Italian Concession Contracts for Water and Sewerage Systems: An Empirical Analysis

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Abstract

We argue that the concession contracts in the Italian water sector may have been shaped by the very local circumstances. In turn, different contract designs may have influenced the aptitude of bidding companies. To investigate these issues, we assemble an original dataset and construct two composite indices to characterise each contract according to: the strength of the incentives and the degree of complexity. The results show that cost-plus contracts are vague and associated to public ownership and direct delegation, though few of them have been auctioned and have attracted many bidders. Incentive schemes tend to be more detailed and are usually contracted out through public auctions, but the number of bids decreases with the power of incentives. The analysis reveals a serious paradox: competition for the market has been high only in the presence of cost plus schemes.

Keywords: incentive regulation, contractual incompleteness, regulatory governance
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1. Introduction

The 1994 reform of the Italian water and sewerage sector has brought about substantial changes in the regulatory governance (Danesi *et al.*, 2006). The model is based on the key role played by a new supervisory body, the ATO Authority,[1] which has both contracting and regulatory functions. Despite the legislation is thought to be consistently applied nationwide, the ATO Authorities have substantial discretion to choose the actual conditions of the concessions, and to spell out the broad regulatory framework. The national legislation is quite vague on tariff rules and quality standards. Some model contracts are provided by regional governments, but most ATO Authorities have not taken them into account (COVIRI, 2002). Hence, despite a broader regulatory framework, the concession contract signed at the local level is the main regulatory tool.

The ATO Authorities make such critical choices as the property regime of the managing company and the selection procedure.[2] Other decision variable are: the length of the concession; the strength of performance control; the pervasiveness of informational obligations; the allocation of main risks; the system of penalties; the procedural aspects.

A central argument of this article is that the design of the actual contracts has been influenced by the local circumstances and the key parameters of the concession. We argue that most ATO Authorities have devised the contracts according to the specific circumstances they face. The differences found in the application of the national default rules can therefore be explained by the diverse nature of the regulatory problems at the local level. In turn, different contract designs may have influenced the number of companies willing to bid for the concessions, where auctions have been carried out.

We investigate these arguments by assembling an original dataset and then constructing two composite indices that capture two relevant dimensions of the concession contracts: the strength of incentives, and the degree of complexity. We then analyse the correlation between the two indices and between each of them and other parameters of the concession. To out knowledge, this is the first time an analysis on contractual issues in public utilities is carried out in such a comprehensive and detailed way.

The rest of the article is structured as follows. In section 2 we set the theoretical framework used to design the dataset. Section 3 offers a description of the main variables used, whereas section 4 explains the methodology employed to construct the two indices and shows the classification of the contracts. In section 5, we perform an additional analysis to double-check the previous results. Sections 6 and 7 present the results of the empirical analyses. Section 8 concludes with policy recommendations.

2. Theoretical grounds

Regulating a monopolist always imposes a trade-off between allocative and productive efficiency (Laffont, Tirole, 1993). Public authorities usually adopt a combination of the two polar regulatory schemes, cost-plus and fixed-price, allowing varying degrees of cost passthrough in order to gauge the incentive power to fit local conditions and foreseen business risk.

Effective oversight is a precondition for applying incentive regulation. A crucial step is building up an information system that links the attained performance to credible rewards and penalties, and that responds coherently to the regulatory objectives. In the case of cost-plus regulation, information should be gathered on the investment side, in

order to avoid overcapitalisation and gold-plating (Averch, Johnson, 1962). In fixed-price regulation, the very aim must be controlling that the company does not downgrade quality in order to cut costs (Holmström, Milgrom, 1991). However, when the administrative capacity is weak, or where many aspects are difficult or impossible to monitor, it is advisable to reduce the incentive power of the contract, by adopting different cost-sharing rules, so that cost savings are not attained at the expenses of service quality.

Another regulatory trade-off is between contractual rigidity and flexibility. The need to undertake sunk and specific investment makes both parties vulnerable to ex-post opportunistic behaviour (Williamson, 1985). Moreover, the uncertainty associated to long-term concessions exposes to exogenous changes in the underlying conditions, which are impossible or extremely costly to anticipate (Hart, 1987). If the contract is not able to adapt to changing circumstances, one or both parties may find it convenient to deviate from the original agreement or call for a renegotiation. This undermines the credibility of the original agreement and hinders the benefits associated to contracting.

Recent developments show the impact of limited commitment when the performance is complex and the probability of renegotiation is high. As far as the costs of building an effective enforcement mechanism (Laffont, 2001), managing a dispute (Garcia *et al.*, 2005), and negotiating work changes (Bajari, Tadelis, 2001) increase, it is always better to keep the power of incentives lower than what would be preferred. Furthermore, monetary schemes may not be enough to prevent opportunism, so it is necessary to devise specific contractual mechanisms to handle the life of a contract.

According to the theory of contractual incompleteness, renegotiation of the original terms can never be avoided when the performance is not verifiable by a third

party, and this event triggers strategic behaviours on how ex-post rents will be split. Such uncertainty lower the incentive to make specific investment. An appropriate design of the renegotiation process is thus warranted (Hart, Moore, 1988). A first possibility is to assign the investing party all the bargaining. This implies granting the company a certain amount of flexibility in deciding how to face an unexpected event. But this may not be sufficient to prevent the opposite problem, i.e. overinvestment. Hence, the allocation of bargaining power could be reverted, by assigning the non-investing party the power to decide the outcome of a renegotiation, and allowing a remunerative default option to the investing party in case of unsuccessful renegotiation (Aghion *et al.*, 1994). A common interpretation of the default option is that that any work changes ordered by the public authority should contain an economic offer, which could be rejected by the operator, without implying that will loose its previous sunk investment (Chakravarty, MacLeod, 2006).

Due to the need to devise safeguards, concession contracts tend to be highly 'complex', in the sense that they are rich in the expected number of payoff-relevant contingencies, variable in the magnitude of payoffs, and severe in the cognitive load necessary to understand them (Eggleston *et al.*, 2000). Complex contracts are expensive to design, and contracting around the many details can leave room for opportunism. Instead, it may be optimal for the parties to reduce complexity, by relying on other legal, informal, and reputational mechanisms to fill the gaps whenever they arise.[3] These 'relational' contracts are voluntary left incomplete, so as to allow adaptation whenever required (Hviid, 2000).

The aforementioned aspects suggest the importance of establishing form the outset decision criteria and procedures to follow in the case of renegotiation and

disputes. General principles, such as 'good faith' or 'reasonableness', may not be sufficient: it is in the details of the agreement that an opportunistic behaviour can take place (Schwartz, 1992). In this sense, a contract can be thought of as a 'box of procedures', instructing the parties or a judge on how to allocate the bargaining power.

3. Description of the dataset

The previous theoretical insights have been instrumental to building up an original dataset of 49 water and sewerage concession contracts, signed or auctioned in Italy from June 1999 to date.[4] The dataset focuses on the fundamental economic aspects of the relationship, in order to screen for the strength of incentives provided, and the degree of procedural complexity embedded. It is composed of more than 60 variables, most of which categorical, that codify the contracts according to the following headings:

- general information about the contract;
- broad principles governing the concession;
- performance obligations and compensation;
- supervision, penalties and information flows;
- contractual adjustment mechanisms;
- dispute resolution and termination provisions.

