Chapter 2

Renegotiations in public private partnerships:
Theory and evidence

Eduardo Engel and Ronald Fischer, University of Chile,

Alexander Galetovic, University of Los Andes, Chile

Public private partnerships (PPPs) have the potential to increase efficiency and improve resource allocation. However, contract renegotiations are common and make us question the benefits of PPPs.

Under current accounting standards, PPPs allow intertemporal reallocations of infrastructure spending that do not occur under traditional methods of procuring infrastructure and which allow governments to escape the constraints of congressional purview. This chapter reviews the theoretical results in Engel et al. (2009a) as well as data from Colombia, Chile and Peru comprising 610 highway PPPs and 540 renegotiation processes to verify these predictions. The data and original analysis comes from Bitran et al. (2013), complemented with additional descriptive statistics. The empirical evidence supports the predictions of the theoretical model.

"Cynics suspect that the government remains keen on the Private Finance Initiative, not because of the efficiencies it allegedly offers but because it allows ministers to perform a useful accounting trick." *The Economist*, 2 July 2009

Infrastructure provision via a PPP has become an accepted mechanism in many countries. This explains the rise from almost zero PPP investment in Europe in 1990 to almost EUR 30 billion in 2006, before falling by one-third in the aftermath of the financial crisis. When considering low- and middle-income countries, the numbers rise from approximately USD 20 billion in 1990 to more than USD 160 billion in 2010, and with no ill-effects from the financial crisis[1]. PPP investments range from highways, bridges, airports and tunnels to less conventional prisons, convention centres, hospitals, schools, sanitation systems and railways (Engel et al., 2014).

There are several reasons for the increased use of PPPs. One of them is the potential for efficiency gains from packaging in one contract the final design, financing, construction and operation of a project[2]. Second, some countries, such as the United Kingdom, used it to escape the constraints imposed by the Maastricht Agreements on public spending. Other countries believe, or act as if they believe, that PPPs provide access to additional sources of finance. There are also political economy arguments for PPPs: For example, some countries avoid the unpopularity of privatisation by transferring (temporarily) state assets to a private party for a limited time. The problem is that having a successful PPP programme necessitates avoiding a series of pitfalls that are observed in the programme of many countries.

In particular, governments should set limits on contract renegotiations, as they can overturn the efficiency gains of PPPs. This is not easy and PPP programmes are often riddled with contract renegotiations. An early study by Guasch (2004) covered over a thousand Latin American concessions prior to the year 2000. One of his findings was that over 30% of contracts are renegotiated, and in the case of roads, the figure is 54.4%. Another finding was that there is often a bias towards the private party; in 62% of cases, tariffs were raised, and in a similar proportion the required investment was reduced[3]. It is clear that in a long-run contract, it will be necessary to make adjustments in response to changes in demand, in quality standards or for other similar reasons. These adaptations of the contracts require renegotiations, and so long as they are conducted transparently, can lead to welfare gains[4,5]. The trade-off between the gains from flexibility in order to adapt the project to changed conditions and the risk of opportunistic renegotiations is examined in Athias and Saussier (2010). However, this reasoning does not explain why it is often the case that there is substantial renegotiation in the early stages of the project, and even during construction[6]. In our interpretation, there are incentives to renegotiate. One case is when there are mistakes at the planning stage by the Public Works Authority (PWA), which is reluctant to admit the fact publicly, leading to contract renegotiation on very easy terms for the firm. These mistakes may range widely, but often include intentionally or unintentionally omitted components of the project. Unintentional omissions are a result of incompetence at the PWA, but there are cases in which the omission is desired by the PWA. This occurs, for example, when the PWA omits components of the project in order to lower its cost and receive the approval of the Finance minister or other budgetary authority[7].

However, there is an additional reason for intentional renegotiation of PPPs by government, and moreover, it is a motive that is associated with PPPs and not to other types of infrastructure provision contracts. What is special about PPPs is that the project is financed by the concessionaire and that future obligations to it are not registered as debt in the fiscal balance sheet. This can happen when the availability payments are made by the state (the case of the Private Finance Initiative [PFI] programme in the United Kingdom), but even more so when user fees are the main basis of resources for repayment.

Thus the private party can provide additional infrastructure, not included in the original contract, with costs to be paid either by future users or governments.

Infrastructure investment is popular among politicians and helps an incumbent during elections. However, governments face budgetary constraints – in the case of developing economies spending limits are often introduced by multilateral organisations. In the case of the UK, the Maastricht agreements limiting public investment led to an abandonment of the Ryrie Rules used for PPP investments. These rules included all PPPs as part of public investment, thus limiting their usefulness for the current administration[8]. Many other countries have also used PPPs to escape budgetary constraints. In Engel et al. (2009a), we showed that budget renegotiations can also be used to increase spending and escape budgetary constraints, thus helping a government get re-elected. We use the results of that paper to examine the political-economy use of renegotiations.

The model starts with the observation that under traditional provision of infrastructure, a company is hired to build a project backed with fiscal funds, and is paid when the project is finished. The fiscal funds must be approved in the budgetary process and are therefore restricted. An increase in spending associated with the project requires either a reassignment of budgetary funds or going through the budgetary process. Thus, it is difficult and costly to increase spending on the project, and we assume that it is impossible under traditional provision.

In the case of PPPs there is a difference, however, because the private party is paid over time and finances the project by itself. Due to deficient accounting standards, changes in the future flow of resources that the firm will receive as repayment are usually not included in the fiscal balance sheet. Thus, an increase in future user fees, or an extension in the life of a PPP that charges user fees do not require budgetary approval. In countries where availability payments are not included in the balance sheet, government may increase the value of these future flows. This means that the present government can bind the resources available to future governments in exchange for current infrastructure spending by the PPP. In essence, in a renegotiation for additional infrastructure, the PPP "lends" to the current government in exchange for these future funds.

Engel et al. (2009a) presents a model with four predictions. First, under competitive bidding and renegotiation, firms will make bids that are below costs. A standard interpretation is that this corresponds to cases of Winner's Curse. However, there is empirical evidence that lowballing bids are higher under weaker institutional frameworks, where renegotiation is easier, see Athias and Nuñez (2008) and (2009). This is consistent with our prediction of the association of opportunistic renegotiations and lowballing. Second, renegotiation includes not only compensation for the low bids, but also additional investment. Third, these renegotiations occur early and, fourth, a large part of the cost of renegotiations falls onto future governments. In that paper we simplified the analysis by assuming that firms have identical costs and there is perfect competition among bidders.

