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Soft Budgets, Renegotiations, and Public-Private Partnerships

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SOFT BUDGETS, RENegotIATIONS, AND PUBLIC-PRIVATE PARTNERSHIPS*

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Abstract

Renegotiations of PPPs are pervasive. We argue that they can be used by incumbents to elude normal budgetary constraints and anticipate infrastructure spending. We show that renegotiations foster lowballing in ex ante auctions and both include additional compensations for the works originally contracted and add works not contemplated in the original contract. Nevertheless, spending anticipation is not inherent to PPPs, but the consequence of defective accounting standards. We show that if PPP investments are included as investments in the public budget spending caps prevent anticipation.

Our thesis has three observable implications: (i) significant additional works should be added after renegotiating the contract; (ii) significant renegotiations should occur during construction; (iii) additional payments should be deferred to future administrations or users.

We compile renegotiation data for the 50 concessions awarded in Chile between 1993 and 2006. Total investment has been increased from $8.4 billion to $11.3 billion – nearly one-third. 83% the total amount has been awarded in 78 bilateral renegotiations, the rest by arbitration panels. For the $2.3 billion awarded in bilateral renegotiations we find that: (i) about 84% is attributed to additional works. (ii) 78% was awarded during construction. (iii) only 35% was paid from the budget by the administration that renegotiated. Last, although specific provisions in the concessions law limit the amounts that can be renegotiated, these limits are routinely exceeded.

Keywords: Build-operate-and-transfer; concessions; renegotiation; PPPs.

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1. Introduction

Private participation in infrastructure via public-private partnerships (PPPs) has increased dramatically since the early 1990s.\(^1\)\(^2\) For example, Figure 1, which shows the evolution of investment commitments in infrastructure projects with private participation in developing countries, indicates a substantial increase between 1990 and 2006.\(^3\) PPPs have also been massively adopted in some developed countries—in Britain 14% of public investment is done under the so-called Private Finance Initiative.\(^4\) This surge is also reflected in the financial press. For example, articles in the *Financial Times* mentioning PPPs increased twenty-fold over the last decade, from 50 in 1995 to 1,153 in 2004.

A reason behind the popularity of PPPs is that governments can simultaneously attract private firms and claim that they are not privatizing. More important, PPPs have the potential to increase efficiency and improve resource allocation.\(^5\) Nevertheless, time has also revealed some pitfalls.\(^6\)

One is that renegotiations of PPP contracts are pervasive. Consider, for example, the evidence presented by Guasch (2004), who examined nearly 1,000 Latin American concession contracts awarded between the mid 1980s and 2000. He found that 30% of all contracts were renegotiated and the proportion reaches 54.4% in the transportation sector (roads, ports, tunnels and airports) and 74.4% in the water sector.\(^7\) Table 1, which is reproduced from its book, shows that renegotiations often favored the firm. For example, 62% led to tariff increases, 38% to extensions of the concession term and 62% to reductions in investment obligations. Renegotiations do not only occur in LDCs. Gómez Ibáñez and Meyer (1993), who analyzed highway franchises, showed that they tend to be renegotiated even in developed countries.

What explains renegotiations? A common claim of industry participants is that circumstances change over the life of a concession, which usually lasts between 20 and 30 years. Thus renegotiations just reflect adaptations to changing needs and circumstances—PPPs are long-term, incomplete contracts. Yet this thesis is suspect. One reason is that, as Bennet and Iossa (2006) point out,

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\(^1\) A rich set of acronyms describe specific PPP arrangements, including BLT, BLTM, BOT, DBOT, DBFO, DBFO/M, JV and ROT. The B usually stands for build, the L for lease, the R for rehabilitate, the T for transfer, the O for operate, the D for design, the F for finance, and the M for manage. JV stands for “joint venture”. See Grimsey and Lewis (2005) and chapter 1 in Guasch (2004).

\(^2\) Infrastructure that has been provided via PPPs include roads, bridges, tunnels, railways, ports, airports, air traffic control systems, water and sanitation plants, hospitals, schools, prisons, and social housing.

