expected returns for their investments decrease, which lowers their incentives to invest ex ante [Grossman and Hart, 1986; Hart and Moore, 1988]. In particular, relationship-specific investments are discouraged as they lead to a lock-in situation where the risk of "hold-up" through renegotiation is high [Williamson, 1979]. Examples of hold up strategies include lowballing, wherein the supplier of a service ex ante offers a low price to the buyer, then renegotiates the price upwards after the "fundamental transformation" has occurred.

Moreover, under asymmetric information, renegotiation reduces the incentives for parties to cooperate in revelation games [Maskin and Dewatripont, 1990; Bolton, 1990]. Contract revision can also be used by a better-informed agent to completely insure himself against risks when his investments are realized but not yet observable [Fudenberg and Tirole, 1990].

The common conclusion of this literature is that the possibility of renegotiating a contract leaves room for opportunism. The theoretical solution to these problems would be to draft a renegotiation-proof contract, i.e. a contract which prevents parties from renegotiating : however it seems unlikely that a court would enforce such a contract when both parties have *ex post* interest in renegotiating the contract [Tirole, 1999]. Besides, in the case of public procurement, legal bounds exist on the public party's ability to commit to a single relationship [Laffont and Tirole, 1993].

A less pessimistic view of renegotiation has been introduced by recent works in Third party opportunism (TPO). Spiller [2008] argues that procurement contracts are subject to public

scrutiny by political opponents. Writing rigid contracts is a defense mechanism against challenges by interested third parties. A few empirical studies seem to confirm this hypothesis. Moszoro et al. [2013] find that public contracts are indeed more rigid, i.e. governed by strict rules and procedures, than equivalent private ones. Beuve et al. [2019] show that rigidity is caused by higher political contestability, which is a proxy for third party-opportunism. Finally, Beuve et al. [2021] link contestability and rigidity with a higher frequency of renegotiations.

2.2 Renegotiation intiative

Many studies have focused on the risk of operator-initiated renegotiation, with the idea that the private contractor may use his informational advantage to renegotiate the terms of the contract in his favor. Nevertheless, opportunism from the public party is also possible and could take the shape of government-led renegotiation.

Guasch et al. [2007] and Guasch et al. [2006] distinguish between government-led and firm-led renegotiation. Both kinds of renegotiations are associated with different challenges. Concerning government-led renegotiation a newly elected government can use renegotation to expropriate the public party. Moreover, a firm fearing opportunistic renegotiation initiated by the government can withhold strategic information in order to avoid this. Firm-led renegotiation deals with the more standard case of the procurer using his informational advantage to obtain quasi rents through renegotiation. Guasch, Laffont and Straub show in their theoretical models that government-led and firm-led renegotiation are determined by different factors. More precisely, macroeconomic shocks and existence of a regulator have similar effects in both cases, while institutional quality and financial variables, which both affect the statu quo (what happens in case renegotiation fails), have opposite effects on government-led and firm-led renegotiation.

However Guasch, Laffont and Straub focus on the case of developing countries, where contract enforcement may be highly imperfect. In their models, one determining feature is that there is a probability that a change in contract is not enforced by law.

Apart from this strand of literature, studies on renegotiation initiative are scarce, mainly because the problem of expropriation by the government is considered an issue mostly in developing countries.

2.3 Propositions

Renegotiation is a problem if it leads to more opportunism. As a clue for opportunistic behaviour, we use the initiative of renegotiation. The idea behind this is simple : if a renegotiation is clearly linked to an exogenous event, it is unlikely to be motivated by opportunism from one of the parties. In this case, renegotiation of public contracts would not be a problem.

If public contracts are more rigid, they may be more complete, leaving less space for opportunistic manoeuvres[1]. In this case, we can expect rigidity to reduce opportunistically-motivated renegotiations :

Proposition 1a : Party-initiated renegotiations are decreasing in contract rigidity.

However, a more pessimistic view of rigidity could be envisioned, in which we assume a different relationship between rigidity and completeness. Indeed, in the view of Battigalli and Maggi [2002], rigidity can equate more incompleteness, and simply more renegotiation, which could perfectly well be initiated by an opportunistic party. This leads to the counterpart of Proposition 1a:

Proposition 1b : Party-initiated renegotiations are decreasing in contract rigidity.