Further extensions of this research would loosen these constraints. For example, if a firm has a cost advantage over the remaining bidders, it might use limit pricing, so the winner might not be placing a bid below costs. On the other hand, if a firm has an advantage in renegotiation over the rest of the field, it might be able to offer a lower bid than a more cost-efficient firm, thus creating a further inefficiency in renegotiations. If costs are equal, but there are few firms and there is a first-price auction, bids may also be higher than costs.

Another point to take into consideration is that the desire by the government to engage in renegotiation may depend on its probability of winning the election. Since the reallocation of future resources is costly, a government that is sure to be re-elected will not renegotiate the contract, while the

desire and extent of renegotiation depends on the likelihood of re-election without the increase in public spending associated with renegotiation. Note also that during renegotiation, it is easy for the government to be a bad bargainer in exchange for political slush funds, which are useful to pay for campaign expenses. The relationship between corruption and PPP renegotiations has been studied by Guasch and Straub (2009).

The solution, noted in Engel et al. (2009a), is that in order to reduce the incentives to renegotiate, the PPP and all its associated obligations should be included in the balance sheet of the government, and subject to the same oversight as other budgetary expenses.

There is empirical evidence for the predictions of this model. Engel et al. (2009b) describe the extent of renegotiations in the Chilean PPP industry up to 2006. The results were consistent with the predictions of the model.

More recently, Bitran et al. (2013) have studied renegotiations of highways in Chile, Colombia and Peru. These authors examine 61 interurban concession contracts between 1993 and 2010. In Chile they study the 21 interurban concessions (2 400 km) awarded up to 2004. They analyse 60 contract changes, adding up to USD 2.1 billion, of which USD 0.9 billion was to be paid by future administrations. They also include 17 additional years of contract terms (i.e. another cost for future administrations, which will not be able to sell these contracts as brownfield concessions). In Colombia the authors studied 25 contracts covering 4 800 km. They examined 430 contract changes worth USD 5.6 billion and 131 years of extension to the contract terms, and add almost 1 000 km of roads to the original contracts. In Peru they examined 15 road contracts for USD 2.3 billion covering 5 500 km. These concessions are newer, with an average elapsed time of 4.6 years, but despite this, they have been renegotiated 53 times. The cost has been USD 300 million and has added nine years to the contracts. Thus the more recent data examined in Bitran et al. (2013) confirm the predictions of this chapter as well as the previous study of Engel et al. (2009b) for Chile.

This chapter reviews the political economy model of Engel et al. (2009a) and the evidence supporting its predictions organised as follows. The next section describes the intuition behind the model in Engel et al. (2009a) and its predictions. We then present the evidence from Bitran et al. (2013) and derive the implications.

A simple renegotiations model

Model

The model is simple, with two periods: at the end of the first one, we have an election to change or keep the current administration. Social welfare depends on infrastructure services (other things being equal), and we assume a zero discount rate so social welfare is the sum of per-period social welfare:

$$U = u(I_1) + u(I_2) \quad (1)$$

where u is strictly increasing and strictly concave and I_t denotes infrastructure services in period t. In this setting, infrastructure lasts for a single period. This setting implies that not all infrastructure investments are made in period 1. In a first approximation, both the PPP and construction industries are competitive and the cost of a unit of infrastructure is one dollar. There are no costs of operation. The construction industry and the PPP industry are competitive, infrastructure fully depreciates in one period and each unit of infrastructure costs one dollar. Operation costs are zero.

Taxes per period Ti are exogenous, and the budget must be balanced:

$T_1 + T_2 = 1 = I_1 + I_2$ (2)

Maximising social welfare subject to the budget constraint leads immediately to the result that investment in each period should be the same: $I_1 = I_2 = ½$. We assume (a big assumption) that Congress wants to maximise social welfare, and uses spending limits in period 1 (I_1) to achieve this. The problem is that the executive includes, in its own utility function, the probability of being re-elected. The probability of re-election depends on infrastructure investment in period 1, so that the government's utility function is:

$G(I_1, I_2) = u(I_1) + p(I_1)u(I_2)$ (3)

This utility function reveals that the government cares about social welfare only if it continues in government. We assume that p is increasing and strictly concave. This is a standard formulation in this context (Alessina and Tabellini, 1990)[9]. Note, however, that from the government's point of view, biasing expenditure towards the first period increases utility by increasing the chances of re-election.

Conventional provision vs. public private partnerships

In general, the provision of public infrastructure can be private (the case of a private sanitation company), conventional (government hires a construction company to build the infrastructure and pays the company out of current funds) and via a PPP[10].

Congress authorises expenditure of $I_1 = I_2 = ½$ in period 1, and the government cannot exceed this limit. However, PPPs have the possibility of increasing current expenditure and getting paid later, as they finance the project themselves; and most importantly, these deals are not registered by congressional oversight in most countries. Thus, there is the potential to make a credible promise of future repayment, something that is not possible under conventional provision, where funding and payment are made period by period.

There are various possibilities for transferring resources to the second period: the government can, for example, grant a term extension to the PPP, raise future used fees or lower the quality standards of the project. As we show in Engel et al. (2013), these options always involve a transfer of resources from future administrations and users, and allow the government to increase first-period spending in excess of budgetary limits.

Conventional provision. As mentioned above, Congress allows the government an expenditure of at most $I_1^s = ½$, a limit that cannot be exceeded, because there are no mechanisms for it. There is procurement to an amount $I_1 = ½$ from construction companies (here, competition ensures that investment is comparable). If $½ > T_1$, the government issues debt of an amount $D = ½ - T_1$. This means that $I_2 = T_2 - D$, since the intertemporal budget constraint always holds. Since period-2 spending in the optimal case is $I_2 = ½$, we have that $T_2 = ½ + D$. This means that in this case there is no mechanism to shift spending between periods, and the government cannot achieve its desired spending pattern. Note also that an alternative way for Congress to control spending is by putting a limit on the issuance of public debt.

Public private partnerships. In this case, the private firm does not only build the infrastructure project, but it also operates and finances the project. The firm makes a bid for a payment of B (over the

two periods) in order to build infrastructure to the amount ½, which is all that Congress allows. Given the expenditure limits enforced by Congress, B ≤½.

Assume now that the contract is renegotiated before period 2, in order to increase infrastructure investment by the amount W, in exchange for an additional amount R to be paid in period 2 to the private firm. The new contract specifies W in additional investment (to ½+W) in exchange for increased payments, to be paid in the second period. Total payment is B + R. Thus, the agreement involves an intertemporal obligation that has not been approved by Congress and that can be used to exceed the expenditure limits[11]. In equilibrium, the values of the variables B, R, W can be determined.