For each variable, a set of categories has been created, in order to cast the various clauses of the concession contracts into a consistent framework. The categories have been standardised across the contracts and have been designed to maximise the differences between contracts. The categories are mutually excluding and exhaustive of both the clauses found in the contracts, and the aspects one would expect to find in similar documents.

Under the section 'general information' we have included data about the geographical location, the property regime of the company, the delegation procedure, the number of bids received, and the length of the concession. As regards ownership, a company could be: fully-public; public quoted in stock market; mixed public-private; and fully-private. The delegation procedure, ordered according to the competitive pressure instilled, can be: direct to a public company; auction for a private partner after a direct delegation to a public company; auction for a private partner before the delegation takes place; and auction for delegation to a fully-private company.

The 'broad principles' reflect the contracts' underlying economic philosophy. We first look for clauses preserving the economic and financial equilibrium of the company,[5] which guarantees against overall business risks. On the contrary, when the company is assigned responsibility for business risks, this should provide more incentives.

The third group of variables, on 'performance obligations and compensation', deals with economic performance and tariffs. Quality levels can respect national requirements, or be more demanding, up to the specification of detailed standards. The tariff variable indicates whether it has been determined form the outset –at least for the first years – or instead there is room for discretion. We also look at specific risks transferred to the operator, namely demand fluctuations, revenue variations, regulatory changes, and mismatch between actual and planned investment.

Under the section 'supervision, penalties and information flows', we first look at how much information is to be communicated, whether the few data mandatory by law, or a more complete set of indicators. We also check the nature of the sanctions for late communication or misrepresentation. Overall performance measurement can be based

on input indicators or on a more complete system. The sanctions for underperformance are further screened, in order to distinguish the cases where there is only a generic fine from those based on differentiated penalties. Another variable captures how much the procedure for applying those sanctions is vague or specific. Finally, we verify if the operator is compelled to reimburse the users in case of underperformance.

The variables regarding the 'adjustment mechanisms' capture contractual flexibility and bargaining power. We first look at the degree of discretion granted to the public administration in modifying the contract, disentangling the cases where a negotiation with the operator is mandatory. Next, the boundaries of the Authority's right to order changes are investigated, by ranking its level of discretion. In turn, we consider the extent to which the operator has the right to propose modifications of the investment plan. Another variable captures if and how contracts deal with extraordinary tariff adjustments. We also examine the existence and specification of a *force majeure* clause. The criteria surrounding extraordinary tariff adjustments are also spelled out, in order to verify whether or not the economic and financial equilibrium is always guaranteed. Finally, we investigate how the parties govern extraordinary maintenance works.

The last group of variables regards the 'dispute resolution and termination provisions'. We detect the preferred legal mechanism for dispute resolution, being it the district courts, a non-compulsory or a compulsory arbitration panel. The procedure applicable in the event of dispute is also codified, in order to see if the counterparts have set to resort to mediation before going to courts. We finally look at the termination payment, which could be based on accounting or economic criteria. As regards the related procedure, we distinguish whether the compensation is negotiated or unilaterally fixed by the ATO Authority *a fortiori*.

4. The methodology for classifying the contracts

The aim of classifying concession contracts is shading light on the likely determinants of different contractual designs. To do so, we construct two indices, reflecting for each contract the strength of incentive power and the degree of procedural complexity. The rationale behind the two indices is presented in table 1. The appendix reports the whole set of variables used.

Table 1 – Rationale of the two indices

Index 1: strength of contractual incentives	
Cost-plus contract: guarantees the operator from major risks, allowing it to preserve always the economic and financial equilibrium. Lacks an advanced control system over performance.	**Incentive contract**: transfers most risks to the operator, making it responsible for the economic and financial results. Controls accurately the performance through an advanced system of indicators.
Index 2: degree of contractual complexity	
Relational contract: vaguely specifies the procedures and criteria for the application of penalties and for contractual adjustments. Relies on negotiation when key choices have to be made.	**Detailed contract**: specifies accurately the procedures and criteria for penalties and contractual adjustments. Envisages a specific allocation of bargaining power when key choices have to be made.

As regards the incentives dimension, we identify two types of contracts. Cost-plus contracts as those guaranteeing agents from major economic risks. This can be achieved by offering partial or total insurance against fluctuation and reimbursement of cost overruns. Control and monitoring are not emphasised, since the operator is not expected to disregard quality. On the contrary, fixed-price contracts transfer most economic risk to the operator, and consequently develop an accurate information system for performance monitoring.

On the complexity dimension, we also identify two types of contracts, according to the number of circumstances envisaged and the degree of clarity to which they are

specified. A relational contract would be characterised by poor specification of procedures and criteria to handle adjustments. It configures an agreement based on reciprocal trust and/or faith in the law. Conversely, a detailed contract would explicitly regulate all aspects concerning the distribution of bargaining power in the event of a renegotiation.

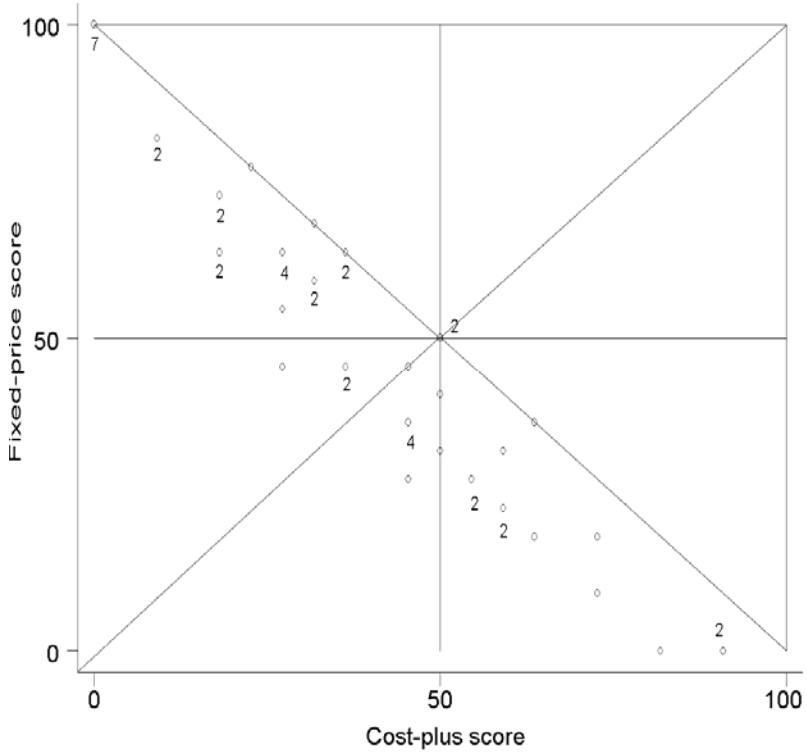
The computational method behind the construction of the indices is straightforward: for each of them separately, we assign the relevant provisions to one or the opposite type of contracts, according to the chosen category.[6] We then sum up the scores obtained in each type, normalize the range in a 0 to 100 interval, and then assign a contract to the type which received the highest score. The more a contract resembles a certain type, the closer to 100 its relative score will be in that type. If the scores are intermediate, elements pertaining to both contract types are present. All calculations are performed with STATA 8 S.E. software.