Following these propositions, another question arises : were rigid contracts more prone to opportunism, would this opportunism be the feat of the municipality or of the operator ? Or would it be associated with more exogenous reneotiations ? As discussed previously, operator opportunism is more often considered, especially since the operator is assumed to have an informational advantage on the municipality. One possibility could then be that operators use the rigidity of the contract as a tool for opportunistic renegotiation. This would mean that public buyers face a tradeoff between protecting against operator opportunism (through contracts that are less likely to be renegotiated) and against third-party opportunism (through more rigid contracts) :

Proposition 2a : Operator-initiated renegotiations are increasing in contract rigidity.

Another option would be that rigidity is a way for the public party to have a high degree of control on the relationship. This is consistent with the idea that in public contracts, contract amendment is a standard management tool rather than an exceptional event. It would also be consistent with the view that rigidity is meant for the public party to have a firm grip on the contract, which would also translate to a firm grip on its amendments :

Proposition 2b : Buyer-initiated renegotiations are increasing in contract rigidity.

[1] Although rigidity and completeness are not equivalent concepts, we can expect them to be correlated.

Finally, the optimistic view would be that rigid contracts are renegotiated more often simply because they lack adaptability to unforeseen contingencies. This does not mean that they are more prone to opportunism, but more likely to be renegotiated because of exogenous events :

Proposition 2c : Exogenous renegotiations are increasing in contract rigidity.

3 Data and context

3.1 General presentation of the database

Our database is comprised of 139 parking lot agreements[2] concluded between a single firm, which we will call the operator and with public administrations. The public administrations in question are, for the vast majority, municipalities. Contracts have been concluded in 58 French communes across the territory. Among these contracts, 91 have been renegotiated, for a total of 313 renegotiations. The number of renegotiations per contract lies between 0 and 19, with a mean of 2.58 (including contracts that were never renegotiated). Within each amendment, we distinguish a set of dimensions it may affect (for example, tariffs or service operation). We call provisions the various dimensions affected by an amendment. The average scope of an amendment is 1.42 dimensions, for a total of 437 amendment provisions.

Parking lots are interesting to our study for various reasons. First, they are a standardized good, involving few specific investments and allowing comparisons between contracts [Brown and Potoski, 2003]. Moreover, the parking lot market is highly competitive, which allows us to rule out concerns about ex ante competition for the market and auction procedures. Finally, parking lots are distributed homogeneously across the territory, avoiding any geographic bias in our database.

Regarding contract types, our database contains a rich array of arrangements, from simple public markets (short term service operation contracts) to long term concessions dealing both with construction and operation of the parking lot.

[2]These 139 contracts only constitute a subset of the whole sample I have at my disposal, which I have not yet coded all variables for.

3.2 Legal context : French rules concerning public contract renegotiation

3.2.1 Contract modification in general

In the general case, French contract law is consensual, meaning that if both parties are willing to make a change in the contract, then such change can legally be enforced.
French civil law also allows contract to be modified without full consent of both parties in the special case of "imprévision", namely, an unforeseen contingency that makes execution of the contract excessively costly for one of the parties (article 1195 of the French Civil Code). In such a case, the party who suffers from the unforeseen event can demand renegotiation from the other party. If the latter refuses to renegotiate, or if renegotiation fails, the parties can agree to ask the judge to proceed the amendment of the contract. If one of the parties refuses to opt for judicial amendment, the contract is terminated.

3.2.2 Public contracts

In the case of public procurement, French law puts additional constraints on the renegotiation process. Indeed, simple consensual renegotiation such as exists in private contracts would allow violations of the competitive tendering process : renegotiation could be used to circumvent the strict regulations on public contract awarding (see for instance, lowballing and other forms of corruption).

Because of such concerns, the renegotiation of competitively awarded public contracts is strongly restricted. The Code of public procurement (Article L. 2194-1) states that a public contract can be modified without a new competitive awarding process "when modifications are made necessary by unforeseen circumstances). Article R. 2194-5 adds that the circumstances should not be forseeable by a "diligent buyer".

