

RENEGOTIATION OF INFRASTRUCTURE CONCESSIONS: AN OVERVIEW

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ABSTRACT:** *Numerous renegotiations have plagued Latin American infrastructure concession contracts in the 1990s, to the point that private sector involvement is being questioned in some countries. This issue has been analyzed in a series of papers by Guasch et al. (2003, 2006a, 2006b). After putting these contributions in the context of the theoretical and empirical literature on contract renegotiation, this note surveys the existing evidence on the determinants of these renegotiations and discusses the main policy implications regarding the necessity of efficient regulatory institutions and the adequate type of price regulation.*

1. Introduction

This paper reviews and discusses the empirical evidence and the policy implications from a set of papers analyzing the determinants of infrastructure concession contracts across Latin America in the 1990s. The insights from these studies are interesting for two main reasons.

First, despite the fact that the theoretical contracting literature has long been dealing with potential and actual renegotiations, to our knowledge no previous empirical studies had analyzed the determinants of renegotiations in a systematic way, incorporating variables that capture both contract clauses along several dimensions and characteristics of the economic and institutional environment.

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** *Résumé en fin d'article; Zusammenfassung am Ende des Artikels; resumen al fin del artículo.*

Second, the recurrent conflicts that plague the operation of concessions in Latin America have major welfare consequences for the population there, so their understanding and the consequent definition of better mechanisms to enable private participation in infrastructure constitute a vital public policy objective.

The objective of the paper is therefore twofold. First, it puts the empirical evidence in the context of the existing literature, and second it presents the specific empirical results and discusses how they inform the practical policy debate on the issue of private investment in infrastructure. To this end, it is organized as follows. In Section 2, we briefly discuss how the issue of renegotiation has been addressed in the theoretical and empirical contracting literature and present the approach developed by Guasch et al. (2003, 2006a). In Section 3, we detail the Latin American experience with concessions and discuss how the issue of contract renegotiation has affected the process. Subsequently, we summarize in Section 4 the main results concerning the determinants of these renegotiations from the two papers mentioned above. Finally, we discuss in Section 5 the main policy consequences regarding regulatory agencies and the type of price regulation and conclude.

2. Renegotiation: theory and empirics

While the regulation literature¹ has in general considered complete contracting frameworks, in which contracts are perfectly enforced thanks to the good quality of supporting institutions (judiciary, regulatory agencies) that have been set up in the past, there is a growing recognition that imperfect enforcement and renegotiation are major issues in most developing countries.²

It is well known from the contracting literature that with complete contracts, even when the principal cannot commit not to renegotiate ex post, there might be inefficiencies linked to the ratchet effect but no actual renegotiation occurs along the equilibrium path (Dewatripont, 1986, Laffont and Tirole, 1990). Any inefficiencies are anticipated in the initial contract that becomes renegotiation-proof.

Renegotiation occurs only if the initial contract is plagued by some type of incompleteness.³ In this context, the design of models

1 See Laffont and Tirole (1993).

2 World Bank (2001).

3 See Tirole (1999) and the references herein.

suited to the analysis of different issues becomes a practical exercise in identifying the reasons behind the observed incompleteness in each specific context and making the correct assumptions (Laffont, 2005). In the case of renegotiation of infrastructure contracts, following a methodology first introduced by Laffont (2003), Guasch et al. (2003) propose a model in which the incompleteness of contracts is linked to some imperfection of the judicial system and other institutions in charge of enforcing contracts with outside investors, and the government is able to invest in a costly enforcement technology, in the spirit of the law enforcement approach of the Chicago school.⁴

The basic model is an *ex ante* regulatory contract between the government and a firm, under asymmetric information on the firm's cost, which the firm accepts or not before discovering its type. Therefore, because the participation constraint is only satisfied in expectation at the signing of the deal, *ex post* a high-cost firm is left with a negative utility (see Laffont and Martimort, 2002, chapter 2) and would like to renegotiate the contract. The government can then invest in a costly mechanism that ensures the enforcement of the contract with some probability, depending on the level of expenses incurred. The model is then enriched to include a number of characteristics of concession contracts, as well as the regulatory environment, exogenous economic shocks and the quality of institutions.