Figure 1 plots the score obtained by the contracts on the two axes representing respectively the cost-plus and the fixed-price dimensions. We notice the prevalence of contracts providing powerful incentives: 27 out of 49 contracts are classified as fixed-price. On the opposite, 19 contracts display cost-plus characteristics. Other 3 contracts remain unassigned.

Additional insights can be gathered from figure 1. Contracts on the bisector are of fixed-price nature, whilst they are considered cost-plus when lying under that line. By looking at the distance of each point with respect to the bisector, the intensity of incentives can also be inferred: the closer to the bisector, the more a contract is ambiguous in terms of incentives. In some cases, assigning a contract to one type or the

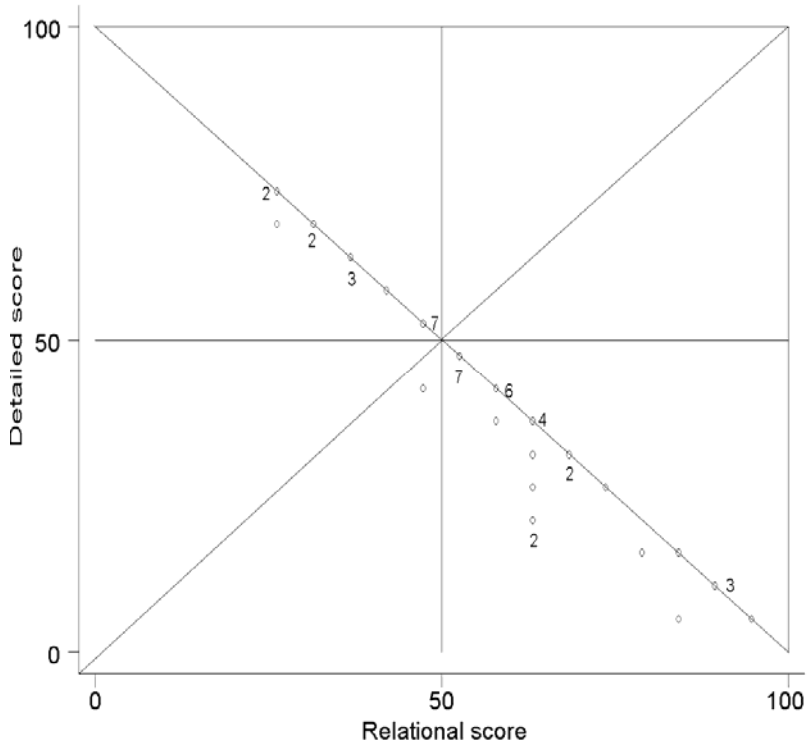
other is rather arbitrary. Besides, the distance from the secondary diagonal shows how much a contract lacks any characterisation concerning some relevant variables.

Figure 1– Contracts classification on incentives dimension



As regards the second dimension, the degree of contractual complexity, we report in figure 2 the relevant scores. We distinguish 33 relational contracts and 16 detailed ones. In this case, almost all cases are relatively close to the secondary diagonal, since by construction the categories are exhaustive, unless some contractual elements were not directly accessible because specified in other documents. Many contracts display intermediate characteristics; in particular, only a few of them can be classified as strongly detailed. Hence, the vast majority of contracts are quite loose in regulating the relationship over time. This lack of procedural complexity, as defined above, represents a very critical element.

Figure 2– Contracts classification on complexity dimension



By being synthetic in their very nature, the indices are not informative about what combination of characteristics produces a given contractual approach. They instead give an overall appreciation of the underlying philosophy of each contract. In other words, we are only able to grasp synthetic measures, but not so much to discriminate among fuzzy combinations of contractual provisions that display a similar degree of characteristics. Notwithstanding, we find our methodology suitable to analyse some crucial aspects of concession contracts design and, in very the end, sufficient to provide useful insights.

5. A factorial analysis of contract characteristics

In this section, we try to corroborate the reliability of the two indices by comparing our classification to what obtained through multiple correspondence

techniques. We turned our attention to multidimensional techniques able to treat the complete set of information contained in the matrix of data, organising and synthesising it. Thus, these validation processes serve the purpose to compare our classifications with those obtainable by a different technique so as to let similarities and differences emerge. Considering the amount of qualitative variables in the dataset, we firstly opted for multiple correspondence analyses in order to identify the factors underlying the structure of the matrix and, consequently, synthesise original items interdependence relations in a number of factorial axes. We then run cluster analyses based on these factorial axes.

As regards the comparative exercise through cluster analysis, we have chosen the partition whose classes are at the same time most differentiated between them and most homogeneous in their components. The detailed characterisation of each class by relevant items is reported in the appendix. Class 2 has null within-group variability; it includes the 7 contracts classified with the highest score as fixed-price: 100 out of 100 scoring points. On the opposite, class 8 is constituted by the three cases with the highest cost-plus scores. Classes 4 and 7 include two elements for each, all of them classified unambiguously as cost-plus contracts. All these 3 last classes are very homogenous in their own constituent elements. The 10 contracts in class 1 all exhibit prevailing fixed-price scores ranging from 59 to 82, 68 on average; this group exhibits a good value for within-group inertia, even if not as low as previous ones. Class 3 includes 3 contracts weakly characterised as cost-plus and one not assigned to any type: their own prevailing scores range from 45 to 59. The 7 elements in class 5 are all of fixed-price type except a not assigned case: their scores range is as large as 32 scoring points. Class 9 is characterised by 5 ambiguously assigned contracts, 3 of which are closer to fixed-price

nature. It is peculiar that they all exhibit the very same value for the prevailing score, that is 45. Finally the class with the highest within-group variance: it puts together 6 well-defined cost-plus contracts, a not assigned case, a very weak fixed-price contract and a well-defined one.

Overall, the clustering process produces a high number of classes relative to the total number of observations in the dataset. It can be inferred that selected characteristics in our data are combined in a very variegate way. Even so, the proposed index categorisation looks very similar to the clustering one. Thus, we can conclude that the comparative exercise provides enough support to the intensity of the strength of contractual incentives as "captured" by the index. In other words, our classification bringing on by index 1 appears to be fully reliable.

As regards the second dimension to investigate – the degree of contractual complexity – in this case too we find it useful to run a comparative exercise through clustering contracts, in order to evaluate how the index for this dimension performs. The chosen partition is that with the highest number of classes, which amounts to 10, for reasons similar to previous ones. Class 1 collects the 5 contracts with the highest relational scores: the minimum value among the group is equal to 84 scoring points. Not surprisingly, this group has also very low within-group variability: they are very similar in the way contractual aspects - relevant to the complexity dimension- were settled. There are then 5 groups (5, 7, 8, 2, 4) sharing the characteristic to exhibit an extremely low within-group inertia value. This is likely due to the fact that they include at maximum 4 elements and that, more important, their clustering is poorly characterised: just one or two items. In terms of contractual philosophy, all their components are classified as relational contract (except for two ambiguously assigned to detailed in

class 8). Their poor characterisation is also reflected in the very wide prevailing scores range. The 3rd group comprises 4 borderline relational contracts. Classes 6 and 10 are the most puzzling: they include respectively 3 out of 6 and 5 out of 12 components classified as detailed. It has to be noted that scores range varies from 53 to 63 when it is the relational one to prevail, from 53 to 74 otherwise. It signals a strong mixture of aspects typical of the detailed philosophy with some in the opposite direction. Finally the 9th group consists almost entirely of detailed contract.