PPP renegotiations and additional infrastructure spending

Suppose the government only faces the intertemporal budget constraint ($I_1 + I_2 = 1$) and is not limited by the per-period supervision by Congress. Then the first-order conditions (FOC) for the government's choice are:

$$\frac{dG(I_1, 1 - I_1)}{dI_1} = u'(I_1^*) - p(I_1^*)u'(1 - I_1^*) + p'(I_1^*)u(1 - I_1^*) = 0, \qquad (4)$$

It is fairly easy to show that $I_1^* > ½$. Just to give the flavour of the proof, consider the case in which $p' = p'' = 0$, i.e. when the probability of re-election is constant and does not depend on infrastructure investment. Even so, the fact that the government values the future less leads to excessive expenditure in period 1. The FOC become:

$$u'(I_1^p) - pu'(1 - I_1^p) = 0.$$

Note that only when the probability of re-election is p = 1 do we reproduce the efficient solution. Now, it is easy to see that the higher the probability of re-election p, the lower the distortion in governmental incentives, i.e. $dI_1^p/dp < 0$, and thus whenever p < 1, we have that the desired first-period spending is $I_1^p > ½$.

There is an additional effect, however, which comes from the fact that the probability of re-election increases as first-period infrastructure investment increases. Hence, there are two reasons for governments to desire to increase first-period investment.

Implementing the incumbent's optimum via renegotiation

What is noteworthy is that using renegotiations, the government is able to achieve its desired allocation of infrastructure investment. There are two things to consider here: first, the bargaining power of each party; second, the degree of lowballing by the winning bidder. In Engel et al. (2009a) we show that, independently of the bargaining power of the parties, the government can always obtain its chosen allocation.

The reason is that as the firm obtains more bargaining power, the competition to be the firm that builds the infrastructure project becomes more intense (in the expectation of profitable renegotiation), increasing the extent of lowballing. In turn, lowballing implies that there exist period-1 ex post free funds that the government can use, apart from any reallocation due to the possibility of the PPP firm "lending" resources to the government to increase first-period investment.

We assume that the government, following the spending cap set by Congress, auctions a PPP contract with period-1 investment $I_1 = \frac{1}{2}$. Note that renegotiation leads to W in additional infrastructure in exchange for a renegotiated amount of R to be paid in the second period: we have that second-period investment can only be $1 - (B + R)$. Thus the utility of the incumbent is:

$$u(\tfrac{1}{2} + W) + p(\tfrac{1}{2} + W)u(1 - (B + R))$$

During renegotiation the concessionaire obtains a rent $R \equiv R - W$ where the markup is given by its renegotiation ability. In this first stage, we assume that all firms are identical in this respect. Then an increase in the rent, due to reduced bargaining power by the incumbent, increases lowballing because of competition among firms. If we demote the extent of lowballing by L, then $L = \frac{1}{2} - B$, where B is the bid. By competition, we have that first-period spending commitments by government are $B + R$ and must equal first-period spending $\frac{1}{2} + W$. Note the effect that, in equilibrium, the firms lowball to the extent of what they will obtain in the renegotiation process.

The important point is that the transfer implicit in the lowballing is a free transfer to the incumbent, which can use it to increase its spending in the first period, without it being at stake in the renegotiation process. Under the two assumptions of efficient bargaining and competition, this is sufficient to achieve the desired first- period investment by the incumbent. To make the point, we show that when the concessionaire has all the bargaining power, the incumbent can achieve its desired spending.

The private party has all the bargaining power. Since the government does not obtain any additional utility by renegotiation (because it is all appropriated by the firm), renegotiation keeps its pre-renegotiation utility constant. However, this utility includes the resources saved by lowballing: This means that there are free second-period resources. The incumbent's utility of no renegotiation is: $u(\frac{1}{2}) + p(\frac{1}{2})u(\frac{1}{2} + L)$, where the additional second-period resources are due to the fact that the first-period expenditure cost less than $\frac{1}{2}$. Thus the problem for the winning bidder – after being awarded the contract – is to maximise its profits $R - W$ by renegotiation, under this constraint:

$$\max_{\{W, L\}} R - W \tag{5}$$

$$\text{s.t. } u(\tfrac{1}{2} + W) + p(\tfrac{1}{2} + W)u(\tfrac{1}{2} + L - R) = u(\tfrac{1}{2}) + p(\tfrac{1}{2})u(\tfrac{1}{2} + L)$$

The first-order conditions of this problem arise from competition and the absence of loss on the part of the private parties. This means that $R = L + W$, i.e. second-period additional payments are equal to the extent of lowballing plus the additional first-period infrastructure investment. We obtain the expression:

$u'(\frac{1}{2}+W) - p(\frac{1}{2}+W)u(\frac{1}{2}-W) + p'(\frac{1}{2}+W)u(\frac{1}{2}-W) = 0$

which is identical to (4)! Thus, even when the firm has all the bargaining power, the incumbent can use renegotiations to achieve its desired allocation of expenditure.

Note that in this setting we get cost overruns because the firm makes an offer that is below costs; however, this is not inadvertent but endogenous to the model. The renegotiated amount R to be paid in the second period includes an amount to compensate the firm for lowballing in its period 1 winning bid.

The government has all the bargaining power[12]. In the case in which the incumbent has all the negotiating power, there is also no lowballing, since firms know that they will not be able to raise their profits through renegotiation. In that case, renegotiation takes place, but the cost of the additional work W is equal to period-two repayment R and we have a straightforward case of government attaining its preferred allocation of infrastructure investment by maximisation of its utility.

One way of giving all bargaining power to the government is by a congressional mandate that all additional works in renegotiation should be awarded by the concessionaire to the winner of an open auction for these additional works. In this case, there are no profits to the concessionaire even though it pays for the works in the first period (and is receives the compensation in the second period). There will be no lowballing, but the ability of the concessionaire to "lend" to the incumbent means that the incumbent is able to attain its desired allocation of investment.

In this model, the incumbent distorts the allocation of investment away from the optimal, in order to enhance its probability of being re-elected. Second-period infrastructure spending is reduced from its optimal amount. A simple generalisation of this model is to assume that in many cases the government is certain of being re-elected and does not want to distort the allocation of investment.

Results. We have shown that:

- governments include additional work during the renegotiation process

- renegotiations occur early (during construction) so that additional work can be added

- the cost of renegotiation is passed onto future administrations (or users, in the case of user fee revenue).