\(^3\) The source is the World Bank and PPIAF’s PPI Project Database.

\(^4\) Hemming et al. (2005).

\(^5\) See, for example, Hart (2003), Bentz et al. (2005), Bennet and Iossa (2006), Martimort and Pouyet (2008) and Engel et al. (2009a).

\(^6\) See, for example, Engel et al. (2003).

\(^7\) It is worth noting that Guasch’s data base probably underestimates the prevalence of renegotiations. For example, his data includes several Chilean concessions which hadn’t been renegotiated by 2000, but which have repeatedly renegotiated since.
PPPs transfer control and decision rights to a private firm, which thus has more autonomy. Thus, if anything, PPPs should be renegotiated less than conventional procurement contracts. More important, the “long-term, incomplete contracts” thesis ignores that a lot of renegotiations occur shortly after contracts are awarded, even during the construction phase. For example, Guasch (2004, Table 6.4) reports an average of just 2.2 years between the concession is awarded and renegotiated for the first time.

In this paper we show that renegotiations of PPP contracts can be used by incumbents to elude budgetary constraints. In our model an incumbent who spends more on infrastructure is more likely to be reelected. This creates a bias towards anticipating infrastructure spending. Under conventional provision—the government hires a construction company to build infrastructure—caps on spending or net indebtment are effective to control this bias. By contrast, because of defective accounting standards, renegotiations of PPP contracts can be used to elude spending caps.

Essentially, finance and construction are bundled together in a PPP deal. For this reason, the firm can “lend” to the government. But under current accounting rules neither the additional investments nor the future obligations assumed by the government in a renegotiation are accounted for in the budget.

The problem, however, is not inherent to PPPs. In fact, relative to conventional provision PPPs neither change the information structure, nor show significant differences as far as delegation is concerned—both delegate infrastructure procurement to a government agency, which reports directly to the executive, not to any independent overseeing body. Rather, the problem is caused by defective accounting standards. Indeed, we show that the problem has a remarkable simple solution: spending caps prevent anticipation if PPP investments are included as investments in the public budget.

Our thesis has three observable implications: (i) significant additional works should be added after renegotiating the contract; (ii) significant renegotiations should occur during construction; (iii) additional payments should be deferred to future administrations or users. We compile renegotiation data for the 50 concessions awarded in Chile between 1993 and 2006. Total investment has been increased from $8.4 billion to $11.3 billion—nearly one-third. 83% the total amount has been awarded in 78 bilateral renegotiations, the rest by arbitration panels. For the $2.3 billion awarded in bilateral renegotiations we find that: (i) about 84% is attributed to additional works. (ii) 78% was awarded during construction. (iii) Only 35% was paid from the budget by the administration that renegotiated. Last, although specific provisions in the concessions law limit the amounts that can be renegotiated, these limits are routinely exceeded.

Our paper adds to the evidence on renegotiations and PPPs; see Guasch, 2004; Guasch and Straub (2006) and Guasch et al. (2006, 2007 and 2008).

We also contribute to the literature on soft budgets.\(^8\) In the standard mechanism, developed

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\(^8\)See Kornai et al. (2003) for a synthesis of this literature.
by Dewatripont and Maskin (1995), the “center” lends and sinks money into a firm in period 1. Because assets are sunk, in period 2 the center wants to bail out the firm. Thus, the dynamic consistency problem wrought by the inability to commit not to bail out the firm softens the budget. In our model, by contrast, there is no time consistency problem. In this case the “center” (i.e. the government) does not face a commitment problem, and wants to renegotiate. The budget constraint is soft because a renegotiation allows the incumbent to elude spending limits.

The rest of the paper is organized as follows. Section 2 formalizes our argument and derives some observable implications. Section 3 presents evidence from the Chilean PPP program on these observable implications. An appendix presents an extension of the model.

2. A simple model of renegotiations

2.1. Model

There are two periods, and each is the term of one administration. Between periods an election occurs. (See the time line in Figure 2.)