Case law gives more precision on how "unforeseen contingencies" should be interpreted : the event must be (cumulatively) *unpredictable*, *external* to the parties, make execution of the contract more *costly*, and, in the case of fixed-price contract disrupt the economic balance of the contract.

Even if an unforeseen contingency is characterized, the extent of renegotiation is regulated. The "global nature" of the contract must remain unchanged. More importantly, renegotiation must not increase the cost of the contract by over 50%.

Apart from the case of modification due to unforeseen events, some special cases allow revision of public markets :a) Non substantial modifications of the contract, b) If a revision

clause in the contract explicitly allows it, c) if a new contractor replaces the previous one.

Moreover, modification of contract is not necessarily the result of renegotiation. Under certain conditions, the public party can impose a change of the contract by virtue of its public authority status. In this case, the public party has the obligation to compensate the private party for any damage resulting from the amendment. Braconnier [2022].

Importantly, modification of the contract may not only be through amendment. A simple letter, or meeting can be sufficient. Besides, the transaction mechanism (an extra judicial way of resolving disputes) can serve as disguised amendment.

3.3 Initiative of renegotiation

To determine which party initiated the renegotiation, we rely on explicit indications. Amendments often contain a preamble, which provides precious contextual information : formulations such as "The municipality wished to [...]" or "The operator asked to [...]" allow to classify amendments in our initiative categories.

Because it is frequently impossible to determine who initiated the renegotiation, we also have an "uncertain" category which amounts to almost a third of amendments. The following table presents the distribution of amendments across initiative categories.

A first glance at the descriptive data indicates that renegotiations are vastly initiated by buyers. This may be explained by the specific legal regime of public contracts in France, where the public authority can impose a change on the private party.

Table 1: Renegotiation initiative : Descriptive data

Initiative	**Count**	**Frequency (%)**
Buyer	154	46.53
Operator	34	10.27
Exogenous	39	11.78
Uncertain	104	31.42

3.4 Explanatory and control variables

Our key explanatory variable here is rigidity. To assess the rigidity levels of our contracts we borrow the data from Beuve et al. [2021], following the methodology proposed by Moszoro et al. [2015]. This methodology is based on textual analysis. The authors construct “dictionaries” of terms associated with rigidity. Seven rigidity categories are identified : arbitration,

certification, evaluation, litigation, penalties, termination, and contingencies. The rigidity categories capture relevant contractual clauses intended to signal probity and lower the likelihood of challenges by third parties. Arbitration clauses submit plausible disputes to an arbitrator instead of a court.Certification clauses regulate the contractor regarding certification requirements. Evaluation clauses introduce duties regarding delivery. Litigation clauses appear as triggers to a lawsuit. Penalty clauses describe the damages and sanctions for contract breaching. Termination clauses signal ways to resolve intractable contract disruption. Finally, contingency clauses make provisions for future possible, but uncertain events and circumstances. We created as many variables as rigidity dimensions.

Then, they use the normalized frequencies (i.e., z-values) of the total count of search terms in each category to measure the degree of difference between contracts. For example, they transform the total word count of search terms in the Arbitration category by calculating:

$$zArbitration = \frac{Arbitration - \mu}{\sigma}$$

where μ is the mean and σ is the standard deviation of the count of Arbitration search terms across all contracts.

Summing the z-values across rigidity categories gives us a global rigidity measure, $zRigidity$:

$$zRigidity = zArbitration + zCertification + zEvaluation + zLitigation$$
$$+zPenalties + zTermination + zContingencies$$

We include a set of control variables to account for various kinds of heterogeneity : heterogeneity between amendments, between contracts and between municipalities. Amendment-level control variables include the number of previous amendments underwent by the contract, the scope of the amendment (how many dimensions it deals with), the dimensions the amendment concerns (among the five most prominents : tariffs, transfers, service, investments and duration). Contract-level variables include the total number of amendments underwent by the contract, the duration of the contract, the size of the parking lot, the simplified type of the contract (concession or provision-of-service) and the number of years of previous experience between the two parties. City-level controls include population of the city at the latest census previous to contract signing (from the INSEE database), political leaning of the mayor and the perceived corruption index from Transparency International.