These predictions will be contrasted with the empirical evidence in Chile, Colombia and Peru below.

Extensions

The section covers some extensions of the original model.

Stochastic renegotiation. A more realistic situation for the government is that its election is in doubt only in certain cases, while in others it is fairly certain that it will be re-elected. In the case of certain re-election, the government prefers not to distort the allocation of expenditure across periods, since it will be in power with certainty in the next period. Assume that, with exogenous probability r, there is a shock which makes for a weak government (after awarding the PPP in a competitive auction). In that case, the re-election probability depends, in part, on its infrastructure investments in the first period. We model this as:

$$G(I_1, I_2) = u(I_1) + p^e(I_1)u(I_2),$$

where $p^e \equiv \pi p + (1 - \pi)$. 1 is a weighted average of the two probability functions. Now since the winning bidder in the project will renegotiate with probability π, the equilibrium bid falls by πL.

Consider the case of all bargaining power to the firm. In the event of a strong government [which occurs with probability $(1 - \pi)$], the resources the government saves as an effect of lowballing in the winning bid can be spent on additional infrastructure investment. If the government is weak, we are back to the previous models, but the amount R that must be paid back in the second period to the firm includes

an additional amount to compensate the firm for lowballing by the strong government that did not need to renegotiate. Thus the distortion in second-period expenditure is larger.

In the case where all bargaining power belongs to the government, there is no lowballing. Thus there is no change in the investment in the case of strong governments, because it does not obtain its desired investment at a price below cost. This also means that a weak government achieves its desired allocation of investment, as in the previous section.

Bargaining differences among firms. Assume that one of the firms is known to have more bargaining power than the others. This means that the amount of lowballing it offers (within the fixed price limit) does not compensate totally for the rents it obtains from renegotiation. In this case, the government – unless it has all the bargaining power so there is no lowballing – cannot achieve its desired allocation of investment across periods. The rents that the winning firm obtains will reduce the resources available to the government, resulting in a constrained optimum.

Accounting for PPPs

The appropriate way of accounting for PPPs in government balance sheets has been an issue for a long time. The solution Eurostat (2004) found was to make the decision based on the part of risks that the private party has to bear. If that party bears at least construction risk plus either availability or demand risks, the PPP is not included in the fiscal balance sheet. This decision seems to have been a compromise between the forces pushing for the exclusion of PPPs altogether and those that found that it was an unsound fiscal policy, as events would show[13]. More recently, several countries have been considering stricter approaches without an implicit bias to PPPs, denoted by the "control approach", because ultimate control determines whether to incorporate the PPP into the balance sheet ("Eurostat Treatment of Public Private Partnerships", 29/10/2010). Another alternative would be to reconsider the Ryrie rule that included all PPPs in the fiscal accounts.

A related important advance towards a sounder policy is the gradual incorporation of contingent obligations associated with PPPs into the fiscal accounts. Recently, Eurostat has established a separate set of accounts for contingent liabilities. See "Supplement on contingent liabilities and potential obligations to the EDP related questionnaire", Eurostat, 22/07/2013. Some Latin American countries (Chile, Colombia) have gone beyond this by applying standard financial tools to put a value on these liabilities.

Evidence from Chile, Colombia and Peru

In this section we report on the evidence for the hypothesis presented in this chapter. We begin with two examples that illustrate how the Chilean government has used renegotiations to circumvent Congressional approval for increased expenditures.

The rainwater collectors. In 2001, there was flooding in Santiago, which led to political pressures on the government to invest in mains collectors that would drain the rainwater from flood-prone areas. Since the government was unwilling to obtain the necessary resources from the budget or through increased indebtedness, it decided to renegotiate the scheduled contracts of the urban highways constructors, so that they would build the drains. The sums involved were in the hundreds of millions of dollars and required changes to the contracts of three urban concessions during the construction phase. The initial payments for the additional works were scheduled to begin several years in the future.

The San Antonio Bypass. Access to the main port of Chile was hampered by the fact that trucks had to go through the city of San Antonio to reach the port. The government decided to add a special access route to the port that bypassed the city. There were three options to finance the project: i) with fiscal resources; ii) through an independent self-financed tolled concession; or iii) as a non-tolled extension to Route 78 from Santiago to San Antonio. The president at the time, while a candidate, had promised the city that he would not impose a toll on the proposed access. Even though the government had ample access to the international credit markets, it decided to renegotiate the contract, valuing the 8-kilometre project at around USD 45 million. The payment consisted of a substantial increase in tolls with a further increase in 2012. It is not clear whether the expected revenue from increased tolls corresponds to the value of the project.

Concession programmes

Chile. As mentioned in the introduction, the Chilean Concession Program is considered among a handful of well-established PPP programmes (Hemming, 2005). Detailed data on concession contracts are available on the webpage of the Ministry of Public Works (MOP by its Spanish acronym) and the quality of fiscal accounting can be described as at par with average OECD levels.

Chilean public infrastructure PPPs were launched in 1993 with the El Melón Tunnel concession. As shown in Table 2.1, between 1993 and 2006, MOP awarded 50 PPPs: 26 roads, 10 airports, three jails, two water reservoirs, five public transportation infrastructure projects and four other miscellaneous projects. At the time, roads represented 89% of the USD 11.3 billion invested in PPPs.

By 2014 there were three hospitals and seven additional roads under construction, in addition to several large infrastructure projects (the underground Américo Vespucio Oriente, Part II and the renewal of the Santiago Airport PPP) that are planned to be auctioned in the near future[14].

The history of Chilean PPPs has not been without *contretemps*: In 2002, at the time when the programme was at its most active, corruption was discovered in the PPP unit. In order to avoid losing personnel to private firms, the PPP unit devised a scheme to raise the remuneration of its employees[15]. Consulting firms hired by the PPP unit would charge extra amounts. These firms would then hire the employees of the PPP unit as experts, and pay them for non-existent work, thus raising their total remuneration. The ensuing scandal sent the Minister of Public Works to prison and removed almost all of the executive cadres in the PPP unit. For this reason, as well as the excess expenditure on PPPs in the previous years (studies, contingent guarantees, subsidies, etc.), there were almost no new PPPs for several years, until the end of the decade when there was a new push in favour of PPPs[16].