Let \( I_t \) denote the capacity of the infrastructure in period \( t \), and \( u \) a strictly increasing, strictly concave function.\(^9\) If the discount factor equals 1, social welfare is

\[
U = u(I_1) + u(I_2). \tag{2.1}
\]

We assume that the construction industry is competitive, infrastructure fully depreciates in one period and that each unit of capacity costs $1 and is costless to operate.

Infrastructure must be financed with the exogenous sequence of taxes \( T_t \) such that

\[
T_1 + T_2 = 1. \tag{2.2}
\]

This implies that the budget constraint is

\[
I_1 + I_2 = 1. \tag{2.3}
\]

That is, over time infrastructure spending cannot exceed $1.\(^{10}\) We assume that the government can freely issue debt in period 1, constrained only by (2.2) and whatever spending cap Congress imposes. Then the following result follows immediately:

\(^9\)There are other interpretations for the concavity of utility: for example, increasing investment when there are no alternative suppliers to the firms already in the market (assuming that getting new international firms to participate is costly) raises prices, so it is inefficient to bunch investments in the first period. alternatively, it increases the market power of the firms that already operate in the infrastructure franchise market, again leading to higher prices.

\(^{10}\)It is straightforward to extend the model to include toll revenue, but this would add little to the analysis in this paper.
\textbf{Result 2.1.} \( I_1 = I_2 = \frac{1}{2} \) maximizes (2.1) subject to (2.3). This investment program is feasible. We assume that Congress wants to maximize social welfare (2.1) and can impose a spending cap \( T_1 \). By contrast, the incumbent has a reelection concern. If \( p \) is the probability of reelection, her payoff is

\[ G(I_1, I_2) = u(I_1) + p(I_1) \cdot u(I_2). \]  

(2.4)

Note that the incumbent’s preferences coincide with social welfare in period 1, but she values period’s 2 welfare only when in power. We assume that \( p \) is a strictly increasing, strictly concave function of \( I_1 \).

The assumption that Congress’ and society’s interests coincide is rather unrealistic. Nevertheless, our point is that Congress’ oversight leads to better spending quality though, of course, not necessarily “optimal.” In this sense, our simplification is akin to assuming a risk-neutral principal and a risk-averse agent in the standard principal-agent problem.

What is the rationale of (2.4)? One reason why the probability of reelection may increase with infrastructure spending is that voters are irrational and just prefer investments “now,” before the election. An alternative approach comes from the political economy literature. Hillman (1982), as cited by Helpman (1997), suggests that governments choose policies trading off political support from industry (for instance, campaign contributions) against the dissatisfaction of consumers from inefficient investments. Higher industry profits are paid for with higher political contributions, which raises the probability of reelection, but also increases the welfare loss and, therefore, the dissatisfaction of voters.

This approach is analogous to pork barrel politics, which increases the political support for the government, but reduces welfare. Note that in the neighborhood of \( I_1 = \frac{1}{2} \), the loss to voters from distorting the efficient investment allocation is

\[ L(I_1 - \frac{1}{2}) = u''(\frac{1}{2})(I_1 - \frac{1}{2})^2 < 0, \]

which is negative and concave in \( I_1 - \frac{1}{2} \). On the other hand, we assume that the effect on political support of the increase in first period investment is given by \( \mathcal{U}(I_1 - \frac{1}{2}) \), which is such that the political support function \( \mathcal{P} = \eta \mathcal{U} + \mathcal{L} \) can be rescaled into a probability of reelection function \( p(I) \) which is increasing and concave in the neighborhood of \( I_1 = \frac{1}{2} \). Here \( \eta \) represents the marginal rate of substitution in the government’s supply function between aggregate welfare and special interests (Helpman [1997]). The distortion increases with \( \eta \), the weight given to special interests.

