

Empirical Evidence for Renegotiation of PPP Contracts in the Road Sector

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Abstract: Public-private partnerships (PPPs) have been used worldwide to deliver road infrastructure. The experience over the last decade has allowed academics and practitioners to assess the benefits and pitfalls of this procurement model. Among the main pitfalls, renegotiations are clearly one of the most critical issues affecting the performance of concessions. Based on the analysis of road concession contracts developed in Portugal, the writers found that the main problem behind renegotiations is intrinsically related to the performance of the public partner at several of the stages of partnership development, jeopardizing the benefits of competition brought by the public tender. The main causes of renegotiations are related to unilateral changes by the government, changes in design due to environmental reasons, delays in expropriation, and traffic below the forecast level. The results of these renegotiations range from direct compensation by the government to deep contractual changes with a completely new allocation of risks. DOI: 10.1061/(ASCE)LA.1943-4170.0000151. © 2014 American Society of Civil Engineers.

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Introduction

All over the world, governments have been engaging in public-private partnership (PPP) arrangements for infrastructure provision. Unable to meet the capital needs of large infrastructure development plans and eager to capture value from goal-oriented private management, governments have established long-term relationships with concessionaires for building, financing, and operating public service infrastructure.

In each country, roads have been a primary type of infrastructure for which this procurement model has been adopted, e.g., the Indiana toll road, the Chicago Skyway, and the Pennsylvania Turnpike in the United States (Bell and Foote 2009). Although the United States experience is relatively short, countries such as the United Kingdom, France, Spain, Chile, and Portugal have been using PPPs for road development for almost 2 decades.

The experiences have shown that the balance of PPP projects is positive but they suffer from several pitfalls, including renegotiation, which is a critical threat to the success of this procurement model. Renegotiation may result from traffic being systematically overestimated or capital costs being underestimated [as discussed by Baeza and Vassallo (2010)], but many other reasons can explain why renegotiations tend to happen. Nevertheless, the literature does not provide detailed evidence on renegotiation (e.g., causes, results, and process).

This paper will try to fill that gap by providing a discussion on the renegotiation process and analyzing a case study, the Portuguese road sector. Portugal has been the European Union (EU) leading country in PPP expenditures by percentage of gross domestic product (GDP; Cruz and Marques 2011) and its road network length has also registered the largest increase. The fact that all concessions have been renegotiated provides an interesting set of conclusions that are helpful for practitioners and academia.

A renegotiation can be seen as a contract failure (Marques and Berg 2010). Unable to cope with existing circumstances, contracts have to be renegotiated to accommodate unforeseen events. These events can either be out of the control of both parties, such as *force majeure*, economic and financial crisis, and large technological shifts, or they can result from direct actions of either one of them, e.g., unilateral contractual changes by the government. This should not necessarily result in a decrease in public welfare but empirical evidence has shown that renegotiations are often biased towards concessionaire satisfaction (Guasch 2004), thus jeopardizing the public interest.

As a result of any of the previously mentioned events (or group of events), one or both parties will not be able to comply with the original contract. The contract has to be revised in order to accommodate the new circumstances. A renegotiation is determined by an agreement on the new terms of the contract.

Therefore, regarding the extent of the impact that these renegotiations have had on PPP projects, it becomes fundamental to determine the causes for the high renegotiation rates and understand the determinants of these renegotiations. This topic is attracting increasing attention in academia and several studies have been done over the last decade (Guasch 2004; Guasch et al. 2007, 2008; Engel et al. 2003, 2009; Marques and Berg 2010; Cruz and Marques 2013a); however, the analysis is not oriented towards a particular sector. This phenomenon is quite different among sectors and a more detailed analysis is required to provide more powerful conclusions.

This paper brings some insights regarding the Portuguese road evolution for which the adoption of the PPP model was crucial. The rationale for using PPPs in road construction and the main risks that are involved are discussed. The specific problem of renegotiations

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is addressed, where the main determinants are analyzed, and a thorough analysis of risk allocation is made in all the national road concessions. The case studies are presented with a detailed analysis of several renegotiations that took place and the main causes are identified, as well as the consequences, in order to provide new insight on this issue. Conclusions and policy implications are presented.