Table 2.1. **Chilean PPPs and renegotiations**
(in USD millions)

	Number of projects and renegotiations[1]	Average	Original investment estimate[3]	Renegotiated amounts[4]	Total investment	Renegotiations as fraction of original value
Pan American Highway	8/28/24[2]	24	2.875	843	3.719	0.33
Interurban highways	13/22/25	27	2.118	426	2.544	0.23
Urban highways	5/12/0	32	2.421	1.332	3.752	0.33
Highways	26/62/49	27	7.414	2.601	10.015	0.89
Airports	10/9/12	13	384	48	432	0.04
Prisons	3/1/4	23	221	113	335	0.03
Water reservoirs	2/2/3	28	120	24	144	0.01
Public Transport	5/2/2	15	157	26	183	0.02
Other	4/2/0	23	169	1	170	0.02
Other PPPs	24/16/21	18	1.051	213	1.264	0.11
Total or average	50/78/70	22	8.465	2.813	11.279	1.00

Source: Engel et al. (2009a).
Notes: (1) Includes cancelled projects. (2) Projects/bilateral negotiations/arbitration panels, (3) Excludes cancelled projects.
            (4) Includes the amounts required to cancel 3 concessions.

Colombia. In Colombia, PPP partnerships in public infrastructure began in 1993 and, by 2012, approximately 32% of its road network was under PPP contracts[17]. By 2012, the government had signed 48 contracts in the transport sector, and local authorities were also involved in PPPs. There were serious problems with the first PPPs, leading to changes in the rules and new "generations" of PPPs. There have been four generations of PPPs altogether and for the current one, the legal environment for PPPs in Colombia is considered to be very good.

The first PPPs were not a success. The lack of road-shows for international investors and the short preparation times meant that only local firms could participate, and thus seven of thirteen projects were negotiated directly without an auction. Among many other problems, there was no detailed road project, so it was difficult to plan the eminent domain purchases for the roads, which caused long delays. Successive "generations" of PPPs improved on previous mistakes and the current fourth generation has been fairly successful. The main public infrastructure PPPs are roads, of which 27 had been awarded up to December 2010, for a total contract value of USD 6.5 billion and covering 4 800 km of roads (Bitran *et al.*, 2013). Currently, there are 48 extant PPP projects for roads (WBI, *op. cit.*).

Peru. Peru's PPP programme on public infrastructure is more recent than that of Chile and Colombia. Though the initial legislation dates from 1991, only one road was commissioned in the 1990s. That PPP was renegotiated several times during its 13-year duration. A new start in Public Private Partnership began in 2001, with the Lima Airport concession; thus, the programme only really got going after that date. In 2008, a new law modernised and added flexibility to Peruvian PPPs in public infrastructure. This means that the Peruvian system for PPPs has learned from the errors of other

countries and is considered well-conceived. This explains the relative lack of renegotiation, apart from the fact that the programme is more recent. Moreover, there are fewer recent projects.

By 2010, there were 15 road PPPs, with a total initial value of USD 2.5 billion, i.e. it was still a relatively small programme in comparison to those of Chile and Colombia. Either because the programme is newer or because of a better legal design, there have been fewer renegotiations.

The data

The following table, derived from Bitran *et al.* (2013), provides some basic information on road PPPs in the three countries.

The following facts are interesting. First, renegotiations begin early, during the construction stage. Second, each country has a large number of renegotiations, but there is a substantial difference between the numbers for Peru and Chile and those for Colombia. Chile and Peru average 3.3 and 4.8 renegotiations per concession respectively, while Colombia has more than 20 per project. While the total fiscal cost, as a percentage of the initial value, is less than 20% in Chile and Peru, in Colombia the fiscal cost almost triples the initial cost. Moreover, Colombia has increased the term by a third, while the other countries have extended the term by less than 5%. On the other hand, Colombia has managed to use renegotiations to change the design of the projects, adding on average 25% to the project length, while the other countries have kept the length of the original projects.

Table 2.2. **Characteristics of renegotiations in each country**

	Chile	Colombia	Peru
Total road concessions	21	25	15
Avg. initial value (million USD 2009)	243	263	266
Avg. term length (years)	25.2	16.7	22.1
Mean length (km)	114	195	383
Mean concession years elapsed	12.5	9.0	4.6
Concessions with renegotiations	18	21	11
Total number of renegotiations	60	430	53
Avg. time of first renegotiation (years)	2.7	1.0	1.4
Avg. cost of renegotiations per road (million USD 2009)	47.2	255.8	28.8
Avg. term increase (years)	0.9	6.3	0.8
Avg. length increase (km)	0	54.6	0

Source: Bitran *et al.* (2013).

Standardised comparisons among countries

The previous comparisons suffer from the fact that Peru has had concessions for a much shorter time (except for one early PPP). Appropriate comparisons should consider the difference in age of concessions before performing a comparison on the propensity to renegotiate.

Renegotiations during construction

A simple comparison is to examine the extent of renegotiations during construction. The prediction of the model is that there will be substantial renegotiations during construction. In this respect, it is useful to note that, in general in developed countries, the maximum increase in cost over the final estimates for road construction is of around 10%[18]. This is also the case for private infrastructure investments. In Chile this is the case for road PPPs, as the value of renegotiations to the construction value is 5.4%. There is excessive variance in these results. In the case of Peru, the equivalent value is 12.5% and in Colombia it is an incredible 56% on average.

It is clear from the figures that, first, Colombia is in a class by itself in the extent of renegotiations. Second, there is much variation in the extent of renegotiations during construction in different PPPs.

Peru and Chile look similar in terms of their renegotiation patterns. However, this may be due to the fact that Peru's programme is younger, so most concessions have run for a shorter period. We try to correct for this by looking at the extent of renegotiations of concessions with the same age. Thus we examine the accumulated renegotiations of PPPs of a given age. Our standardised variable is the ratio of accumulated renegotiations in PPPs of age t to total investment in those PPPs. Let $R_{i\tau}$ be the amount renegotiated in year r in concession $i = 1,\dots,n$ and I_i be the initial investment in the concession. Then $R_{it} \equiv \Sigma_{\tau \le t} R_{i\tau}$ is the accumulated amount of renegotiations up to date t in concession i[19]. The ratio compares the total amount renegotiated in all concessions of age t to the total investments.