Table 2: Descriptive statistics

	Variable	Mean	SD	Min	Max	N
Amendment level						
	Amendment order	4.63	4.02	1	19	313
	Scope	1.42	0.7	1	5	313
	concerns Tariffs	0.28	0.45	0	1	313
	concerns Transfers	0.14	0.35	0	1	313
	concerns Service	0.28	0.45	0	1	313
	concerns Investments	0.21	0.41	0	1	313
	concerns Duration	0.06	0.24	0	1	313
Contract level						
	Rigidity	1.33	17.43	-27.47	45.23	139
	Renegotiated	0.65	0.48	0	1	139
	Number of amendments	2.58	3.88	0	21	139
	Duration (years)	14.19	14.8	1	50	139
	Slots	934.88	1138.91	30	8499	139
	Population at contract signing (thousands)	63.68	47.52	0.36	215.36	139
	Past experience (years)	7.67	9.35	0	38	139
City level						
	Left-wing mayor	0.02	0.14	0	1	53
	Right-wing mayor	0.4	0.49	0	1	53
	Corruption	1.94	2.03	0	14.41	53

4 Empirical strategy

We seek to estimate who initiates rigidity-induced renegotiations, in other words if rigidity increases the likelihood of opportunistic, rent-shifting renegotiation or not.

To see how rigidity affects renegotiations, we first use logit models with Initiative dummies as dependent variables. This gives three dependent variables, one equal to one when the amendment is initiated by the public party, one equal to one when the amendment is initiated by the private party, and one equal to one when the amendment is of exogenous origin. We control for various contract-level and amendment-level characteristics, as well as some institutional conditions. For each model, we include a specification with year fixed-effects and one without them (table 4). We also control for the content of the amendment by including dummy variables for the main amendment categories (variable "concerns Tariffs" is equal to one when the amendment concerns tariffs). Results for this specification are contained in Table 5.

We also run a multinomial logistic regression with categorical variable *Initiative* as a dependent variable. *Initiative* takes four values, "Municipality", "Operator", "Exogenous" and "Uncertain". We use "Uncertain" as our baseline value (Table 6).

There are some severe econometric issues with these methods, due to the fact that we use amendments as an observation level while our main explanatory variable (rigidity) is at the

contract level. Some control variables are meant to deal with this. By controlling for the total number of renegotiations underwent by the contract, and by amendment order, we eliminate the potential effect of an amendment being the n-th, or of belonging to a contract that has been renegotiated multiple times. Despite this, our observations (amendments) are still not independent within a contract and may be correlated according to unobserved variables, which can lead to inconsistent estimates. To correct for this, we use Generalized Estimating Equations [Liang and Zeger, 1986] which are meant to correct for correlation between observations within a cluster (a cluster being, in this case, a contract). GEE requires to specify a correlation structure, i.e. to feed the model a matrix for the type of correlation between observations. We use an exchangeable correlation structure meaning, that within a contract, any pair of amendments is expected to be correlated in the same way. Although this is probably unrealistic, we do not have sufficient information to specify a more precise correlation structure. We use GEE for a preliminary regression with $Party\_Initiative$ as our dependent variable (Table 3, then in a set of logit models with each initiative type as the dependent variable (Table 7).

Another problem with our approach comes from the fact that it uses amendments as observations. This poses to issues. The first one, which we have already talked about, is that amendments within a contract are not independent. The second is that we omit all contracts that were not renegotiated, even though they may contain useful information. In order to deal with this, we propose a second empirical methodology where observations are no longer amendments, but contracts. The question here is how to transpose amendment-level data on initiative to the contract level. We cannot use the average number of -for instance- municipality-initiated renegotiations, because some contracts have no renegotiation, which would imply dividing 0 by 0. Hence we rely on the following approach : for each contract, we use the number of amendments in a given initiative type as our dependent variable. By controlling for whether the contract has been renegotiated or not (variable $Renegotiated$) and for the total number of renegotiations underwent by the contract ($Number\_of\_renegotiation$) we eliminate the inflating effect of renegotiation in general. (If a contract has 13 municipality-initiated renegotiation, it is only relevant to use this number once we have controlled for the total number of renegotiations.) We then consider linear relationship between Rigidity and number of x-initiated renegotations using Ordinary least squares.