The probability of renegotiation is then given by an expression of the type:

$$Pr(\text{renegotiation}) = (1 - \nu - \varepsilon)(1 - \pi(x)),$$

where ν is the *ex ante* probability that the firm is of the high-cost type, ε is a shortcut to model an exogenous shock on demand or on the firms' costs (through a devaluation or some similar macroeconomic shock), and $\pi(x)$ is the probability that the contract is enforced, given government's expenses x .

As is clear from the above discussion, this model describes renegotiations at the initiative of the firms. Guasch et al. (2006a) develop this framework to account for government-led renegotiations. The model is extended to several periods. At the beginning of each of them, elections take place and the incumbent government is replaced with some exogenous probability.⁵ While the government that signed

4 See for example Becker (1968), Becker and Stigler (1974). Guasch et al. (2006b) present several extensions of this model.

5 See Besley and Coate (2003) for a discussion of the fact that regulatory issues are not pivotal in shaping the outcome of general elections.

the concession contract in the first place is unable to renegotiate, a new government can generate some renegotiation in two ways. First of all, it may offer the firm a new contract, with the previous outcome representing the status quo utility level of the firm. This captures the possibility of Pareto improving deals to account for changes in the environment or in agents' preferences. Second, there is a small probability that this new government reneges on the initial contract and expropriates the firm. This is akin to a country risk parameter, known in expectation by the firm when signing the contract.

Guasch et al. (2006) show that the model then generates predictions for the probability of renegotiations that are in line with those related to firm-led renegotiations, except for the variables entering the status quo of the parties (investment requirements, existence of private financing, corruption), which are expected to have reversed effects on the probability of firm-led versus government-led renegotiations.

Finally, note that to our knowledge Guasch et al. (2003, 2006) are the first papers to develop a systematic empirical analysis of the determinants of renegotiations. While some existing contributions have looked at the effect of the potential cost of ex post renegotiations on the form of contracts among others,⁶ none provides for detailed predictions on how specific aspects of the contracts and features of the economic and institutional environment affect the probability of renegotiation. In what follows, we present the results from these two studies.

3. Concessions of infrastructure in Latin America

In the last decades, Latin America has been at the forefront of the movement to attract private participation in infrastructure (see Harris, 2003). Until the end of the 1990s, private investors have committed important amounts to key projects throughout the region, in the four main sectors of telecommunications, energy, transport and water. In the latter two sectors, and to a lesser extent in electricity, private involvement mostly took the form of concessions. Overall, between 1990 and 2000, 89 per cent of water projects, 98 per cent of transport projects and 54 per cent of energy projects were adjudicated using the concession model (Guasch, 2004).

6 See Crocker and Reynolds (1993) and Bajari et al. (2003) *inter alia*.

A concession contract grants a private firm or consortium the right to operate a given infrastructure in exchange for the revenues generated by users' payments. It is typically granted for a limited period of time (in general between 15 and 30 years), after which the underlying assets are devolved to the state. This scheme has often been used to circumvent the political problems and sometimes the legal or constitutional impediments linked to the transfers of assets to private, sometimes foreign operators that take place in outright privatizations.

However, several problems have plagued the concession model. First of all, despite its growing involvement, private capital never fully compensated the parallel reduction in public investment that took place since the end of the 1980s (Calderón and Servén, 2004). This failure to attract sufficient capital to bridge what many observers see as a growing infrastructure gap has been accompanied by a strong surge in dissatisfaction in Latin American public opinion. According to *Latinobarometro*, an opinion survey realized every year in 18 countries of the region, as of 2003, 67 per cent of the respondents disagree to some extent that privatizations were beneficial for their country. In no country is this negative perception lower than 50 per cent (the minimum is 53 per cent in Honduras), and it is above 80 per cent in Argentina and Panama.