\textbf{2.1.1. Conventional provision vs. public-private partnerships}

\textbf{Conventional provision} There are two ways of procuring infrastructure (see Figure 2). Under conventional provision Congress authorizes the government to spend at most \( T_1 \). Then the government procures \( I_1 \leq T_1 \) in a competitive auction and the construction company builds the
infrastructure. At the end of period 1 the government collects taxes $T_1$, issues debt $D = I_1 - T_1$, and fully pays the construction company.\footnote{Construction companies finance their operation mainly with short-term bank loans, which they must fully repay when the works are completed.} Note that in period 1 net borrowing $D$ equals $I_1 - T_1$. Hence under existing budgetary practices Congress can also impose an effective limit by capping net borrowing at $T_1 - T_1$.

Because (2.3) must hold, $I_2 = 1 - I_1$. Thus, in period 2 the government procures $I_2$, collects taxes $T_2$, pays the construction company and repays debt $D$. Then the game ends.

**Public-private partnerships** Now in period 1 the infrastructure can also be financed, built and operated by a private firm under a PPP (see Figure 2). Congress imposes a spending cap $I_1$ and the government allocates the PPP in a competitive auction where firms bid for the total payment $B$ they demand to finance, build and operate the infrastructure $I_1$.\footnote{The specifics of oversight of PPPs vary from country to country. For example, in some countries PPPs must pass a social cost-benefit evaluation, sometimes performed by an agency dependent of Congress. In others, a PPP must pass a value-for-money test which compares costs with conventional provision. Nevertheless, there are many anecdotes of PPP units understating costs so that the test is met.} The lowest bidder wins and becomes a concessionaire signing contract $\{B; I_1\}$, which entitles him to receive $B$ at the end of period 1. Note that the spending cap implies that $B \leq I_1$.

We now show how a renegotiation can be used to elude the spending cap. Assume that after the PPP contract is signed, but before the infrastructure is built, the incumbent can renegotiate and agree on $\epsilon$ in additional works and $R$ in additional payments to the concessionaire. Hence, they sign the new contract $\{B + R; I + \epsilon\}$ and the concessionaire builds $I_1 + \epsilon$ units of infrastructure in period 1 against a total payment of $B + R$.

Consider now the timing of payments. Because PPPs bundle finance with construction, the renegotiated contract can be backed by a promise of a payment in period 2. This promise will not enter the budgetary discussion until period 2, hence a renegotiation can be used to elude the spending cap $I_1$—as pointed out by Maskin and Tirole (2008), “[…] bundling may make hidden intertemporal transfers possible.” Thus, assume that the renegotiated contract promises to pay $P_1$ in period 1. As long as $B \leq P_1 \leq I_1$ the spending cap is met. Indeed, the government’s net borrowing appears to be

$$D = P_1 - T_1.$$  

Nevertheless, in addition to $D$ the government assumes a contractual commitment to pay $(B + R) - P_1$ in period 2. Hence, the government’s true net borrowing in period 1 is

$$[(B + R) - P_1] + D = (B + R) - T_1.$$  

In period 2 the contractual obligation appears in the budget and bind through the intertemporal
budget constraint in period 2. Hence, $I_2 = 1 - (B + R)$. At the end of the period, the government collect taxes $T_2$, pays $1 - (B + R)$ to the construction company, $(B + R) - P_1$ to the concessionaire and repays debt $D$.

One might be a bit concerned because we just assume that Congress does not supervise renegotiations and don’t model the agency relationship with the government. Indeed, in the simple environment that we model one could just write the optimal contract into the country’s constitution and force the optimal contract on the government. Nevertheless, we feel that there is little point in complicating our model by endogenously deriving the agency problem from the information structure wrought by PPPs, because bundling and PPPs do not substantially change the information structure in the first place. Rather, the cause of the problem is that most governments register spending under cash accounting. Under such convention, only current cash disbursements are registered and included in the budget. Hence, unless a renegotiation causes a current disbursement, it remains hidden from the current budget and eludes spending limits. Below we show evidence that caps on renegotiations are routinely eluded.

One might think that direct congressional oversight of PPPs may substitute for budgetary accounting, but this is unlikely in practice. The reason is that PPP contracts tend to be renegotiated by the individual agencies who signed them. The obligations they assume are most of the time ignored by the budget office because they are registered in the individual bilateral contracts signed when a renegotiation occurs. For example, referring to a related issue, Hemming et al. (2005) point out that in many countries it is very difficult to obtain information about minimum income guarantees, which tend to be granted by individual ministries, not the government budget office.