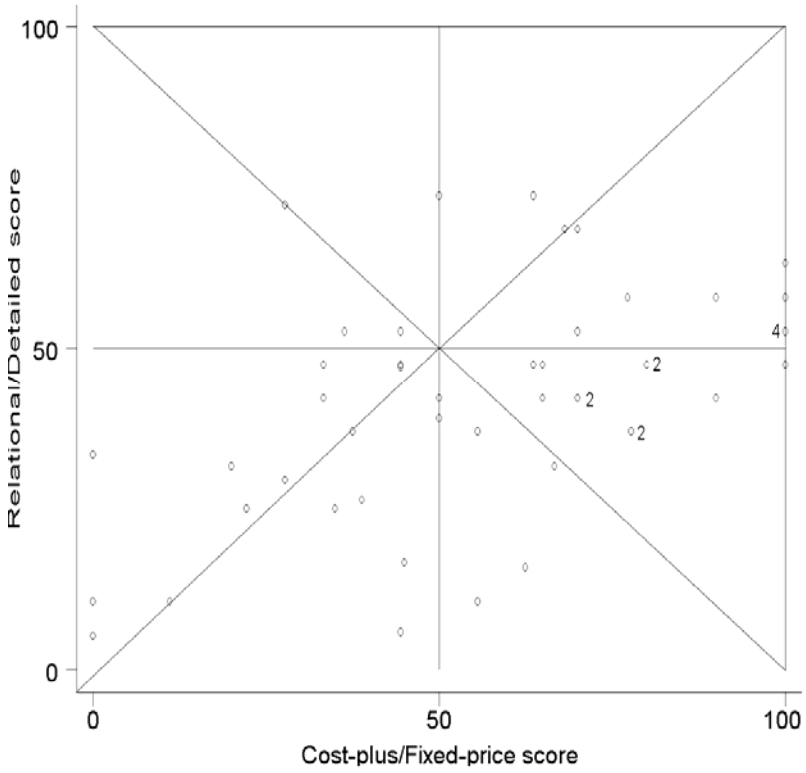
Summing up, clusters reveal a wider variety of contractual elements combination – on the dimension of complexity – than those captured by the proposed index. In other words, many contracts show to have combined relational aspects and detailed clauses in different ways. Our index is able to catch the "intensity" of complexity in contracts but is not so much informative to be able to discriminate among fuzzy combinations with a similar degree of complexity.

6. Contract characteristics and regulatory choices

Figure 3 displays simultaneously the classification of the contracts on both the incentives and complexity dimensions.[7] On average, the results confirm what envisaged in theory: fixed-price contracts are more detailed, whereas cost-plus contracts are generally more relational. At the same time, however, the slope of the trend shows that the degree of complexity is not much reactive to the growth of incentives. This is confirmed by the fact that as many as 17 contracts are classified as fixed-price and relational. Finally, we note some interesting outliers: there are 2 contracts which are very detailed despite their cost-plus nature; and 4 contracts that are extremely relational although they give strong incentives. We therefore investigate further the reasons

behind different contractual choices, focusing on the property regime of the company and the delegation mechanism.[8]

Figure 3– Contracts classification on both dimensions



We would expect that when a service is delegated to a public company, the contract will be cost-plus and relational, and would be directly assigned. This is the case when no bilateral relationship is in place, since there is a direct public control over the management, which makes incentives provisions basically meaningless. At the same time, as the company's lack of autonomy nullifies the risk of opportunistic behaviour, it is not necessary to specify the rules for contract adjustment over time. On the contrary, when the concession is awarded through auction to a fully-private company, we would expect that the associated contract is of a fixed-price and detailed nature. As shown by McAfee and McMillan (1986), powerful contracts enhance the advantages of a

competitive procedure. At the same time, since more competition lowers the profit margins and raise the risk of a conflicting relationship, contracts tend to specify from the outset the procedure for adjustment.

It is more difficult to speculate on how a contract would look like if the company has a majority of public ownership, but private entities are also involved. In the case the company is quoted in the stock market, we suspect that the public authority retains substantial control and there should not be much conflict. Hence, we would expect a quite loose, relational contract. However, it seems more plausible for this type of company of being hostage of the public authority, which can make it difficult to collect private resources through the stock market. In this perspective, a more detailed contract can make it possible for the public partner to 'tie its hands' and insure private investors against the risk of expropriation. The design of the incentive power might also work in this direction, reflecting the degree of autonomy that the public counterpart wishes to allow to the management of the company.

In the case of a mixed public-private company, the chosen contract typology may help clarifying the true nature of the expected partnership. One could argue that, if the relationship is believed to go peacefully and cooperatively, there will be room for mutually-advantageous periodic adjustments. Conversely, a tougher relationship may be assumed, with the related need to set up a more rigorous package of procedures. The allocation of risks and the related incentive power may also reflect such a judgment. A cost-plus contract may reveal that the public administration will share with the private counterpart the responsibility of attaining performance. In this case, an auction based on the most economically-advantageous offer would not be the best way of selecting a partner, which should instead be based on reputational mechanisms (Bajari, *et al.*,

2005). On the contrary, a fixed-price contract might show that the private partner will be left alone in reaching performance targets, and so there is the need to devise proper contractual incentives. The auction for selecting of the private partner is, in this case, a dissimulated way of choosing an operating company.

Table 2 shows how contract types are related to company ownership. Not surprisingly, contracts that regulate a public operator are usually relational and are equally divided between cost-plus and fixed price. The agreements that regulate a fully-private operator are more frequently of fixed-price nature, although it is quite striking that almost all of them are relational. On the contrary, the contracts signed with mixed companies are usually detailed, suggesting that this is a way of guaranteeing the private investors against opportunism form the public administration. Finally, the auction for the choice of a private partner for a mixed company is usually associated to incentive contracts, giving evidence that this mechanism has been considered a substitute for full delegation. As regards the 3 contracts with no clear characterization with respect to the incentives, 2 of them are relational and the operators are fully-public. The last is of detailed nature and regulates a mixed company.