Portuguese Road Sector

Overview

With income per capita growing significantly, after Portugal's entry into the EU, there was an increase in the motorization rates in a country with severe infrastructure deficits. The government policies were directed to provide the country with a road network that would be able to (1) increase accessibility, (2) decrease fatalities, and (3) stimulate regional development. The first two objectives were fulfilled (Fernandes and Viegas 2005) but regarding regional development the impact of road development is yet to be proven. Several researchers have studied the importance of road infrastructure in a country's development and the positive impact on regional economy. Positive correlation has been found between the existence and extension of highways or main roads with GDP (Banister and Berechamn 2000). Nevertheless, the benefits of road construction are not the focus of this paper.

In this section the physical and organizational development of the sector will be analyzed, as well as the evolution of the financing mechanisms, in order to provide an adequate framework for the analysis of PPP arrangements and renegotiations.

Physical Development

The first national road plan (NRP) appeared in 1945 and had undergone changes until the NRP in 2000, which set the main structure of the network; 16,500 km of road, of which 3,000 km are highway.

This development placed Portugal as one of the leading European countries in terms of the number of highway kilometers per inhabitant. Between 1990 and 2007, 18 out of 27 countries saw their highway networks increase by 50% or more, but three countries had extraordinary increases, as follows: (1) Ireland (934.6%), (2) Portugal (726.9%), and (3) Greece (480.5%).

The density of highways per unit area and per inhabitant is significantly higher in Portugal than the EU average; 28.4 km/1,000 km² against the EU average of 15.0, and 246.5 km/1 million inhabitants compared with 131.4 km/1 million inhabitants in the EU. These numbers illustrate that a country that is facing structural infrastructure gaps can manage to attain one of the most developed highway networks in a relatively short period.

Organizational Evolution

At an organizational level the road sector also suffered significant transformations. Between 1927 and 2002, the main stakeholder was the Public Road Agency, called Junta Autónoma das Estradas (JAE). Its main functions were to plan, finance, operate, and maintain the road network, but it was fully dependent on state financing.

In 2002, JAE was transformed into the Portuguese road institute [Instituto das Estradas de Portugal (IEP)] and became a public-owned enterprise with the ability to contract debt in what can be seen as a bypass to budgetary constraints. At this point, the stability and growth pact (SGP), signed in 1997 by 17 EU countries, established a 3% cap on public deficits. In 2007, IEP was turned into a public limited company, Roads of Portugal

[Estradas de Portugal (EP)], owned a master concession for a 75-year period for the design, finance, operation, and maintenance of the main road network. Unlike the previous concessions granted by the Portuguese state to the concessionaires, all the concessions are in fact subconcessions granted by EP after 2007. For brevity reasons, the writers refer to subconcessions as concessions.

Financing Scheme Development

In the 1990s, the successive governments, aware of the national delay on road infrastructure when compared to the rest of Europe, particularly regarding road casualties and regional imbalances, viewed PPP arrangements as the only possible way to recover from that delay, to succeed in increasing the length of road infrastructure, and/or to upgrade existing infrastructure. At the same time, the governments avoided spending large amounts of capital.

The financing scheme of the Portuguese road systems evolved significantly over time. After Portugal had joined the EU in 1986 it was granted cohesion funds for infrastructure development. Nevertheless, these funds represented less than half of the total investment. The remaining funds were achieved through a mix of user tolls and private investment (equity and debt). In 1994, the first project under a project finance scheme was developed, the Vasco da Gama Bridge. In the subsequent years the same model was applied to several road concessions. In the late 1990s, the government decided to develop shadow toll concessions, where the government would pay the concessionaires the toll for each vehicle. These concessions were renegotiated in 2011 because the government decided to change the shadow toll to a real toll regime and switch from a model where the concessionaire received compensation according to traffic (though there was high limitation on risk due to a band system) to an availability scheme model. These changes were related to the sustainability of the financing model for the entire network.

Public-Private Partnerships in the Road Sector

The PPP contractual model is defined by national legislation (Decree-Law No. 86/2003) as "the contract or union of contracts by which private entities, nominated by private partners, in the long term are compelled to assure, before a public partner, that the development is aimed at satisfying a collective need, and where funding and responsibility for investment and operation and maintenance obligations belong, in whole or in part, to the private partner."

One of the main characteristics of PPP arrangements is related to the financing model of the projects. Although project finance is sometimes used as a synonym for PPP, this is not entirely accurate. The financing could be, theoretically, out of the scope of the PPP option. However, that is usually not the case. Traditionally, a substantial portion of the capital needs are met by private partners who are responsible for finding the financial resources needed for the investment and operation of the partnership, often assuming the form of prior financing to be reimbursed throughout the duration of the contract. Nevertheless, the expectations from the private party are more than access to capital. The synergies achieved through a whole lifecycle approach to the project, as well as the incentive to perform effectively and efficiently when exposed to risk (Grimsey and Lewis 2002), are maximized when both parties honestly contribute their best efforts.