Figure 2.2. **Profile of renegotiations by PPP age, quartile and country**
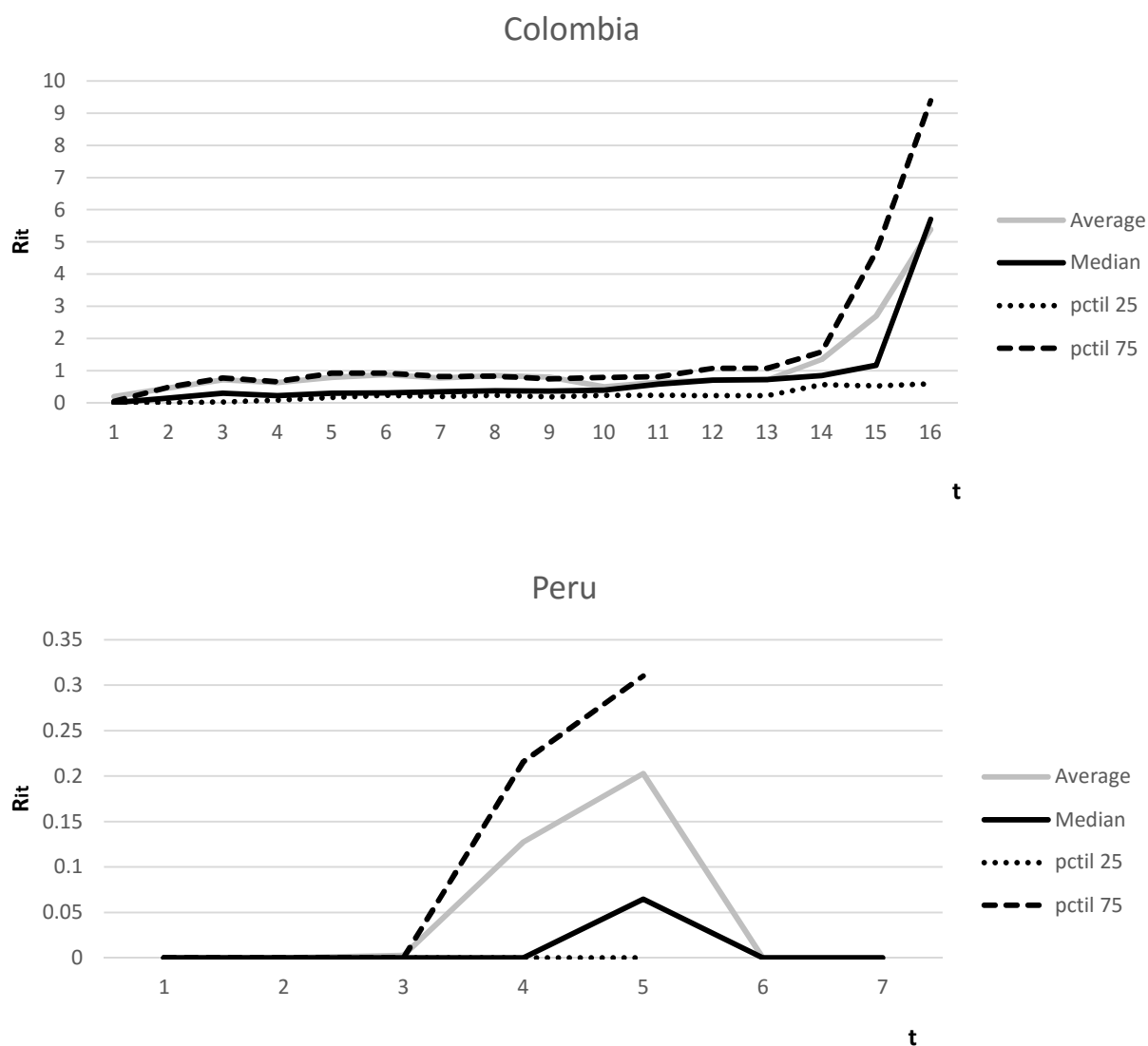
Colombia

Peru
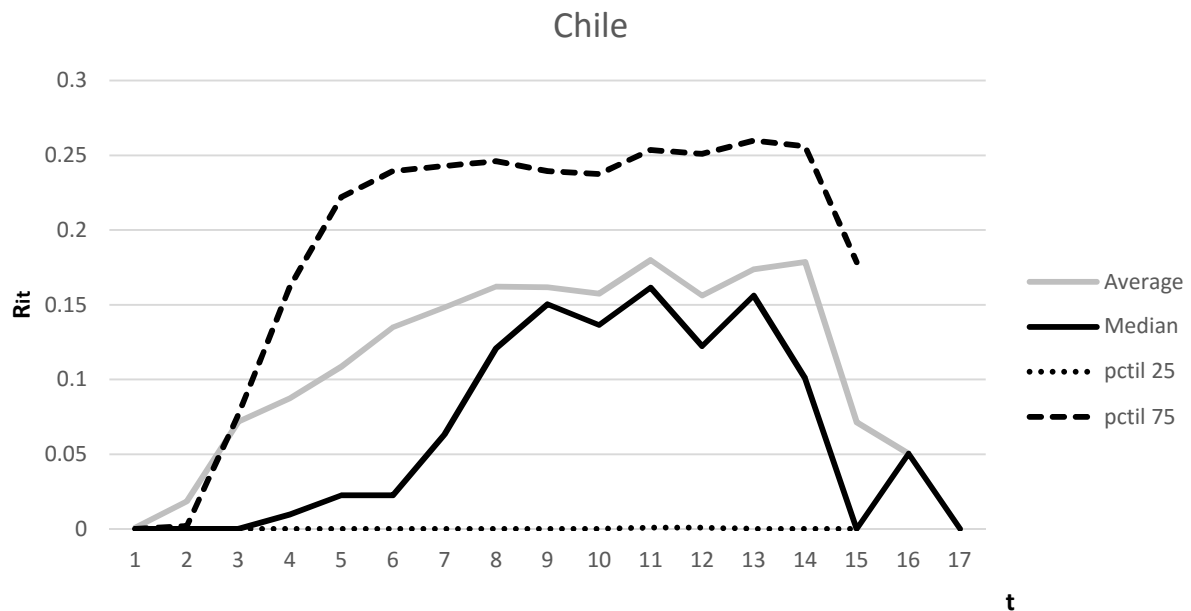
Figure 2.2 shows this variable graphed for the three countries. This figure allows a better understanding. The figure shows the data divided by quartiles, so that the terms in (6) are divided into quartiles according to the amount renegotiated[20].

$$\rho_t \equiv \frac{\sum_1^{n_t} \mathcal{R}_{it}}{\sum_1^{n_t} I_i} \qquad (6)$$

In the case of Chile, we observe that some concessions, even after 15 years, have no relevant renegotiations (in the 25% percentile). Other concessions are renegotiated almost from the beginning. On average, renegotiations as a percentage increase until the 14th year, and there are too few concessions to make conclusions after that. In any case, the percentage even at the 75% percentile does not reach 30%

of the initial value. Notice, however, that in the projects in that percentile, renegotiations take place during the first four years, i.e. during construction.