5 Results

As a preliminary result, we look at how rigidity influences a binary variable $Party\_Initative$, which is equal to 1 when the renegotiation is initiated by one or the other of the two parties, and 0 when the renegotiation initaitive is either "exogenous" or "uncertain" (table 3). We run a simple logit as well as a GEE logit regression, and find in both cases that rigidity

significantly decreases the likelihood of party initative. In other words, it is more difficult to determine who initiated renegotiation in more rigid contracts. This confirms Proposition 1b and the more optimistic view of renegotiation suggested by TPO.

When separating the components of initiative, we consistently observe that rigidity is significantly associated with lower buyer initiative (Tables 4,5 and 6). Recall that buyer initiative is by far the most common case : this means that, while rigid contracts are more frequently renegotiated, they are less likely to be renegotiated at the initiative of the public buyer. It is likely that the significance of this result is due to a higher variance of the dummy variable "Municipality Initiative" : Indeed, its variance is 0.24 while it is 0.09 for Operator initiative and 0.1 for Exogenous. This is due to the fact that there are a small number of observations that take value 1 for Operator initiative and Exogenous. These results give strong evidence against Proposition 2b, and indicate at least one thing : rigidity does not increase the risk of expropriation by the government.

However, it is unclear whether this decrease in buyer initiative leads to an increase of operator initiative or exogenous renegotiation : coefficients for rigidity are not significant with these two dependent variables, so rigidity may increase the likelihood of buyer initiative or exogenous renegotiation, or both.

Our contract-level analysis seems to indicate that rigidity is also associated with more exogenous renegotiations (Table 8), althgough the coefficient is only significant at the 10% level, which goes to confirm Proposition 2c, and the TPO assumption that more renegotiation does not equate more opportunism.

6 Discussion

The goal of this paper was to understand the normative implications of rigidity-induced renegotiations in public contracts. In order to do so, we looked at the effect of rigidity on initiative of renegotiation. Three main results stand out. First, rigidity decreases the likelihood of one renegotiation being attributed to the initiative of one specific party. Second, and this is perhaps the strongest result of our study, rigidity significantly decreases buyer-initiative in the renegotiation process. Finally, it seems that rigidity increases the share of exogenous renegotiations.This last result is the least significant, and remains to be confirmed in the larger version of our sample.

Many further challenges remain. First, this paper only relies on a subsamples of about a third of the total data we have at our disposal. It remains to be sees whether our results hold in a larger sample, and whether the weaker results gain significance. Second, the set of explanatory variables for initiative is not complete. As suggested by Guasch, Laffont and

Straub, macroeconomic shocks and the regulatory environment are important determinants of renegotiation initiative. Finally, there may be better empirical strategies to deal with the multi-level data structure we are working on.

Table 3: Party initiated renegotiations and rigidity

	Dependent variable:	
	Party initiative	
	logistic	*logistic generalized estimating equation*
	(1)	(2)
Rigidity	-0.035^{***}	-0.031^{***}
	(0.012)	(0.011)
Total Amendments	0.037	0.029
	(0.028)	(0.036)
Renegotiation Order	-1.240^{***}	-1.112^{***}
	(0.320)	(0.332)
log(duration)	0.882^{**}	0.707^{*}
	(0.392)	(0.389)
log(size)	0.394^{**}	0.300
	(0.189)	(0.230)
log(population)	-0.005	-0.003
	(0.023)	(0.024)
Experience	0.303	0.257
	(0.187)	(0.259)
Scope	-3.310^{***}	-3.102^{***}
	(0.850)	(0.992)
Type = MP	-0.233	-0.147
	(0.327)	(0.380)
Left	1.157^{**}	1.117^{*}
	(0.586)	(0.666)
Right	-0.071	-0.088
	(0.106)	(0.089)
Corruption	-14.650^{**}	-11.072^{*}
	(6.701)	(6.175)
Observations	307	307
Log Likelihood	-190.496	
Akaike Inf. Crit.	404.991	
Note:		*p<0.1; **p<0.05; ***p<0.01