The question of risk sharing is undoubtedly one of the most critical issues for the success of the model. It is through an effective risk-sharing agreement that value for money (VFM) can indeed be delivered.

Table 1. Features of Main Portuguese Road Concession Contracts

Concession	Type of toll	Extension (km)			Contract signing	Duration (years)	Investment (M€)	
		New	Duplicate	Existing				
In operation	Lusoponte	Real	17.3	—	—	1994	30	867
	Norte	Real	175.1	—	—	1999	30	879.2
	Oeste	Real	85	—	—	1998	30	453.5
	Brisa	Real	1,088.7	—	—	2007	30	2,623.8
	Litoral Centro	Real	92	—	—	2004	30	550.7
	SCUT Beira interior	Shadow	83.2	47	47.2	1999	30	628.3
	SCUT Costa de Prata	Shadow	61.3	2.1	37.9	2000	30	320.7
	SCUT Algarve	Shadow	35.6	—	91.5	2000	30	228.5
	SCUT interior Norte	Shadow	116.3	—	38.6	2000	30	504.1
	SCUT Beiras Litoral e Alta	Shadow	161.8	—	5	2001	30	718.4
	SCUT Norte Litoral	Shadow	41.1	71.8	—	2001	30	318.6
	SCUT Grande Porto	Shadow	49	15	64	2002	30	492.5
	Grande Lisboa	Real	67	—	—	2007	30	180
	Under construction	Subconcession Douro Litoral	Real	128.9	—	—	2007	27
Subconcession AE Transmontana		Real	9	38	—	2008	30	535.9
Subconcession Douro interior		No toll	222.7	27.3	—	2008	30	641.7
Subconcession Marão		Real	30	—	—	2008	30	348.2
Subconcession Baixo Alentejo		Real ^a	154	—	220	2009	30	381.9
Subconcession Baixo Tejo		Real	70	—	—	2009	30	270.1
Subconcession Litoral Oeste		Real	109	—	—	2009	30	443.6
Subconcession Algarve Litoral	No toll	273.5	—	—	2009	30	165.1	

^aReal toll only in 68 km.

Unlike traditional procurement, a PPP contract can adopt a life-cycle approach by bundling construction, operation, and maintenance. This integrated approach captures synergies and increases the VFM.

Due to these characteristics, PPP projects have become extremely appealing for governments. However, the underlying objectives and assumptions should be tested for each particular project to assess which option would maximize the social welfare. This is usually done through the public sector comparator (PSC); *see more* in Bain (2010).

As mentioned, a master concession for developing and maintaining the entire principal road network was awarded in 2007 to Estradas de Portugal, a company with a single shareholder (the Portuguese state), and which is able to issue its own debt.

Table 1 summarizes the road concession contracts that are either in operation or under construction.

The available models for the delivery of road infrastructure through a PPP model are diverse. Commonly, they are structured according to the several stages that may be incorporated in the contract. For example, the contract may include the construction, property acquisition and maintenance of the infrastructure, which is referred to as a build-own-maintain (BOM) project. It may also include the design and the financing, and therefore it is a design-build-finance-operate (DFBO) scheme. Table 2 summarizes the main models used worldwide.

Renegotiating Road Concessions

Problem of Renegotiation

While renegotiation may be necessary to improve the performance of the partnership, due to the inevitable incompleteness of concession contracts, there is evidence that renegotiations often end up decreasing the welfare of one party while increasing the welfare of the other. This rent appropriation is due to opportunistic behavior of the parties, both governments and concessionaires (*see more* in

Cruz and Marques 2013a). The problem becomes more difficult to tackle due to high incidence of these renegotiations. The problem of renegotiation has affected all road concession contracts in Portugal. All the contracts have been renegotiated, some of them being renegotiated more than 5×.

Several researchers have studied the causes of renegotiations, including Guasch (2004), Athias and Saussier (2007), Estache et al. (2008), Athias and Nunez (2009), Brux (2010), Engel et al. (2009), Marques and Berg (2010), and Cruz and Marques (2013a, b). Some of the identifiable causes are poor accountability, insufficient coordination of the government, poor preparation of the tenders, aggressive bidding and strategic behavior, poor contractual design, and inadequate regulation. Whatever the causes, the literature and professional practice has shown that renegotiations largely take place due to inadequate preparation and management by the public sector. For example, aggressive bidding and strategic behavior could be prevented if proper regulation and contract management were in place. If the concessionaires are aware that it will be difficult, if not impossible, to get profit in *ex post* renegotiation, they will be less willing to add risks by bidding aggressively.