Although a number of explanations have been put forward to explain such a public distrust, one major reason seems to be the perception that the process fostered corrupt deals at the expense of customers, in particular through numerous renegotiations of the initial contracts (Martimort and Straub, 2006).

As a matter of fact, considering an exhaustive data set of more than 1,000 concessions in Latin America and the Caribbean during the period 1985–2000, it appears that, excluding telecommunications where most projects were real privatizations with transfer of assets, 41 per cent of the total projects in the three remaining sectors were renegotiated at some point. In water and transport, renegotiations have affected 74 per cent and 55 per cent of the projects respectively, and have occurred 1.6 years and 3.1 years on average after the award, despite most of these contracts having been signed for 15 years or more (Guasch, 2004).

Moreover, renegotiations have an important negative impact on users. The costs include service disruption, non-compliance with expansion targets and excessive prices due to cost pass-through charged to customers, among others. In Mexico, the concession toll

road program started at the beginning of the 1990s was finally bailed out by the government in 1997 at a cost of approximately 1 to 1.7 per cent of GDP. Similar costs are to be expected in Argentina, where the whole set of concessions is in disarray and a difficult renegotiation process is ongoing since the 2001 crisis, or in Bolivia where major water concessions were recently cancelled by the government following popular protest (Guasch et al. 2006a).

The broader picture shows that renegotiations may be of two types. First of all, there are renegotiations initiated by operators (Guasch et al. 2003). These might be shock related, when a devaluation or a recession make the operation of a given concession unsustainable. In a region that has proved very volatile over the last 20 years, this is a major concern for policy makers. They might also be opportunistic, when a firm uses its bargaining power in bilateral negotiation with the government or the regulatory agency to strike a better deal than the initially agreed one. This affects one of the central benefits of the concession model, namely the competitive pressure introduced by the *ex ante* auction procedure. To the extent that firms are aware of the potential gains due to their bargaining power in a subsequent bilateral negotiation with sometimes inexperienced government officials, they may be tempted to strategically undercut rivals at the bidding stage.

Second, renegotiations are sometimes initiated by governments (Guasch et al. 2005). Again, this may reflect simple changes of priorities, or unforeseen evolutions of the economic environment, and be of a Pareto improving nature. However, most government-led renegotiations happen to be opportunistic, with politicians during or after an election campaign renegotiating on previous contracts to please their constituencies.

The outcome of these renegotiations depends on who initiated them. Most of the time, they lead to delays or reduction in investments, tariff increases or increases in the number of cost pass-through, and other adjustments favorable to the firms. In a subset, however, changes appear to be unfavorable to operators, reflecting a number of government initiated renegotiations mentioned above.

4. Data and empirical results

The empirical analysis presented in Guasch et al. (2003, 2006a) is based on a unique data set including information about infrastructure contracts in Latin America between 1985 and 2000

(see Guasch, 2004, for a complete description of the database). The analysis focuses on contracts in the water and transport sector, because these are the sectors in which real concessions have been granted, as opposed to outright privatizations. As a result, the sample is an unbalanced panel comprising 307 projects in five countries (Argentina, Brazil, Chile, Colombia and Mexico), across 12 years, for a total of 1287 observations.

For each contract, the data includes information on the general characteristics of the projects (sector, year of award, duration), on the award process, the investment and financing conditions, the institutional and regulatory context and the type of price regulation in place (price cap versus rate of return), and other contract clauses (arbitration, income guarantees, take-over clauses, etc.). These are completed by macroeconomic data (growth rate, exchange rate evolution), dummies for national and local elections and a full set of institutional indicators (corruption, quality of the bureaucracy, rule of law).