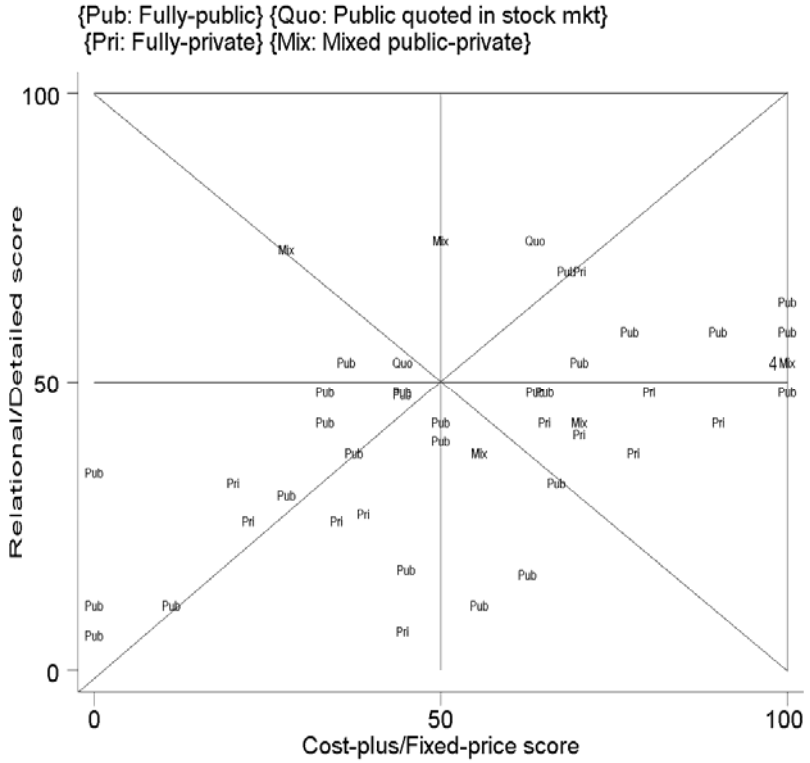
Table 2 - Companies ownership and contracts classification

Property regime of the company	**Cost plus**	**Fixed price**	**Not assigned**	**Relational**	**Detailed**
Fully-public company	12	12	0	19	7
Public company quoted in stock market	1	1	2	0	2
Mixed public-private company	1	6	1	2	6
Fully-private company	5	8	0	12	1
Total	*19*	*27*	*3*	*33*	*16*

In order to clarify the link between the types of contracts and the delegation procedure, we slightly modify in figure 4 the previous scatter plot, by adding information on the delegation procedure. In our view, the four quadrants identify four different typologies of contracts, and so four different regulatory models.

The first quadrant on the bottom left of figure 4 identifies the 18 cost-plus relational contracts, of which two thirds have been signed with a fully-public company. This shows that, when the public authority believes to retain a strong control, there is no need to provide sophisticated clauses. Many of these contracts are also short-term, which can have further discouraged to devise complex arrangements. It is instead noticeable that 5 of those contracts have been auctioned to a fully-private company. These types of agreements neither allow taking advantages of the auction, nor can be thought to be resistant to continuous renegotiations, being instead vulnerable to the 'foot in the door' strategy (Williamson, 1976).

Figure 4 – Companies ownership and contracts classification



The second quadrant on bottom right of figure 4 groups 17 fixed-price relational contracts. Half of them are associated to a public company, whereas the other half are auctioned contracts, the majority of which for the choice of a fully-private firm. Those signed with a public company can reflect the fact that some responsibility in reaching performance objectives has been transferred to the managers. A deeper analysis of these contracts allows us to notice that there are no monetary incentives, but a strong control over performance is exerted. This may mean that these ATO Authorities preferred economising in drafting costs and signing a looser contract, since they felt protected by their hierarchical power over the management, while at the same time they chose to monitor strictly the management results. It is questionable the meaning of sanctions and rewards in this case, where a reduction in the profit margins of the public company would scarcely affect the welfare of managers.[9]

One could, instead, worry about those cases in which a fixed-price relational contract regulates an auctioned service. There has been an attempt to provide incentives, but the result will probably be conflicting and unmanageable in the face of unforeseen contingencies. Perhaps, it is not accidental that all those contracts have been auctioned in the south of Italy, where the capacity of the public administration to manage complex economic relationships is notoriously lower than the rest of the country.

The third quadrant on top-left of figure 4 shows the contracts classified as cost-plus and detailed. Two of them are associated to mixed companies and one regulates a public company quoted in the stock market. We argue in this case that the higher degree of complexity may be explained by the need to insure the private investors against the risk that the public authority will penalise the company for political reasons. Possibly,

the auction for the private partner has not been used to solicit the most convenient offer, but as a mean of eliciting a solid industrial partner with reliable reputation.

The last quadrant on top right of figure 4 reflects more properly the idea of the regulation-by-contract model, in that it gathers the fixed-price detailed contracts. Most of them are associated to auctions for a private partner or sale of stocks. One further interesting case concerns a contract awarded to a fully-private company, which is the second version of a contract that substantially modified because initially no companies participated to the auction. There are also four contracts whose wordings leave the door open to the private sector in the future. It is nonetheless surprising that many contracts have been auctioned to a private partner, rather than to a fully-private company

7. Incentives, complexity, and the attractiveness of a concession

Turning attention to the subset of 17 contracts that have been auctioned, we relate the characteristics of the contracts to the number of bids received. Table 3 shows that only in 6 auctions the participants were two or more, whilst in 11 cases only one or no companies participated. There are of course many factors that can affect the attractiveness of a water concession, including the geographic localisation. Actually, five out of six auctions where competition was sustained were carried out in the centre of Italy, where per capita income is high, whereas those with weak competition were primarily located in the poorer southern regions – 8 out of 11 cases.

However, the characteristics of the contracts may have played a role too. In fact, only in 25 per cent of the cases the auctions for a fixed-price contract attracted more that one participant, whereas cost-plus contracts received two bids or more in three fifths of the cases. The reverse is true for the degree of complexity: relational contracts usually

discouraged participation, while detailed contracts received over two bids in half of the cases. This view is confirmed by the fact that, where competition was weak, the contracts were more powerful and less detailed that the average.

Table 3 – Number of bids and contract characteristics

Number of bids	Cost-plus	Fixed price	Av. score on incentive dimension	Relational	Detailed	Av. score on complexity dimension	Centre of Italy	South of Italy
$N \leq 1$	2	9	77	8	3	40,6	3	8
$N \geq 2$	3	3	53,4	3	3	50	5	1

We have also run some regressions in order to analyse the impact on the number of participants of geographic localisation and contract characteristics. We have found that, on average, every 25 more points in the incentive indicator, one participant drops out, and that the auctions in southern regions attracted two participants less than the central regions.[10]

In order to further emphasise our result, we included in our sample the new version of three contracts whose auctions must be repeated because no companies showed up at the first round. As table 4 shows, in two of these cases the new contract is less powerful and more complex than the original one, probably in order to make the concession more attractive.

Table 4 – Auction repetition and contract characteristics

ATO	Incentive score 1st contract	Complexity score 1st contract	Incentive score 2nd contract	Complexity score 2nd contract
ATO 1 - Palermo	80	47,4	70	68,4
ATO 5 – R. Calabria	44,4	5,9	38,9	26,3
ATO 9 - Agrigento	77,8	36,8	77,8	36,8

Taken as a whole, our overall results reveal a serious paradox about the use of competition for the market. According to the economic theory, the stronger the incentives of a concession contract, and the higher the number of bidders, the more an auction is effective in reducing private profits. On the contrary, cost-plus contracts should be directly negotiated, and reputational aspects should take prevalence. But according to our data, incentive contracts actually discourage the companies to bid. Hence, what is being happening in Italy is that the power of incentives in fixed-price contracts, which would be theoretically efficient to auction, are weakened by the low number of bidders. Conversely, the selection properties of the auction in cost-plus contracts, which attract much interest because of low incentives, are neutralised by full-reimbursement.

8. Conclusions

This article has taken a first step to developing a methodology for categorising concession contracts according to two dimensions: the strength of incentives and the degree of complexity. We have drawn some insights from the theory to argue that the shapes of the contracts reflect fundamental choices or circumstances. We have tested these predictions on a sample of concession contracts signed in the Italian water and sewerage sector.