### 2.2. Soft budgets, renegotiations and PPPs

We now show that an incumbent exploits PPPs to anticipate spending. First we show that an unconstrained incumbent would like to spend more than what Congress allows under conventional provision. Next we show that the incumbent can use renegotiations to attain her optimum.

#### 2.2.1. Two benchmarks

**The unconstrained government** Assume a government constrained only by (2.3). Then the incumbent would set $I_1$ to satisfy the necessary FOC

$$\frac{dG}{dI} = u'(I^*_1) - p(I^*_1)u'(1 - I^*_1) + p'(I^*_1)u(1 - I^*_1) = 0,$$

with SOC

$$\frac{d^2G}{dI^2} = u''(I^*_1) + p(I^*_1)u'(1 - I^*_1) - 2p'(I^*_1)u'(1 - I^*_1) + p''u(1 - I^*_1) < 0,$$
since $u$ and $p$ are concave and increasing.

We now show that $I_1^* > \frac{1}{2}$. To begin, assume that $p' = p'' = 0$, that is, there is a fixed probability of reelection $p \in [0, 1]$. Denote the corresponding optimal investment in infrastructure during period 1 by $I_1^*$. The FOC simplifies to

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

Simple differentiation then shows that

$$\frac{dI_1^p}{dp} = \frac{u'(1 - I_1^p)}{u''(I_1^p) + pu''(1 - I_1^p)} < 0.$$ 

Hence, $I_1^p > I_1^*$ for $p < 1$. This result is well known (see Alesina and Tabellini [1990]): the current government tends to anticipate spending because it bears the cost of it—less future spending—with probability less than one.

We return to the first order condition (2.5) with $p$ a function of $I$. We define $p_{eq}$ as the fixed probability such that the current government would optimally choose to spend $I_1^*$, that is

$$u'(I_1^*) = p_{eq}u'(1 - I_1^*).$$

Now from the FOC (2.5) we have

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

It follows that

$$p_{eq} = p(I_1^*) - p'(I_1^*)\frac{u(1 - I_1^*)}{u'(1 - I_1^*)}.$$ 

Hence $p_{eq} < p(I_1^*)$ and $I_1^* > I_1^{eq} > \frac{1}{2}$, where $I_1^{eq}$ denotes optimal government expenditure for a government with constant $p$ equal to $p(I_1^*)$.

Thus, there are two reasons why the current government wants to anticipate spending. First, the coalition may not be in office in the future: $p < 1$ acts as a discount rate. Second, more spending today increases the probability of reelection. Hence, the government’s expenditure not only depends on its probability of being re-elected, $p(I_1^*)$, but also on how responsive this probability is to changes in expenditures. A more responsive probability leads to higher expenditures, even when the actual probability of being re-elected remains unchanged.

**Conventional provision** It can be easily seen that $I_1 = I_2 = \frac{1}{2}$ maximizes (2.1) subject to (2.3). Thus, under conventional provision Congress implements the optimal sequence of investments by setting a spending limit $I_1 = \frac{1}{2}$. Because $I_1^* > \frac{1}{2}$, this spending limit is binding.
2.2.2. Renegotiations

Implementing the incumbent’s optimum   Assume that Congress sets a spending cap $T_1 = \frac{1}{2}$ and that the incumbent auctions a PPP contract such that $I_1 = \frac{1}{2}$. We now show that by renegotiating the PPP contract the government can anticipate spending and implement her optimum, $I_1^*$. 