Table 2. Models of PPP Projects

Acronym	Designation
BOM	Build-own-maintain
BOO	Build-own-operate
BDO	Build-develop-operate
DCMF	Design-construct-manage-finance
DBO	Design-build-operate
DBFO	Design-build-finance-operate
BBO	Buy-build-operate
LDO	Lease-develop-operate
BOT	Build-operate-transfer
BOOT	Build-own-operate-transfer
BROT	Build-rent-own-transfer
BTO	Build-transfer-operate

Note: Data from OECD (2010).

To organize the analysis, three main determinants affecting renegotiations have been proposed, as follows: (1) risk sharing, (2) award criteria, and (3) contract management.

Risk Sharing

The way risk is evaluated, shared, managed, and mitigated becomes crucial for the success of any PPP. Baeza and Vassallo (2010) claim that risks in a concession contract are the consequence of the inability to forecast the evolution of the variables, which determine the outcome of the concession. The way that these risks are allocated between the two partners, i.e., (1) public, and (2) private, is the cornerstone of the model. The general principle for optimal risk sharing is that each party should assume the risk that it is best able to deal with (Grimsey and Lewis 2002, 2005; Meda 2007; Cruz and Marques 2011).

The value at risk for the concessionaires provides the incentive to increase efficiency and develop solutions with VFM, compared with the alternative of public management. However, this risk sharing requires a great deal of attention, not only in designing the contract but also in the preparation of the tender. A mishandling of the risks associated with a concession, through poor risk identification, quantification, and allocation, jeopardizes the success of the partnership (Marques and Berg 2011).

What are the main risks affecting a road concession? Table 3 provides an overview of the type of risks, and a qualitative classification of their probability of occurrence and potential impact.

The risk sharing agreement has a significant impact on the likelihood of renegotiation. The road sector and particularly the Portuguese experience with road concessions provide evidence

of this relationship. As stated previously, the main reasons for the renegotiation of road concessions are changes in design (nine changes due to political reasons and five changes due to environmental issues), delays in expropriation (four), and traffic below forecast (two).

Changes in the design must be divided into two different groups, as follows: (1) those changes related to political reasons (e.g., changing the location of a highway exit), and (2) those changes arising for environmental reasons (e.g., environmental assessment determines that the layout has to be diverted). The first case is always a unilateral contract change and therefore it is a risk that is always handled by the public sector. However, it is not clear that the second group must be under the government's responsibility. In most concessions (currently under construction), the government decided to change this responsibility from the public side to the concessionaire. The rationale is that the construction should be entirely assumed by the concessionaire because this party is best able to deal with changes in the design due to environmental reasons. The same rationale is evoked for expropriation. It was also a risk under the public sector responsibility, which in recent years has moved towards the concessionaire (Table 4).

The rearrangement in the risk sharing agreement also affected traffic risk. The first models were based on a band system, which defined the level of compensation per vehicle. Typically, the lower the number of vehicles, the higher the compensation per vehicle. Recently, concessions have been developed under an availability payment scheme, in which the concessionaire receives a rent for delivering the infrastructure under predefined quality parameters. By doing so, the risk of renegotiation due to insufficient traffic is eliminated because the government bears the risk.

Table 3. Main Risks in a Road PPP

Risk type	Risk description	Probability	Impact Level
Planning	Political risk	High	High
	Definition of project outputs		
Environmental	Adequacy of construction projects as defined in specific design	High	High
	Obtaining the environmental impact statement		
	Appearance of environmental sensitive fauna and flora during construction stage		
Design	Risk of inadequacy between project and real conditions <i>in situ</i>	Low	Medium
Financial	Risk of insolvency of lenders	Medium	High
	Uncertainty about rising inflation		
	Volatility in financial markets		
	Amendment of conditions of tariff by the regulatory authorities		
Expropriation	Acceptance of expropriation	High	High
	Obtaining licenses for construction and operation		
Construction	Delays in the commissioning of the road	High	High
	Uncertainty about geological and environmental conditions		
	Uncertainty about archaeological findings		
	Equipment damages during operation or during the installation		
	Difficulty in providing material		
Operation and maintenance	Uncertainty about the quality of maintenance services	Low	Low
	Risk of availability of infrastructures		
Tolls collection	Uncertainty about fraud	Low	Low
	Potential labor problems with toll booth operators		
	Technological risk with automatic payment methods		
Demand	Location and displacement of enterprises	High	High
	Threat about the coming of new competitors into the business		
Availability	Risk about traffic accidents and other events that might affect the infrastructure availability	Low	Low
Latent defects	Risk about defects detected only during operation	Low	Low
Unilateral changes	Risk arising from one of the agents deciding unilaterally to change the concession conditions	High	High
Legislation	Likelihood of new legislation with an impact on the cost structure	Low	High
	Stricter regulations		
Force majeure	Natural disasters, vandalism, war, and epidemics	Low	High