Table 4: Rigidity and Initiative of renegotiation

	Initiative of renegotiation (logit)					
	Buyer		Operator		Exogenous	
	(1)	(2)	(3)	(4)	(5)	(6)
Rigidity	−0.023*	−0.048**	0.002	−0.050	−0.017	0.011
	(0.012)	(0.020)	(0.020)	(0.039)	(0.021)	(0.031)
Number of amendments	0.059**	0.084**	−0.057	0.049	−0.019	−0.085
	(0.029)	(0.042)	(0.051)	(0.081)	(0.040)	(0.061)
log(duration)	−0.499*	−0.674	−0.649	−2.015**	−0.072	−0.003
	(0.276)	(0.471)	(0.400)	(0.839)	(0.450)	(0.774)
log(size)	0.107	0.182	0.734	1.662	1.417*	0.533
	(0.431)	(0.593)	(0.673)	(1.113)	(0.825)	(0.925)
log(slots)	0.362*	0.384	−0.456	−0.068	−0.711***	−0.645
	(0.186)	(0.279)	(0.277)	(0.423)	(0.273)	(0.439)
Experience	0.003	0.004	0.024	0.027	−0.051	−0.050
	(0.022)	(0.030)	(0.030)	(0.047)	(0.031)	(0.056)
Private contract	−15.299	−17.427	−11.861	−15.653	4.976**	3.803
	(591.260)	(1,426.339)	(958.106)	(7,014.626)	(2.043)	(2.857)
Scope	0.572***	0.462**	−1.196**	−1.369**	−0.337	−0.438
	(0.191)	(0.218)	(0.525)	(0.568)	(0.313)	(0.386)
Type = MP	−1.606**	−1.607*	−2.163**	−2.459*	1.452	1.289
	(0.723)	(0.955)	(1.060)	(1.412)	(1.205)	(1.456)
Left	0.093	−0.097	−0.472	−1.104	−0.324	−0.956
	(0.326)	(0.590)	(0.611)	(1.215)	(0.496)	(1.380)
Right	0.881	2.168**	0.264	1.955	−2.821**	−2.748*
	(0.549)	(1.011)	(0.709)	(1.548)	(1.141)	(1.551)
Corruption	0.172*	0.075	−0.297	−0.722	−0.350	−0.138
	(0.101)	(0.169)	(0.233)	(0.513)	(0.222)	(0.236)
McFadden Pseudo R2	0.094	0.171	0.122	0.280	0.102	0.277
Year Fixed Effect	No	Yes	No	Yes	No	Yes
Observations	304	304	304	304	304	304
Log Likelihood	−190.309	−174.200	−87.904	−72.060	−104.613	−84.185

Note: *p<0.1; **p<0.05; ***p<0.01

Table 5: Rigidity and Initiative of renegotiation (logit, controlling for content)