In the case of Colombia, the results are skewed by the disastrous effects of the first generation of concessions (the early concessions are those dating over 14 years since they were awarded). The average renegotiation is also very high in all years, perhaps because the first generation concessions weigh every year. When considering the median, the level of renegotiations is lower, but it increases significantly at year 10, which seems to indicate that the second generation of concessions was not that successful in eliminating the problems caused by the initial design mistakes.

Peru has fewer concessions and they are more recent, so the figure is not as informative. Nevertheless, the average and 75 percentile are higher than for Chile (though obviously far from the Colombian figures) from the third year onwards.

Testing the predictions

This section describes the tests of the predictions of the model, using the results in Bitran *et al.* (2013).

Type of renegotiation. A first thing to notice is that most renegotiations are by mutual (or bilateral) agreement, so there is no conflict among the parties. In Chile, 83% of renegotiations lead to these agreements and it is also true for 98% of the cases in Colombia and in all cases in Peru. The arbitration option, which reveals the inability to reach an agreement, is only chosen in 17% of the cases in Chile and 2% in Colombia.

In Chile and Peru, most renegotiations are led by the government, and to a lesser extent in Colombia, with 40%, but where jointly led agreements have about the same percentage. It can be concluded that renegotiations find their justification in the political economy. This option transfers more of the fiscal costs onto future governments than arbitration, and may be one of the reasons for the preference of governments for this type of renegotiation.

When do they occur? In the standard interpretation of renegotiations, they should be more frequent as time passes and as previously uncertain events take place. In all three countries, however, more than half of the renegotiations took place during the construction phase, that is, within the first four years of the contract. There are three interpretations for these observations. One is that projects were not carefully designed and require modifications. This can be described as the incompetent interpretation of renegotiation. The second interpretation is that government wants to add additional works without going through the normal budgetary process and may also want to take advantage of the equipment already on site. Third, the firm may want to recoup from lowballing its offer. These last two interpretations work together in the model.

When is the cost of renegotiations paid? A large chunk of the cost of renegotiations falls onto future governments, as predicted by the model. In Peru, only 14% of renegotiations have fiscal costs that fall on the current government. In Chile, most renegotiations involve the current government incurring some costs, but 90% of renegotiations have some costs falling on future governments: by a combination of extending the project term, raising future tolls and assuming additional risks. In Colombia, most renegotiations (88%) have costs falling on the current government. However, 6% of renegotiations involve future costs, and these account for 60% of all fiscal transfers.

The extension of the project term is one way of transferring cost to future administrations. When the term of the concession ends, the government in place has a valuable asset that it can either operate by

itself, obtaining toll revenue, or it can put it to auction, in exchange for additional works and revenues. Chile and Peru have used term extensions, but this has added less than a year to the typical concession. In the case of Colombia, on the other hand, the average extension has been of 6.5 years. This means that a future government that would have received the resources associated to the released PPP will be denied their use (assuming a presidential term of less than seven years). However, this was the case of the 15 early concessions whose lengths were extended by an average of 70%. More recent PPPs have had a variable term, and term extensions have been avoided.

What do they pay for? Engel et al. (2009b) show that in the case of Chile, for those renegotiations where data is available, 84% of the sums contracted were designated as additional investments, with the remaining 16% designated as additional payments for works included in the original contract. This is consistent with lowballing by firms in the original auction, as suggested by our model.

In Colombia, only 5% of renegotiations involved road extensions, but these accounted for a third of the total renegotiated value. As Bitran et al. (2013) mention, concession projects have been used to achieve objectives for which they were neither intended nor designed. These authors add that the costs of these additional stretches of road may be higher than registered in the data, because these extension projects are also renegotiated, and the added costs are no longer included as part of the original renegotiation. In Colombia there was one example of extreme lowballing that eventually led to the cancelation of the contract.

Conclusions

In Engel *et al.* (2013) we have shown that one of the benefits of PPPs for incumbent governments is that they allow them to exceed spending limits, because, as in England, PFIs were not part of the balance sheet, given the then current Eurostat rules. In this chapter we note that there is a further advantage to PPPs from the point of view of incumbent governments, which we studied originally in Engel *et al.* (2009a). We showed that, because PPP renegotiations are outside of the purview of Congress they can be used to increase government spending. This leads to a set of predictions: i) competitive firms can make loss-making offers, expecting to recoup their losses though renegotiation., ii) these renegotiations can also be used to increase government expenditure, iii) governments will shift part of the payments onto future governments and iv) we will observe renegotiations during the construction stage of the PPP. We describe data on renegotiations of highway concessions in Chile, Colombia and Peru that are consistent with the results of our model and also show significant differences among countries in the magnitude of renegotiations.
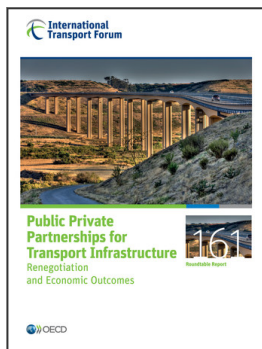
Notes

1. Though these PPPs suffered during the Asian crisis.

2. As in Hart (2003), Bentz *et al.* (2005), Bennett and Iossa (2006) and Martimort and Pouyet (2008).

3. For more on renegotiations of infrastructure projects, see Guasch *et al.* (2006a), Guasch *et al.* (2006b), Guasch *et al.* (2007) and Guasch *et al.* (2008). For developed countries, Gómez-Ibañez and Meyer (1993) have also observed that renegotiations are common.

4. There is scope for corruption in renegotiations of contracts, even though the renegotiation itself is justified. See Guasch and Straub (2009) for evidence of corruption in renegotiations.

5. Note that PVR (Present Value of Revenues) contracts can avoid some renegotiations or at least constrain its bounds [Engel *et al.* (2001)]. By making it easy for the Public Works Authority (PWA) to buy back a PPP project at a predefined value, it can buy back a contested project and auction it again to a new bidder, with the additional investment. Even if it does not do so, the threat constrains the bounds of the bargaining set.

6. Cantarelli *et al.* (2010) is a good reference to the causes of cost overruns in infrastructure projects (not only PPP projects).