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Table 4. Risk Matrix in Road Concessions

Concession	Public tender, year	Contract signature, year	Toll	Main risks													
				Planning	Environmental	Design and project	Financing	Expropriation	Construction	Operation and maintenance	Tolls collection	Demand	Availability	Latent defects	Unilateral changes	Legislation	<i>Force majeure</i>
				Operation													
Brisa	0	1972	Yes	Public	Public	Private	Public/private	Private	Private	Private	Public/private	Public/private	Private	Private	Public	Public/private	Public
Lusoponte	1992	1994	Yes	Public	Public/private	Private	Private	Private	Private	Private	Private	Private	Private	Private	Public	Public/private	Public/private
Oeste	1997	1998	Yes	Public	Public	Private	Private	Public	Private	Private	Private	Private	Private	Private	Public	Public/private	Public/private
Norte	1997	1999	Yes	Public	Public	Private	Private	Public	Private	Private	Public	Public	Private	Private	Public	Public/private	Public/private
Beira interior	1997	1999	—	Public	Public	Private	Private	Public	Private	Private	—	Public/private	Private	Private	Public	Public/private	Public/private
Costa de Prata	1998	2000	Yes	Public	Public	Private	Private	Public	Private	Private	Public/private	Public	Private	Private	Public	Public/private	Public/private
Algarve	1998	2000	—	Public	Public	Private	Private	Public	Private	Private	—	Public/private	Private	Private	Public	Public/private	Public/private
Interior Norte	1998	2000	—	Public	Public	Private	Private	Public	Private	Private	—	Public/private	Private	Private	Public	Public/private	Public/private
Beiras Litoral e Alta	1998	2001	—	Public	Public	Private	Private	Public	Private	Private	—	Public	Private	Private	Public	Public/private	Public/private
Norte Litoral	1999	2001	Yes	Public	Public	Private	Private	Public	Private	Private	Public/private	Public	Private	Private	Public	Public/private	Public/private
Grande Porto	1998	2001	Yes	Public	Public	Private	Private	Private	Private	Private	Public/private	Public	Private	Private	Public	Public/private	Public/private
Litoral Centro	1999	2004	Yes	Public	Public	Private	Private	Public	Private	Private	Private	Private	Private	Private	Public	Public/private	Public/private
Grande Lisboa	2003	2006	Yes	Public	Public	Private	Private	Private	Private	Private	Public	Public	Private	Private	Public	Public/private	Public/private
				Construction													
Marão, tunnel	2007	2008	Yes	Public	Private	Private	Private	Private	Private	Private	Private	Private	Private	Private	Public	Public/private	Public/private
AE Transmontana	2007	2008	Yes	Public	Private	Private	Private	Private	Private	Private	Private	Public/private	Private	Private	Public	Public/private	Public/private
Douro interior	2007	2008	—	Public	Private	Private	Private	Private	Private	Private	—	Private	Private	Public	Public/private	Public/private	
Baixo Alentejo	2007	2009	Yes	Public	Private	Private	Private	Private	Private	Private	Private	Public/private	Private	Private	Public	Public/private	Public/private
Baixo Tejo	2007	2009	Yes	Public	Private	Private	Private	Private	Private	Private	Private	Public/private	Private	Private	Public	Public/private	Public/private
Litoral Oeste	2007	2009	Yes	Public	Private	Private	Private	Private	Private	Private	Private	Public/private	Private	Private	Public	Public/private	Public/private
Algarve Litoral	2008	2009	—	Public	Private	Private	Private	Private	Private	Private	—	Private	Private	Public	Public/private	Public/private	
Pinhal interior	2008	2010	Yes	Public	Private	Private	Private	Private	Private	Private	Private	Public/private	Private	Private	Public	Public/private	Public/private

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Table 5. Bids Evaluation Model for the Road Concessions Program

Weight	Criteria
Group 1, 65–70%	Net present value of future payments by the government to the concessionaire Risks associated with the net present value Dates for road opening
Group 2, 35–30%	Robustness of the corporate structure and financial stability of the bidding consortium Technical quality, i.e., design, construction, and operation Service levels and road safety

Note: Data from Court of Audit (2005).