	Initiative of renegotiation					
	Buyer		Operator		Exogenous	
	(1)	(2)	(3)	(4)	(5)	(6)
Rigidity	−0.020	−0.056**	0.008	−0.020	−0.017	0.002
	(0.014)	(0.024)	(0.020)	(0.046)	(0.022)	(0.034)
concerns Tariffs	2.504***	2.934***	−2.427***	−3.750***	−0.992*	−1.279**
	(0.423)	(0.526)	(0.754)	(1.175)	(0.510)	(0.610)
concerns Transfers	0.976*	1.502**	−0.847	−2.392	−3.132**	−2.679*
	(0.531)	(0.655)	(0.963)	(1.649)	(1.287)	(1.474)
concerns Service	2.947***	3.932***	−3.016***	−19.794	−18.680	−19.621
	(0.430)	(0.576)	(1.075)	(1,609.332)	(1,060.379)	(1,652.489)
concerns Investments	3.012***	2.908***	−2.470**	−3.543***	−1.356**	−1.380*
	(0.492)	(0.566)	(1.088)	(1.348)	(0.690)	(0.823)
concerns Duration	0.582	0.980	−1.530	−0.732	0.595	0.969
	(0.631)	(0.751)	(1.128)	(1.390)	(0.673)	(0.919)
Number of amendments	0.024	0.052	−0.050	0.132	0.004	−0.053
	(0.034)	(0.053)	(0.055)	(0.106)	(0.047)	(0.065)
log(duration)	−0.441	−0.203	−0.959**	−2.410**	−0.134	−0.315
	(0.324)	(0.576)	(0.454)	(0.956)	(0.501)	(0.834)
log(size)	0.341	0.489	0.199	0.459	1.318	0.760
	(0.505)	(0.741)	(0.703)	(1.325)	(0.867)	(1.078)
log(slots)	0.278	0.090	−0.266	0.172	−0.535*	−0.687
	(0.229)	(0.346)	(0.305)	(0.557)	(0.290)	(0.479)
Experience	−0.006	−0.009	0.038	0.054	−0.042	−0.033
	(0.026)	(0.035)	(0.032)	(0.061)	(0.035)	(0.060)
Private contract	−15.127	−15.683	−12.003	−19.543	3.093	2.171
	(997.167)	(2,786.845)	(999.595)	(11,325.290)	(1.973)	(2.934)
Scope	−1.199***	−1.567***	0.222	1.018	1.351***	1.230*
	(0.340)	(0.406)	(0.674)	(1.001)	(0.518)	(0.653)
Type = MP	−0.663	−0.122	−3.418***	−4.146**	0.941	0.798
	(0.869)	(1.174)	(1.280)	(1.868)	(1.347)	(1.693)
Left	0.186	0.406	−0.443	−0.774	−0.395	−0.902
	(0.398)	(0.808)	(0.648)	(1.496)	(0.560)	(1.374)
Right	0.909	1.858*	0.512	3.284	−2.843**	−1.901
	(0.644)	(1.032)	(0.797)	(2.107)	(1.181)	(1.527)
Corruption	0.119	0.124	−0.204	−0.379	−0.273	0.007
	(0.117)	(0.184)	(0.211)	(0.611)	(0.234)	(0.272)
McFadden Pseudo R2	0.321	0.409	0.277	0.498	0.267	0.396
Year Fixed Effect	No	Yes	No	Yes	No	Yes
Observations	304	304	304	304	304	304
Log Likelihood	−142.734	−124.192	−72.380	−50.228	−85.370	−70.372

Note: *p<0.1; **p<0.05; ***p<0.01

Table 6: Rigidity and initiative of renegotiation (Multinomial logit, baseline : uncertain initiative)

	Dependent variable:		
	Municipality	Exogenous	Operator
	(1)	(2)	(3)
Rigid	-0.042^{***}	-0.014	-0.019
	(0.013)	(0.022)	(0.022)
nbamendments	-0.005	-0.092	-0.028
	(0.038)	(0.057)	(0.061)
AmdtOrder	0.120^{**}	0.185^{***}	-0.008
	(0.050)	(0.062)	(0.086)
log(duration)	-1.396^{***}	-0.659	-1.637^{***}
	(0.387)	(0.522)	(0.494)
log(size)	1.121^{**}	1.001	1.034
	(0.443)	(0.767)	(0.647)
log(population)	0.251	-0.385	0.268
	(0.220)	(0.311)	(0.341)
cumulexpe	-0.010	0.0003	0.003
	(0.027)	(0.037)	(0.037)
Scope	0.412^{*}	-0.049	-0.773
	(0.217)	(0.337)	(0.493)
typesimplifiMP	-3.326^{***}	-0.412	-3.728^{***}
	(0.992)	(1.303)	(1.221)
ps1	-0.236	-0.229	-0.410
	(0.377)	(0.538)	(0.617)
dr1	0.559	-2.029^{*}	0.496
	(0.676)	(1.194)	(0.802)
indexcorrupt	-0.064	-0.186	-0.304
	(0.113)	(0.201)	(0.239)
Constant	-16.639^{**}	-10.520	-13.597
	(7.520)	(13.070)	(11.199)
Akaike Inf. Crit.	737.414	737.414	737.414
Note:			*p<0.1; **p<0.05; ***p<0.01