The initial estimations are based on a random effect probit, which is a linearized version of the equations giving the probabilities of firm-led and government-led renegotiations respectively. Moreover, the papers address the key issue of contract clauses endogeneity. The fundamental problem is that all the clauses that are the result of a negotiation process between the parties willing to enter in a contractual agreement are subject to a self-selection problem, because the parties select them according to their sometimes unobservable characteristics or those of the projects. Standard examples include the fact that putting a minimum income guarantee clause has been widely used by governments to attract private operators to risky concessions (for example in the transport sector). Similarly, more efficient operators are more likely to push for a price cap type of regulation, under which they are residual claimants for their cost savings; the financing structure is also likely to be influenced by the nature of the project and the identity of the potential contractors.

The objective is to eliminate this *ex ante* self-selection effect, in order to isolate the true incentive dimension of each specific aspect of the contracts. This is done by testing for endogeneity using the Rivers-Vuong test (1988) and then using a two-stage IV procedure advocated by Angrist (1991).⁷

7 See Guasch et al. (2006a) for a detailed discussion of the econometric issues involved, in particular the definition of adequate instrumental variables.

Table 1 – Significant determinants of renegotiations

	Government-led renegotiation	Firm-led renegotiation
Existence of a regulator	Negative	Negative
Price cap regulation	Positive	Positive
Duration	Positive	Positive
Investment requirements	Positive	Negative
Exclusive private financing	Negative	Positive
Quality of bureaucracy	Negative	Negative
Corruption	Positive	Negative
Election (lagged)	Positive	Positive
Growth (lagged)	Negative	Negative
Minimum income guarantee	Positive	Positive

Source: Guasch et al. (2006a)

Table 1 summarizes the main results from the two papers. It shows the variables that have been found to have a significant impact on the probability of renegotiation, and highlights the fact that the reversed signs predicted by the theoretical analysis were confirmed empirically.

The expected reversed signs hold true for the investment requirement and the private financing variable. Note also that minimum income guarantee is consistently positive, which confirms that this clause has a strongly adverse incentive property. Indeed, there is ample evidence linking it to moral hazard problem and cost overrun at the level of concessionaires, and to mounting fiscal problems for governments, as for example in Colombia, where the fiscal cost of these guarantees to date is around US\$100 million (INCO 2004, Engel et al. 2003).

5. Price regulation and the regulatory environment

To conclude, we want to discuss in some more details the main policy implications of the results above, namely the importance of having a regulator in place at the time the contract is enacted and the adverse effect of price cap regulation. Simulations for specific contracts in the sample, performed in Guasch et al. (2003) indicate that the presence of a regulator might have reduced the probability of renegotiation from 29.7 to 5.3 per cent for a rail concession in Argentina, and from 9.9 to 0.3 per cent for the Buenos Aires water concession for example. Similarly, a shift from price cap to rate of return regulation would have reduced the respective probabilities of renegotiation for these two concessions to 13.8 per cent and

3.3 per cent respectively. These two aspects therefore signal areas in which policy interventions are likely to have direct and significant effect on the incidence of renegotiations.

On the first aspect, there is growing evidence to support the fact that experienced regulators make a significant difference to avoid failures during the early life of concession projects. Not only do regulators allow for better quality contracts from the start, but it appears that they are the more effective in weak governance environments and constitute a barrier against opportunistic behavior by governments (Guasch et al. 2006a). Our firm-level results are in line with other cross-country studies that emphasize the importance of experienced and independent regulators in the telecommunication and electricity sectors (Wallsten 2001, Cubbin and Stern 2005).

To further illustrate the magnitude of the effects, Figure 1 shows the evolution of the hazard rate for an average duration of the contracts (in years) in the case of government-led renegotiations, splitting the sample into the cases that had a regulator in place when signing the contract and those that didn't.⁸

As for price regulation, in the last two decades, price cap regulation, which was initially introduced by Professor Littlechild in the UK, has been implemented all around the world. In our data set, above 70 per cent of the concessions are regulated by price caps.