Award Criteria

The award criteria for selecting the best bid in a tender procedure are critical for future *ex post* renegotiations. Problems such as the winners' curse and aggressive bidding might be enhanced or mitigated during the tender process by the selection of award criteria. The best bid seldom matches the bid where the grantor, theoretically, has less financial costs. If the criteria are not well-defined for possible future renegotiations, a bid that seems to be the best at the selection phase will have a high probability of being too expensive during the concession period (Guasch 2004).

The bidding process for a concession award follows a two-phase process, as follows: (1) the first phase is open to all bidders, after which an evaluation of the proposals leads to a short list (usually with the two best bids); and (2) afterwards, a negotiation process takes place between the grantor and the selected bidders in order to improve the proposals and eventually to incorporate new information made available in between the proposals. Competitors then present the best-and-final-offer (BAFO), and the concession is awarded to the best proposal.

Table 5 presents the evaluation criteria for road concessions, along with their respective weights. The net present value (NPV) of future governmental payments and the dates for road openings account for 65–70% of the weight, placing a large emphasis on cutting costs and opening the door to underbidding.

The evaluation criteria showed a great emphasis on financial indicators, especially in the NPV of future governmental payments, which shows the importance of having low cost bids for winning the tender. Nevertheless, when the best bids are selected the emphasis on cost reduction seems to fade away. While negotiating with the two selected bidders the grantor often introduces changes to the proposals. Looking at data from six road concessions and analyzing the changes in bids between the first phase and the second phase, only three out of 113 bids were related to cost minimization (less than 3%), while the remaining 110 added costs to the project (Table 6).

Contract Management

Contract management represents one of the critical elements for the success of a PPP and can also affect the renegotiation process. The impact is not so much on the probability of renegotiation but on ensuring contract compliance and, particularly, on decreasing information. There is information asymmetry when one of the parties has more information than the other, biasing the process of negotiation (Stigler 1961; Spence 1973; Mu et al. 2010). The more precise the knowledge of the concessionaire regarding their production or cost functions and on the business determinants, the lower the bargaining power of the grantor.

Renegotiations occur in a bilateral environment, without competition, such that the incumbent holds a competitive advantage because it has more information (Williamson 1985). The concessionaire can claim compensation or impose decisions and actions that the grantor cannot contest or against which they do not have the arguments with which to contest (Marques and Berg 2010). These theories place most of the renegotiation power on the concessionaire, supporting their assumptions on information asymmetry which, in complex systems such as health or transportation, may in fact provide significant bargaining power, and also quasi-rent appropriation.

Contract management consists of a series of activities aimed at monitoring and ensuring compliance with the contract, considering the principles and objectives underlying the contract between the grantor and the concessionaire.

The purpose of the next section is to present some case studies and to provide detailed information on what leads to renegotiation and its main results. Three different projects were selected, as follows: (1) the Costa de Prata concession was a former shadow toll highway that recently has been transformed into a real toll; (2) a real toll highway, the Norte concession; and (3) a concession for two bridges in Lisbon, one existing bridge and one new bridge, the Lusoponte concession, which was the first PPP developed under a project finance scheme.

Case Studies

Costa de Prata Concession

The Costa de Prata concession represented a global investment of 602 million Euro [excluding value added tax (VAT)], and a 776 million Euro NPV for government payments to the concessionaire (value at year 2000). The concession was initially under a shadow toll regime and was later changed to a real toll.

Shortly after the award of the concession, the government was unwilling to fulfill its obligations regarding the environmental impact assessment and the expropriations. Two years later, the

Table 6. Changes in Bids Made between Phases 1 and 2 for Road Concessions

Changes in bids	Number of changes in bids between first and second phase						
	Beira interior	BLA	Algarve	Norte Litoral	Costa de Prata	Interior Norte	Total
Improve technical standards for road design	—	1	1	8	3	4	17
Accessibility improvement to the new road	4	4	2	1	3	7	21
Improving the level of service	2	1	2	8	1	6	20
Environmental impacts mitigation	6	4	4	3	4	6	27
Improvement of secondary services to road users	3	1	3	1	2	4	14
Changes imposed by the grantor	2	1	2	3	1	2	11
Cost minimization	—	—	1	—	—	2	3
Total	17	12	15	24	14	31	113

Note: Data from Court of Audit (2005).

concessionaire requested economic and financial reequilibrium (EFR). After this renegotiation, the government required a change in the road layout unilaterally, changing the object of the concession, but the compensation claimed by the concessionaire was excessively high, making the government retreat on its intentions. Nevertheless, there was an EFR given for the time and resources spent by the concessionaire in studies for the new layout, and also for the delays in the completion of the highway and consequent delays in expected revenues arising from the beginning of the operation. All of these aspects and the consideration of the various requests for an EFR resulted in a total claimed value of 449 million Euro. However, because the government stepped back on its intentions for changing the layout, the agreed value was around 42 million Euro.