Table 7: Rigidity and initiative of renegotiation (logistic generalized estimating equation, correlation structure : exchangeable)

	Dependent variable:			
	Municipality	Operator	Exogenous	Uncertain
	(1)	(2)	(3)	(4)
Rigidity	−0.028**	0.010	0.010	0.040**
	(0.011)	(0.019)	(0.022)	(0.017)
Total Amendments	0.029	−0.010	−0.064	−0.020
	(0.036)	(0.051)	(0.051)	(0.083)
Renegotiation Order	0.048	−0.094	0.109	−0.150*
	(0.050)	(0.102)	(0.075)	(0.088)
log(duration)	−0.645**	−0.679**	0.183	1.045***
	(0.303)	(0.319)	(0.384)	(0.387)
log(size)	0.526	0.206	0.279	−0.264
	(0.381)	(0.545)	(0.689)	(0.837)
log(population)	0.256	0.193	−0.423	0.185
	(0.218)	(0.454)	(0.273)	(0.351)
Experience	−0.017	0.009	−0.010	0.012
	(0.021)	(0.027)	(0.034)	(0.022)
Scope	0.510**	−1.036*	−0.227	−0.346
	(0.243)	(0.539)	(0.235)	(0.387)
Type = MP	−1.852**	−1.606*	1.716*	2.261**
	(0.860)	(0.825)	(0.934)	(0.903)
Left	0.005	−0.262	−0.317	0.749
	(0.338)	(0.501)	(0.589)	(0.536)
Right	0.558	0.366	−2.558**	−0.145
	(0.603)	(0.743)	(1.058)	(0.581)
Corruption	0.003	−0.233	−0.152	0.144
	(0.087)	(0.192)	(0.126)	(0.100)
Constant	−10.358	−3.356	−1.996	−1.647
	(6.310)	(11.051)	(11.149)	(14.363)
Observations	307	307	307	307
Note:				*p<0.1; **p<0.05; ***p<0.01

Table 8: Rigidity and renegotiation at contract-level (OLS)

	Dependent variable:		
	Number of exogenous reneg.	Number of municipality-initiated reneg.	Number of operator-initiated reneg.
	(1)	(2)	(3)
Rigidity	0.007*	−0.008	0.004
	(0.004)	(0.007)	(0.003)
Renegotiated	0.068	−0.208	0.191*
	(0.140)	(0.265)	(0.109)
Total Amendments	0.105***	0.466***	0.056***
	(0.018)	(0.034)	(0.014)
log(size)	−0.085	0.153	−0.039
	(0.062)	(0.116)	(0.048)
log(duration)	0.023	−0.167	−0.053
	(0.076)	(0.144)	(0.059)
log(population)	−0.066	0.080	−0.024
	(0.062)	(0.117)	(0.048)
Type = MP	0.203	−0.380	−0.111
	(0.199)	(0.375)	(0.155)
Experience	−0.0004	−0.006	0.004
	(0.007)	(0.014)	(0.006)
Left	−0.027	−0.047	−0.089
	(0.207)	(0.391)	(0.161)
Right	−0.182	0.226	−0.078
	(0.137)	(0.259)	(0.107)
Corruption	−0.026	0.060	−0.026
	(0.024)	(0.045)	(0.019)
Constant	1.172	−1.470	0.656
	(0.720)	(1.358)	(0.560)
Observations	138	138	138
R^2	0.349	0.699	0.247
Adjusted R^2	0.292	0.673	0.181
Residual Std. Error (df = 126)	0.633	1.194	0.492
F Statistic (df = 11; 126)	6.137***	26.581***	3.759***
Note:			*p<0.1; **p<0.05; ***p<0.01

7 Appendix : verbatim of contracts

TO DO

7.1 Clues for operator initiative

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