It was already well known that this regulatory scheme raises several practical concerns, among which the impact on quality, the choice of the technological adjustment term and the treatment of new services.⁹ Moreover, we know that price cap regulation implies a risk transfer from consumers to the firm. Such an increase in risk is bound to be reflected in an increase of the cost of capital. As a matter of fact, Alexander and Irwin (1996) show that price cap regulated firms have systematically higher β s than firms subject to rate of return regulation, and therefore face higher interest rates.

Such an increase in the cost of capital has several implications. First, it may reduce the private sector's willingness to invest and induce an adverse selection effect, with government privatizing the 'crown jewels' and being forced to deal with less attractive projects without being able to use cross-subsidies anymore. Second, it implies

8 The following graphs are based on estimations from a competing risk duration model.

9 See for example, Green and Rodriguez-Pardina (1996), Laffont and Tirole (1999) and Noll (2000).

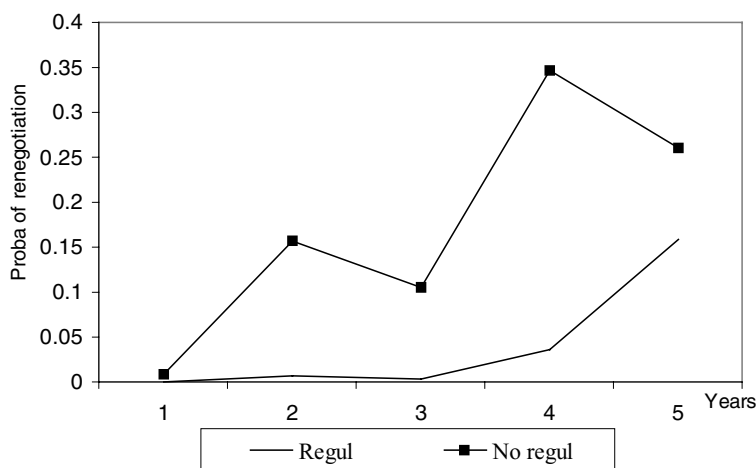


Figure 1 – Hazard rate (Govt-led re neg) by existence of regulator at signing of contract

that efficiency gains, assumed to be the major benefit of price cap regulation, are at least partially lost to the concomitant rise in costs.

But as Guasch et al. (2003, 2006a) show, the main consequence is the increased probability of renegotiation. Figure 2 shows the evolution of the hazard rate in the case of firm-led renegotiations, splitting the sample into price cap versus rate of return projects.

Given the level of incidence (one half to three quarter of the projects) and the costs discussed in the introduction, this is clearly a major concern for regulators. On top of the reputation loss that may affect the contractual parties, the increased risk of renegotiation generates losses for consumers through higher prices, lower investments and net transfers to the firm at the award of the contracts, eventually financed through taxes. For example, in the Buenos Aires water concession, each point increase in the cost of capital translated in a 3.5 per cent increase in tariffs (Guasch and Spiller, 1999).

The crucial point seems to be the interaction between the price cap and the cost of capital, in situations characterized by inexperienced institutions, with weak capability to resist outside pressures. In a majority of cases, regulated firms appropriate the gains made in favorable conjuncture (or these are partly captured by government through taxes), but they renegotiate in case of difficulties, effectively transferring losses to consumers.