In addition to these problems, there is also the issue of the award criteria. They were not considered in order to safeguard the renegotiation of this contract because the NPV of the expected cost to the government was regarded as the most important criterion and, at the same time, this value would be calculated by the bidders, using the government traffic estimates. Knowing that the government estimates were usually optimistic (Siemiatycki 2010), the concessionaire has an incentive to bid aggressively, expecting to capture some rents in postrenegotiation. This is a typical example of aggressive bidding resulting from inadequate award criteria. This phenomenon has also been noted by other researchers (e.g., Guasch 2004) and has been identified as one of the main problems with PPPs. It is also very difficult to address after the contract is awarded because the initial traffic estimates give the concessionaire an expectation regarding revenues that is not realistic. Nevertheless, because the contract is signed on the basis of those estimates the concessionaire seeks compensation.

Regarding contract management, despite considering various mechanisms that allow the grantor to manage the contract, this process was not carried out in the best way. The government did not effectively use the information given by the concessionaire and also the concessionaire did not provide all the mandatory information. In spite of this, no penalties were applied. This mishandling of the contract exacerbated the negative consequences of the renegotiation process because it increased the problem of information asymmetry. The government did not have adequate information to protect the public interest and, in the context of the renegotiation, its position was therefore weakened.

The renegotiation of contractual clauses happened in June 2010 and included the introduction of tolls (this concession did not have costs for users). Besides the introduction of tolls there was a new allocation of some of the main risks associated with this concession, one of them being the traffic demand risk, which moved from the concessionaire to the grantor.

Legal risk was also changed due to the introduction of a new clause that ensures that the concessionaire has the right to renegotiate if the internal rate of return (IRR) varies by more than 0.001 percentage points because of applied changes to the tax regime.

Norte Concession

The Norte concession was granted in 1999 with an estimated investment of 1,490 million Euro (excluding VAT) and 170 million Euro of NPV for government payments. This concession was a real toll concession, and the 170 million Euro payment from the government was made to ensure the economic viability of the concession because the revenues arising from tolls were insufficient. The concessionaire has two sources of revenue, as follows: (1) real tolls, and (2) governmental subsidies. This premise was modified

with the renegotiation of the contract, which occurred in 2010 and is still under scrutiny.

In this concession, as in the Costa de Prata concession, there were problems with the environmental impact assessments, expropriations, and unilateral changes imposed by the grantor. However, in this concession there was also a physical overlap with another existing concession (the Brisa concession) in the Braga area, a city in the north of Portugal, which resulted from flawed planning, a responsibility of the government. Due to these events, there were delays in construction and consequent revenue losses by the concessionaire who claimed a value for the EFR of 488 million Euro (33% of the total investment), an amount that, after the agreement between the parties, was set at 280 million Euro (18.8% of the total investment). Therefore, 18.8% of the total value of the investment was paid to the concessionaire in a bilateral negotiation. This type of event has the potential to completely erode the advantages of a competitive bidding process and provides support for the aggressive bidding approach of concessionaires, which expect to profit in *ex post* renegotiations, as described in the literature (see Guasch 2004). For future tenders, potential bidders are aware of the high probability of renegotiation and may use this expectation to bid more aggressively.

The contractual changes made in this contract regarding demand and legal risk are the same changes that took place in the Costa de Prata concession, as mentioned in the previous section.

Lusoponte Concession

The Lusoponte concession is a unique case among road concessions; it included the conception, design, financing, construction, operation, and maintenance of the Vasco da Gama Bridge, and the operation and maintenance of the 25th of April Bridge. It was awarded in 1994 and it was the first project ever developed in Portugal under a project finance model.