The analysis shows that the contracts analysed are fundamentally consistent with the theory. Incentive contracts are usually more detailed and, while cost-plus contract tend to be more relational. Also, public companies are mostly regulated by relational contracts, although different incentives have been injected. At the same time, companies

quoted in the stock market are mainly regulated through detailed contracts, but again the incentives chosen can vary greatly.

Auctioned contracts can be traced back to all the categories considered herein. The majority of them are strong in the incentives, but only a few are sufficiently complex. We suspect that in many cases this lack of details can be problematic. Some auctioned contracts are of a cost-plus type, but they differ as regards the complexity: those signed with a fully-private company are rather loose, whereas those in which a mixed company is in charge of operations are more complex. We argue that this might be explained by the need to guarantee the private investors from the risk that the public authority will expropriate the company during the contractual adjustments.

A first policy recommendation is that the national legislator should refrain from enacting uniform rules, and instead provide guidelines that characterise accurately two or three different regulatory models, from which the local authorities can pick up one that fits local circumstances. Giving the wide differences of the Italian local authorities, it will be very hard, and perhaps meaningless, to end up with a homogeneous regulatory model throughout the country. At the same time, the extremely high degree of autonomy left to inexperienced local agencies under the current regulatory model can create serious inconsistencies.

Besides, the choice to delegate directly to public companies may be an endogenous response of the public authorities to the lack of administrative capacity and genuine competition for the market. We found that the higher the complexity of the contract, the higher the number of bids received. This shows that the Italian companies have preferred an agreement that make it clear what are the reciprocal rights and powers in the event of contract adjustment. Hence, a second policy recommendation is that for a

public authority it is worth paying the higher transaction costs associated to a better contract design, in order to attract more bids.

The fact that low-powerful incentives attracted more bids is, instead, truly striking, since the auction is supposed to be effective when the contract offered has a fixed-price. We worry that the pressure of competition in Italy has performed only when it is, at the very end, useless. This is probably due to the scarce number of domestic water companies, their low level of development, and their lack of confidence with the bidding process. Time will tell us if there is any scope for autonomous market consolidation, or if regulatory innovations are needed to revert the current situation.

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[1] ATO is the Italian acronym for *Ambito Territoriale Ottimale* (Optimal Territorial Area), whose dimension is supposed to allow for the full exploitation of economies of scale and efficient investment planning.

[2] According to European procurement rules, when a private entity is involved, it has to be selected through competitive auction. Direct negotiation can only occur if the company is fully public.

[3] In so doing, the parties economise on transaction costs during the initial negotiation, by writing down only those clauses that regulate the contingencies which might occur with a high probability.

[4] Some of the contracts we have analyzed have never entered into force, since no companies have posted any bid.

[5] This means that not only ex-ante costs and the return on capital are in line with the foreseen tariff revenues, but also ex-post costs are always reimbursed.

[6] By construction, the elements characterising both pairs of contract types are mutually exclusive.

[7] As evident, we have renormalized the score obtained to a 0-100 range on each dimension.

[8] The lack of investment data does not allow us to explore this additional aspect, which is left for future research.

[9] Note, however, that one of the contracts in our sample envisages sanctions for underperformance in the form of cuts of management salary, up to their firing for serious causes.

[10] Both these coefficients resulted significant, whilst the degree of complexity does not. The R^2 of the regression was 0.62. The results are available from the authors upon request.

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Appendix

Variables used to construct the indices

Distinction between fixed price and cost plus contracts

Contractual Terms	*Cost plus*	*Fixed price*
Guarantee of economic and financial equilibrium	Yes	No
Responsibility of the company for overall business risks	No	Yes
Quality levels	General reference to the national law Defined only in general terms	Defined in detailed terms
Tariff determination	General reference to the national law	Determined for the first years only Determined for the whole length of the contract
Insurance against the risk of revenue fluctuation	Partial risk insurance	No risk insurance
Tariff revision in the case of mismatch between actual and planned investment	Revision if actual investment different from planned	Revision only if actual investment is less than planned
Information to be communicated to the Authority	General reference to the national law	More specific informational obligations
Penalties on informational obligation	Not envisaged Overall sanction	Integrated system of sanctions
Prevalent method for performance supervision	Not envisaged Indicators without thresholds Input indicators	Set of output indicators) Overall index of performance
Penalties for underperformance	Not envisaged Variable at partial discretion of the Authority	Amount variable according to underperformance
Automatic reimburses to users	No	Yes

Distinction between relational and detailed contracts

Contractual Terms	Relational	Detailed
Quality levels	Not envisaged General reference to the national law Defined only in general terms	Defined in detailed terms
Rebate of efficiency gains	Not envisaged General reference to the national law	Modest transfer of efficiency gains Strong transfer of efficiency gains
Tariff revision in the case of mismatch between actual and planned investment	Not envisaged General reference to the national law	Revision only in the case of incompliance Revision if actual investment different from planned Revision only if actual investment is less than planned

Instruments for controlling ordinary maintenance of infrastructure	Not envisaged Reference to broad principles (efficiency, rationality)	List of maintenance operations Objectively verifiable indicators
Procedure for applying penalties	Not envisaged Stated in general wordings	Stated in more detai Automatic application
Right of the Public Authority to modify the contract	Not envisaged Limited to agreement with the operator	Limited to specific cases Unlimited
Right of the Public Authority to order changes in the investment plan	Not envisaged Limited to agreement with the operator	Limited to specific cases Unlimited
Right of the operator to propose changes in the investment plan	Not envisaged Unlimited right to propose, subject to approval	Limited to the three-yearly revision Limited to the revision and changes in laws
Consequences of changes in the area served	Not envisaged To be determined by subsequent agreement	Agreement required only after a specified threshold No reimburses to the operator
Extraordinary tariff adjustment in the event of unforeseen contingencies	Not envisaged Clause formulated in general wordings	Specification of circumstances triggering adjustment *Force majeur* discipline Explicitly not allowed
Criteria surrounding remuneration as a result of changes in contract or investment plan	Not envisaged General reference to negotiation in good faith	Guarantee of economic and financial equilibrium
Criteria for distinguishing extraordinary maintenance works to be included in the regulatory asset base	Not envisaged To be negotiated by the counterparts To be negotiated when works are urgent and unforeseeable	Establishment of criteria plus when works are urgent and unforeseeable Establishment of criteria
Specification of the *force majeure* clause	Not envisaged Clause formulated in general wordings	Defined in detailed terms
Major dispute-resolution mechanism	Court of law Non-compulsory arbitration	Compulsory arbitration
Procedure for initiating a formal dispute	Mandatory preventive mediation (general wordings)	Not envisaged Mandatory preventive mediation (detailed discipline)
Procedure for early termination of the contract	Not envisaged Semi-structured procedure (loose terms / obligations)	Structured procedure (strict terms and obligations)
Criteria for calculating compensation at early termination of the contract	Not envisaged	Accounting criteria Economic criteria
Criteria for calculating compensation at the end of the contract	Not envisaged	Accounting criteria Economic criteria
Procedure for calculating compensation at the end of the contract	Not envisaged To be negotiated	Creation of a bilateral commission in charge of calculating Unilateral decision of the P.A.