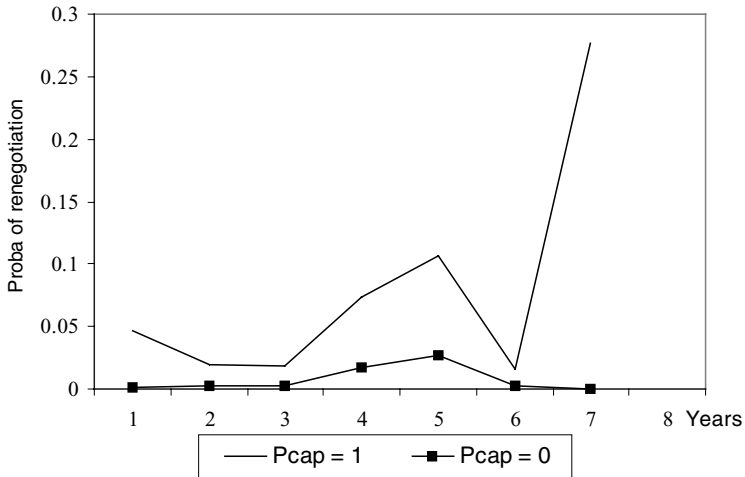


Figure 2 – Hazard rate (firm-led re neg) by type of regulation

One of the solutions considered to solve this problem is to substitute pure price caps by hybrid schemes (see Estache et al. 2003, for a more detailed discussion). Such schemes would make more intensive use of pass-through clauses linked to specific costs and would be especially useful in very volatile environments and when governance is weak. In effect, by reducing the exposure of firms to unexpected supply shocks, it may significantly decrease the number of cases in which calls for renegotiations become inevitable, substituting them with an endogenous adjustment mechanism.

6. Conclusion

This paper has briefly summarized the evidence on concession contracts renegotiations. After putting the analysis in the context of the literature on contract renegotiation, it has discussed the main policy implications in terms of regulation of private infrastructure operators. Given the potentially large welfare consequences of conflicts between these and local governments, it appears crucial to develop a better understanding, through further empirical analysis, of the specific mechanisms, both at the regulatory and contractual levels, that would enable successful private participation in infrastructure.

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Renégociation des concessions d'infrastructure: un aperçu général

Dans les années 90, les contrats de concessions d'infrastructure en Amérique Latine ont été sujets à de nombreuses renégociations, au point que la participation du secteur privé est remise en question dans certains pays. Cette question a été analysée dans une série d'articles par Guasch, Laffont and Straub (2003, 2006a, 2006b). Après avoir situé ces contributions dans le contexte général de la littérature théorique et empirique sur la renégociation des contrats, cette note résume les conclusions sur les causes de ces renégociations et discute les principales implications pratiques de politique économique, en particulier celles ayant trait à la nécessité d'institutions de réglementation efficaces et à la réglementation des prix.

Neuverhandlung von Infrastrukturkonzessionen: ein Überblick

Lateinamerika wurde in den 1990er Jahren von zahlreichen Neuverhandlungen von Infrastruktur-Konzessionsverträgen geplagt – bis zu dem Punkt, dass die Beteiligung des privaten Sektors in einigen Ländern in Frage gestellt wurde. Diese Thematik ist in einer Reihe

von Aufsätzen von Guasch, Laffont und Straub (2003, 2006a, 2006b) analysiert worden. Nachdem diese Beiträge in den Kontext der theoretischen und empirischen Literatur über Vertragsneuverhandlungen gestellt wurden, wird im vorliegenden Artikel ein Überblick über die vorhandenen Nachweise von Determinanten dieser Neuverhandlungen gegeben, und es werden die wichtigsten Policy-Implikationen bezüglich der Notwendigkeit effizienter regulatorischer Institutionen und der adäquaten Art der Preisregulierung diskutiert.

Renegociación de las concesiones de infraestructuras: una visión general

En los años 90, los contratos de concesiones de infraestructuras en América Latina han estado sujetos a numerosas renegociaciones, hasta el punto de que la participación del sector privado se ha puesto en cuestión en algunos países. Este tema ha sido analizado en una serie de artículos por Guasch, Laffont y Straub (2003, 2006a, 2006b). Después de situar estas contribuciones en el contexto general de la literatura teórica y empírica sobre la renegociación de contratos, la presente nota resume las conclusiones sobre las causas de estas renegociaciones y discute las principales implicaciones prácticas de política económica, en particular aquellas que tratan sobre la necesidad de instituciones de reglamentación eficaces y sobre la reglamentación de los precios.