It had an estimated investment of 867 million Euro, an amount that later rose up to 987 million Euro. Unlike the two concessions previously presented, this concession did not include government subsidies but rather EU funds, which comprised approximately 35% of the investment. One of the initial assumptions was that the tolls charged at the two crossings (with the same value) would ensure the economic sustainability of the concession. This implied a significant toll increase for the existing bridge (25th of April) and the government was not able to increase the tolls due to strong public protest. The high impact that the tariff change on the two bridges would cause in the financial mode forced the government to make an EFR overall agreement with the concessionaire to put an end to the constant financial imbalance. After negotiations, a concession that originally would have no direct charge to the government budget became heavily dependent on its compensation. The parties agreed to a direct compensation of 449 million Euro and a contract extension, which initially would have a variable term of no more than 33 years and after the renegotiation had a fixed contract duration of 35 years. Then, it was also agreed that the concessionaire would no longer have to bear the maintenance costs of the 25th of April Bridge (this value was estimated at 67.5 million Euro). The government also granted some tax benefits to the concessionaire, including a maximum value on their corporate income tax rate and a VAT reduction of 5%. Despite such compensation, the shareholder IRR remained at 11.43% (the value previously agreed). Again, the renegotiation resulted in more favorable terms to the concessionaire, as in the other two case studies presented.

The pattern observed in these case studies is common among the several concessions awarded in Portugal and not unique to the road sector.

Conclusions

The Portuguese experience with road PPPs provides interesting insight because this small country developed its entire main highway network under concession arrangements, using a variety of models. This made Portugal the country in the EU with the largest expenditure in PPP projects as a percentage of GDP (Cruz and Marques 2011). Undoubtedly, this procurement model has allowed for a development in the road network that would not have been possible under public management and, particularly, not possible under public financing.

Nevertheless, the renegotiations that affected all the concessions proved to be harmful for the public interest. The majority of the causes that led to renegotiation were related to the poor performance by the public partner. This often led to a vulnerable position in several cases of renegotiation, because after signing the contract all negotiations were carried out on a bilateral basis without any competition for the concessionaire.

Moreover, information asymmetry problems significantly jeopardized the bargaining power of the public partner. Information asymmetry will almost always exist but it could be minimized with effective contract management and regulation, absent from these concessions. From the writers' viewpoint, poor contract management is clearly one of the main pitfalls of the Portuguese PPP program and its negative consequences may have long-term impacts.

Associated with the problem of renegotiation, there are also problems with the criteria for the analysis and selection of the best bids used in the concessions. Related to the analysis criteria is the fact that they did not include directly the shareholder's IRR and this is the primary value used to determine the financial stability of the partnership. In addition, the shareholder's IRR value remains crystallized throughout the concession's whole lifecycle without variation, depending on the existing risks in the various phases of the concession.

The award criteria favoring aggressive bidding, the very likely renegotiation in the first couple of years, and the absence of effective contract management provided the ingredients for a painful and expensive renegotiation process for the public sector. The changes in the risk-sharing agreement made by the government to control or minimize the number and extent of renegotiations will most likely decrease the number of renegotiations, but at an extremely high cost.

Renegotiations can be claimed by both partners but the large majority of case studies have shown that the private partner generally takes the lead in asking for the renegotiation, mostly due to unmet expectations (e.g., traffic forecasts) or the inability of the government to fulfill its contractual obligations (e.g., environmental permits) (see more in Cruz and Marques 2013b).

Renegotiations are critical for the long-term success of PPP arrangements, and this is an issue that requires more empirical evidence to provide academia and practitioners with a better understanding of the process. Renegotiations have the potential to negate the benefits of competition for the market. The process of achieving VFM in concession programs is still very dependent on the tender process and until now there has been some consensus that the competition for the market may ensure the selection of bids with VFM. This may be true only if the VFM is not compromised in *ex post* renegotiations.

The probability of renegotiation will always be high because contracts are, by definition, incomplete. Methods of improving the performance of the public sector during renegotiation can be discussed. This requires an integrated approach to the entire lifecycle of the project. In the initial stage, it is necessary to effectively perform VFM tests to select the best projects to be delivered

through PPP, avoiding engagement in projects that should not be developed in the first stage. During the initial stage, it is also necessary to consider the optimism bias in forecasts, lowering the expectations of revenue, which are usually overestimated. Regardless of these improvements, the writers believe that contract management plays the most essential role in leveraging the public sector position in the context of renegotiation. Decreasing the information asymmetry is crucial and allows the public sector to know the determinants of the business, and therefore it becomes better able to discuss the claims of the concessionaire. However, effective contract management requires significant human and financial resources and dedicated teams to monitor the contracts, but it could be the best alternative to minimizing the negative outcomes of renegotiation.

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