Comparative cluster analysis for the strength of incentives dimension

The present and the following annexes are devoted to describe the cluster analyses. As already mentioned, we firstly performed a multiple correspondence analysis in order to synthetise original items interdependence relations in a number of factorial axes. We then run cluster analyses based on these factorial axes. We used as many factorial axes as necessary to account for the 90 per cent of data variability. Items with relative frequencies lower than 3 per cent were not considered. As regards clustering, it was used SPAD5.0's RECIP procedure, a hierarchical classification scheme based on Ward aggregative criterion. In setting the procedure up a default option of 10 iterations for consolidation toward the centroids was chosen. These characteristics are common to both comparative exercises. The following table reports the value for inertia for the three partitions obtained by RECIP run with the specified options. Here as well as in the second cluster analysis, we chose the partition guaranteeing the widest dissimilarity between groups and, at the same time, the highest degree of homogeneity among components of the same class.

Inertia values		*Partition 1*	*Partition 2*	*Partition 3*
Between-groups		0.69053	1.27559	1.68368
Within-group	Class 1	0.27696	0.19730	0.11424
	Class 2	0.13864	0.00000	0.00000
	Class 3	1.59606	0.13864	0.13864
	Class 4		0.01828	0.01828
	Class 5		0.70537	0.17456
	Class 6		0.36701	0.28343
	Class 7			0.05174
	Class 8			0.04332
	Class 9			0.19428
Total		2.70218	2.70218	2.70218
Quotient (Between-groups/ Total)		0.25554	0.47206	0.62308

The second table describes each group by characterizing items.

Characterising items	% item in the class	% item	% class over the item	Test-value
Class: Class 1 / 9 (Abs. value: 10 - Percentage: 20.41)				
Penalties on informational obligation=To be defined in the future	90.00	24.49	75.00	4.75
Automatic reimburses to users=[To be defined in the future OR Contained in other documents]	90.00	30.61	60.00	4.10
Insurance against the risk of revenue fluctuation=No risk insurance	100.00	44.90	45.45	3.78
Tariff revision in the case of mismatch between actual and planned investment=Revision if actual investment different from planned	70.00	22.45	63.64	3.39
Prevalent method for performance supervision=Set of output indicators	100.00	51.02	40.00	3.35
Quality levels=Defined in detailed terms	100.00	53.06	38.46	3.22
Tariff determination=Determined for the whole length of the contract	90.00	48.98	37.50	2.63
Penalties for underperformance=Integrated system of sanctions	90.00	48.98	37.50	2.63
Clause stating the responsibility of the company for overall business risks=Yes	100.00	63.27	32.26	2.55
Automatic reimburses to users=Not envisaged	*10.00*	*46.94*	*4.35*	*-2.35*
Clause stating the responsibility of the company for overall business risks=No	*0.00*	*36.73*	*0.00*	*-2.55*

Class: Class 2 / 9 (Abs. value: 7 - Percentage: 14.29)

Penalties on informational obligation=Integrated system of sanctions	100.00	20.41	70.00	4.69
Automatic reimburses to users=Envisaged	100.00	22.45	63.64	4.47
Tariff revision in the case of mismatch between actual and planned investment=Revision only in actual investment is less than planned	100.00	34.69	41.18	3.51
Insurance against the risk of revenue fluctuation=No risk insurance	100.00	44.90	31.82	2.88
Tariff determination=Determined for the whole length of the contract	100.00	48.98	29.17	2.65
Penalties for underperformance=Integrated system of sanctions	100.00	48.98	29.17	2.65
Prevalent method for performance supervision=Set of output indicators	100.00	51.02	28.00	2.54
Quality levels=Defined in detailed terms	100.00	53.06	26.92	2.42
Automatic reimburses to users=Not envisaged	*0.00*	*46.94*	*0.00*	*-2.42*

Class: Class 3 / 9 (Abs. value: 4 - Percentage: 8.16)

Penalties for underperformance=Contained in other documents	100.00	8.16	100.00	4.43
Penalties on informational obligation=Contained in other documents	100.00	10.20	80.00	4.07
Quality levels=[To be defined in the future OR Contained in other documents]	100.00	16.33	50.00	3.41
Information to be communicated to the Authority=[To be defined in the future OR Contained in other documents]	75.00	12.24	50.00	2.64
Prevalent method for performance supervision=Not envisaged	50.00	4.08	100.00	2.57

Class: Class 4 / 9 (Abs. value: 2 - Percentage: 4.08)

Prevalent method for performance supervision=Input indicators	100.00	4.08	100.00	3.14

Class: Class 5 / 9 (Abs. value: 7 - Percentage: 14.29)

Tariff revision in the case of mismatch between actual and planned investment=Revision only in actual investment is less than planned	100.00	34.69	41.18	3.51
Tariff determination=Determined for the first years only	57.14	12.24	66.67	2.85
Prevalent method for performance supervision=Set of output indicators	*0.00*	*51.02*	*0.00*	*-2.65*

Class: Class 6 / 9 (Abs. value: 9 - Percentage: 18.37)

Prevalent method for performance supervision=Indicators without thresholds	55.56	16.33	62.50	2.76
Automatic reimburses to users=Not envisaged	88.89	46.94	34.78	2.48
Clause stating the responsibility of the company for overall business risks=No	77.78	36.73	38.89	2.41
Clause stating the responsibility of the company for overall business risks=Yes	*22.22*	*63.27*	*6.45*	*-2.41*

Class: Class 7 / 9 (Abs. value: 2 - Percentage: 4.08)

Tariff revision in the case of mismatch between actual and planned investment=Revision only in the case of incompliance	100.00	6.12	66.67	2.80

Class: Class 8 / 9 (Abs. value: 3 - Percentage: 6.12)

Information to be communicated to the Authority=General reference to the national law	100.00	14.29	42.86	2.89
Penalties on informational obligation=Not envisaged	100.00	16.33	37.50	2.74
Prevalent method for performance supervision=Indicators without thresholds	100.00	16.33	37.50	2.74
Quality levels=General reference to the national law	100.00	16.33	37.50	2.74

Class: Class 9 / 9 (Abs. value: 5 - Percentage: 10.20)

Penalties on informational obligation=Not envisaged	100.00	16.33	62.50	4.02
Penalties for underperformance=Not envisaged	80.00	12.24	66.67	3.40

Comparative cluster analysis for the degree of complexity dimension

Inertia values		*Partition 1*	*Partition 2*	*Partition 3*
Between-groups		0.21947	0.38532	0.68694
Within-group	Class 1	0.54340	0.31372	0.02578
	Class 2	0.39503	0.01931	0.03154
	Class 3		0.10982	0.05354
	Class 4		0.32973	0.04584
	Class 5			0.01931
	Class 6			0.10982
	Class 7			0.02048
	Class 8			0.02714
	Class 9			0.08781
	Class 10			0.04969
Total		1.15790	1.15790	1.15790
Quotient (Between-group/ Total)		0.18954	0.33278	0.59327