7. A recent study by Rosenfeld (2014) shows that the most important causes of cost overruns in construction projects in general (not circumscribed to PPPs or even infrastructure projects) are: i) premature (i.e. poor) tender documents; ii) too many changes in requirements; iii) unrealistic tendering prices. This is consistent with our analysis of renegotiations of PPPs, except for our assumption that these causes can be endogenous in PPP projects.

8. See Engel *et al.* (2013).

9. We can write $p(I1) \equiv P(u(I1))$, where $P' > 0$ and $P'' < 0$, then $p' > 0$, $p'' < 0$. Thus our formulation is reduced for a case where the probability of re-election depends on the first-period utility.

10. Henceforth we will not consider the case of privatisation and will concern ourselves only with PPPs and conventional provision.

11. It is possible to control these underhand fiscal loans, but they require an overhaul of the fiscal accounts system, so that these hidden obligations are revealed.

12. In Engel *et al.* (2009a) we show that this result is also true for the intermediate case, where each party has bargaining power.

13. Observe that, at its inception, the UK Private Finance Initiative used the Ryrie rules. Under these rules, all PPP investments were required to be included in the budget of its sector (Engel *et al.,* 2014, p. 25). Irwin (2007) cites the case of New South Wales (Australia), where the Auditor-General required that all assets and liabilities of the privately-financed treatment plants be included in the state government's balance sheet.

14.   Most Chilean seaports are managed under PPPs with excellent results in terms of productivity and total costs, but they are usually considered separately, as they are governed by a separate legislation.

15.   The extreme rigidity of the public system meant that salaries were non-competitive in the area.

16.   See Engel *et al.* (2014) or Bitran *et al.* (2013).

17.   World Bank Institute, "Public-Private Partnerships in Colombia: Scaling-up Results", October 31, 2012.

18.   See, for example, "*The Cost Estimating Manual for WSDOT Contracts*, Washington State DOT, September 2008, p. 14.

19.   Where t is less than the age of PPP i.

20.   That is, the 75 quartile considers the 25% of PPPs which renegotiate most at that age.

References

Alessina, Alberto and Guido Tabellini (1990), "A positive theory of fiscal deficits and government debt", *Review of Economic Studies,* 57:403-414.

Athias, Laure and Antonio Nuńez (2008), "Winner's curse in toll road concessions", *Economic Letters,* 101 (3):172-174.

Laure Athias and Antonio Nuńez (2009), "The more the merrier? Number of bidders, information dispersion, renegotiation and winner's curse in toll road concessions", *Working paper,* University of Lausanne, August.

Athias, Laure and Stephane Saussier (2010), "Contractual flexibility or rigidity for public private partnerships? Theory and evidence from infrastructure concession contracts", *Discussion Paper 2010-3,* Chaire EPPP, Institut d'Administration des Entreprises, July.

Bennett, John and Elisabetta Iossa (2006), "Building and managing facilities for public services", *Journal of Public Economics,* 90:2143-60.

Bentz, Andreas, Paul A. Grout and Maija Halonen (2005), "What should governments buy from the private sector–assets or services?", University of Bristol.

Bitran,E., S. Nieto-Parra and J. Robledo (2013), "Opening the Black Box of Contract Renegotiations: An Analysis of Road Concessions in Chile, Colombia and Peru", *OECD Development Centre Working Papers*, No. 317, OECD Publishing, Paris. DOI: http://dx.doi.org/10.1787/5k46n3wwxxq3-en.

Cantarelli, Chantal C., Bent Flybjerg, Eric J.E. Molin and Bert van Wee (2010), "Cost overruns in large-scale transportation infrastructure projects: Explanations and their theoretical embeddedness", *European Journal of Transport and Infrastructure Research,* 10(1):5-18.

Engel, Eduardo, Ronald Fischer and Alexander Galetovic (2001), "Least-present-value-of- revenue auctions and highway franchising", *Journal of Political Economy,* 109(5):993-1020.

Engel, Eduardo, Ronald Fischer and Alexander Galetovic (2009a), *Soft budgets and renegotiation in public-private partnerships*, Technical Report 15300, NBER, August.

Engel, Eduardo, Ronald Fischer, Alexander Galetovic and Manuel Hermosilla (2009b), "Renegociación de concesiones en Chile", *Estudios Públicos,* 113:151-205, Verano.

Engel, Eduardo, Ronald Fischer and Alexander Galetovic (2013), "The basic public finance of public-private partnerships", *Journal of the European Economic Association,* 11(1):83-111, February.

Engel, Eduardo, Ronald Fischer and Alexander Galetovic (2014), *Public-Private Partnerships: A Basic Guide,* Cambridge University Press.

Gómez-Ibañez, José Antonio and John Meyer (1993), *Going Private: The International Experience with Transport Privatization,* The Brookings Institution, Washington, D.C.

Guasch, José Luis (2004), "Granting and Renegotiating Infrastructure Concessions: Doing it Right", The World Bank, Washington D.C.

Guasch, José Luis and Stephane Straub (2009), "Corruption and concession renegotiations: Evidence from the water and transport sectors in Latin America", *Utilities Policy*, 17:185-190.

Guasch, José Luis, Jean-Jacques Laffont and Stephane Straub (2006a), "Renegotiation of concession contracts: a theoretical approach", *Review of Industrial Organization*, 29:55-73.

Guasch, José Luis, Jean-Jacques Laffont and Stephane Straub (2006b), "Renegotiation of infrastructure concessions: An overview", *Annals of Public and Cooperative Economics*, 77:479-493.

Guasch, José Luis, Jean-Jacques Laffont and Stephane Straub (2007), "Concessions of infrastructure in Latin America: Government-led renegotiations", *Journal of Applied Econometrics*, 22(Jo):1267-1294.

Guasch, José Luis, Jean-Jacques Laffont and Stephane Straub (2008), "Renegotiation of concession contracts in Latin America", *International Journal of Industrial Organization*, 26:421-442.

Hart, Oliver (2003), "Incomplete contracts and public ownership: Remarks and an application to public-private partnerships", *Economic Journal*, 113:C69-C76.

Irwin, Tim (2007), "Government Guarantees: Allocating and Valuing Risk in Privately Financed Infrastructure Projects", The World Bank.

Martimort, David and Jérôme Pouyet (2008), "To build or not to build? Normative and positive theories of private-public partnerships", *International Journal of Industrial Organization*, 26:392-411.

Rosenfeld, Yehiel (2014), "Root-cause analysis of construction-cost overruns", *Journal of Construction Engineering and Management*, 140(1), January. http://dx.doi.org/10.1061/(ASCE)CO.1943-7862.0000789.