Characterising items	% item in the class	total % item	% class over the item	Test-value
Class: Class 1 / 10 (Abs. value: 5 - Percentage: 10.20)				
Criteria for calculating compensation at early termination of the contract=Not envisaged	100.00	26.53	38.46	3.21
Right of the Public Authority to order changes in the investment plan=[Not envisaged OR Limited to agreement with the operator]	100.00	34.69	29.41	2.72
Instruments for controlling ordinary maintenance of infrastructure=[Not envisaged OR Reference to broad principles (efficiency, rationality)]	100.00	36.73	27.78	2.61
Tariff revision in the case of mismatch between actual and planned investment=[Not envisaged OR General reference to the national law]	100.00	36.73	27.78	2.61
Instruments for controlling ordinary maintenance of infrastructure=[List of maintenance operations OR Objectively verifiable indicators]	*0.00*	*59.18*	*0.00*	*-2.40*
Tariff revision in the case of mismatch between actual and planned investment=[Revision only in the case of incompliance OR Revision if actual investment different from planned OR Revision only in actual investment is less than planned]	*0.00*	*63.27*	*0.00*	*-2.61*
Right of the Public Authority to order changes in the investment plan=[Limited to specific cases OR Unlimited]	*0.00*	*65.31*	*0.00*	*-2.72*
Criteria for calculating compensation at early termination of the contract=[Accounting OR Economic criteria]	*0.00*	*71.43*	*0.00*	*-3.08*
Class: Class 2 / 10 (Abs. value: 3 - Percentage: 6.12)				
Criteria for calculating compensation at the end of the contract=[Accounting OR Economic criteria]	*0.00*	*81.63*	*0.00*	*-2.61*
Class: Class 3 / 10 (Abs. value: 4 - Percentage: 8.16)				
Procedure for early termination of the contract=Structured procedure (strict terms and obligations)	100.00	24.49	33.33	2.83
Right of the operator to propose changes in the investment plan=[Limited to the three-yearly revision OR to the revision and changes in laws]	100.00	32.65	25.00	2.38
Right of the operator to propose changes in the investment plan=[Not envisaged OR Unlimited right to propose, subject to approval]	*0.00*	*67.35*	*0.00*	*-2.38*
Procedure for early termination of the contract=[Not envisaged OR Semi-structured procedure]	*0.00*	*75.51*	*0.00*	*-2.83*
Class: Class 4 / 10 (Abs. value: 4 - Percentage: 8.16)				
Quality levels=Contained in other documents	100.00	12.24	66.67	3.81
Class: Class 5 / 10 (Abs. value: 2 - Percentage: 4.08)				
Instruments for controlling ordinary maintenance of infrastructure=Contained in other documents	100.00	4.08	100.00	3.14

Class: Class 6 / 10 (Abs. value: 6 - Percentage: 12.24)

Procedure for calculating compensation at the end of the contract=[Creation of a bilateral commission in charge of calculating OR Unilateral decision of the Public Authority]	83.33	22.45	45.45	3.01
Procedure for early termination of the contract=Structured procedure (strict terms and obligations)	83.33	24.49	41.67	2.85
Procedure for early termination of the contract=[Not envisaged OR Semi-structured procedure (loose terms / obligations)]	*16.67*	*75.51*	*2.70*	*-2.85*
Procedure for calculating compensation at the end of the contract=[Not envisaged OR To be negotiated]	*16.67*	*75.51*	*2.70*	*-2.85*

Class: Class 7 / 10 (Abs. value: 3 - Percentage: 6.12)

Criteria for distinguishing extraordinary maintenance works to be included in the regulatory asset base=[Establishment of criteria plus when works are urgent and unforeseeable OR Establishment of criteria]	100.00	14.29	42.86	2.89

Class: Class 8 / 10 (Abs. value: 3 - Percentage: 6.12)

Specification of the force majeure clause=Specified in detailed terms	100.00	14.29	42.86	2.89
Specification of the force majeure clause=[Not envisaged OR Stated in general wordings]	*0.00*	*85.71*	*0.00*	*-2.89*

Class: Class 9 / 10 (Abs. value: 7 - Percentage: 14.29)

Procedure for calculating compensation at the end of the contract=[Creation of a bilateral commission in charge of calculating OR Unilateral decision of the Public Authority]	71.43	22.45	45.45	2.65
Major dispute-resolution mechanism=Compulsory arbitration	85.71	34.69	35.29	2.59
Rebate of efficiency gains=[Modest OR Strong transfer of efficiency gains]	71.43	24.49	41.67	2.48
Extraordinary tariff adjustment in the event of unforeseen contingencies=[Specification of circumstances triggering adjustment OR Force majeure discipline OR Explicitly not allowed]	100.00	53.06	26.92	2.42
Extraordinary tariff adjustment in the event of unforeseen contingencies=[Not envisaged OR Clause formulated in general wordings	*0.00*	*46.94*	*0.00*	*-2.42*
Procedure for calculating compensation at the end of the contract=[Not envisaged OR To be negotiated]	*28.57*	*75.51*	*5.41*	*-2.48*
Rebate of efficiency gains=[Not envisaged OR General reference to the national law]	*28.57*	*75.51*	*5.41*	*-2.48*
Major dispute-resolution mechanism=[Court of law OR Non-compulsory arbitration]	*14.29*	*65.31*	*3.13*	*-2.59*

Class: Class 10 / 10 (Abs. value: 12 - Percentage: 24.49)

Extraordinary tariff adjustment in the event of unforeseen contingencies=[Specification of circumstances triggering adjustment OR Force majeure discipline OR Explicitly not allowed]	100.00	53.06	46.15	3.71
Quality levels=Defined in detailed terms	100.00	53.06	46.15	3.71
Information to be communicated to the Authority=[Stated in more detail OR Automatic application]	100.00	55.10	44.44	3.56
Instruments for controlling ordinary maintenance of infrastructure=[List of maintenance operations OR Objectively verifiable indicators]	100.00	59.18	41.38	3.26
Procedure for initiating a formal dispute=Mandatory preventive mediation (general wordings)	100.00	63.27	38.71	2.96
Major dispute-resolution mechanism=[Court of law OR Non-compulsory arbitration]	100.00	65.31	37.50	2.81
Right of the Public Authority to order changes in the investment plan=[Limited to specific cases OR Unlimited]	100.00	65.31	37.50	2.81
Criteria for calculating compensation at early termination =[Accounting OR Economic criteria]	100.00	71.43	34.29	2.36
Major dispute-resolution mechanism=Compulsory arbitration	*0.00*	*34.69*	*0.00*	*-2.81*
Quality levels=[General reference to the national law OR Defined only in general terms OR To be defined in the future]	*0.00*	*34.69*	*0.00*	*-2.81*
Right of the Public Authority to order changes in the investment plan=[Not envisaged OR Limited to agreement with the operator]	*0.00*	*34.69*	*0.00*	*-2.81*
Instruments for controlling ordinary maintenance of infrastructure=[Not envisaged OR Reference to broad principles (efficiency, rationality)]	*0.00*	*36.73*	*0.00*	*-2.96*
Procedure for initiating a formal dispute=[Not envisaged OR Mandatory preventive mediation]	*0.00*	*36.73*	*0.00*	*-2.96*
Information to be communicated to the Authority=[Not envisaged OR Stated in general wordings]	*0.00*	*44.90*	*0.00*	*-3.56*
Extraordinary tariff adjustment in the event of unforeseen contingencies=[Not envisaged OR Clause formulated in general wordings	*0.00*	*46.94*	*0.00*	*-3.71*