As said before, if the incumbent and the concessionaire agree to $\epsilon$ in additional works against $R$ in additional revenues, the concessionaire now receives $B + R$ and spends $\frac{1}{2} + \epsilon$. The incumbent, in turn, is left with $1 - (B + R)$ to spend in period 2. Hence after renegotiation her utility increases to

$$u\left(\frac{1}{2} + \epsilon\right) + p\left(\frac{1}{2} + \epsilon\right)u\left(1 - (B + R)\right). \quad (2.6)$$

Now note that the concessionaire receives a rent $\phi \equiv R - \epsilon$ when renegotiating. Rational expectations on the part of potential concessionaires implies that this rent will affect bids in the auction for the PPP contract—i.e. it will stimulate lowballing. Let $\phi$ be the amount of lowballing. Competition in the auction implies the following result:

**Result 2.2.** $B = \frac{1}{2} - \phi$ and $B + R = \frac{1}{2} + \epsilon$.

That is, the concessionaire’s lowballing equals her expected gain in the renegotiation and, therefore, competition eliminates rents. It follows that any ex post rent due to renegotiation is competed away in the auction. Therefore, substituting into equation (2.6), the incumbent’s utility is

$$u\left(\frac{1}{2} + \epsilon\right) + p\left(\frac{1}{2} + \epsilon\right)u\left(\frac{1}{2} - \epsilon\right). \quad (2.7)$$

Note that the renegotiation allows the incumbent to achieve a debt-like intertemporal transfer. Current infrastructure spending rises by $\epsilon$, at the cost of $\epsilon$ less infrastructure spending in period 2.

What will be the outcome of the renegotiation? Note that if no agreement is reached, $\frac{1}{2}$ will be spent in period 1 and $\frac{1}{2} + \phi \geq \frac{1}{2}$ in period 2. Hence, the incumbent can always achieve utility $u\left(\frac{1}{2}\right) + p\left(\frac{1}{2}\right)u\left(\frac{1}{2} + \phi\right)$. Let $\bar{\epsilon}$ be the extra investment that maximizes (2.7). Then, in utility terms, the surplus to be split is

$$S(B, \bar{\epsilon}) = u\left(\frac{1}{2} + \bar{\epsilon}\right) + p\left(\frac{1}{2} + \bar{\epsilon}\right)u\left(\frac{1}{2} - \bar{\epsilon}\right) - \left(u\left(\frac{1}{2}\right) + p\left(\frac{1}{2}\right)u\left(\frac{1}{2} + \phi\right)\right), \quad (2.8)$$

where we have used the fact that $\phi = R - \epsilon$ in equilibrium. To transform this into monetary units, let $\bar{\phi}$ be the bid such that $S(\bar{\phi}, \bar{\epsilon}(\bar{\phi})) \equiv 0$, i.e., $\bar{\phi}$ indicates the maximum value of an agreement $\bar{\epsilon}$ in monetary terms as a function of $\bar{\epsilon}$. Because the government can build $\frac{1}{2} + \phi$ in period 2 if no agreement is reached, the monetary surplus to be split equals $\bar{\phi} - \phi$. In general the solution to the bargaining problem is such that if the firm’s Nash bargaining power is $\alpha$, it will receive a fraction of total surplus $\alpha(\bar{\phi} - \phi)$. Because competition in the auction implies that $\phi = \alpha(\bar{\phi} - \phi)$ it follows
that
\[ \phi = \frac{\alpha}{1 + \alpha} \phi. \]  
(2.9)

When the government has all the bargaining power \( \alpha = 0 \), and the firm gets nothing. Conversely, if the firm has all the bargaining power, \( \alpha = 1 \) and it gets all the surplus, which equals \( \frac{\phi}{2} \).

We now show that in equilibrium the incumbent chooses \( \epsilon = \epsilon^* \equiv I^* - \frac{1}{2} \).

**Proposition 2.3.** In equilibrium the incumbent implements her optimum, regardless of the distribution of bargaining power.

**Proof** Efficient bargaining implies that the optimal increase in current infrastructure spending maximizes
\[ u(\frac{1}{2} + \epsilon) + p(\frac{1}{2} + \epsilon)u(\frac{1}{2} - \epsilon + \phi - (R - \epsilon)). \]

The first order condition satisfies
\[ u'(\frac{1}{2} + \epsilon) + p'(\frac{1}{2} + \epsilon)u(\frac{1}{2} - \epsilon) - p(\frac{1}{2} + \epsilon)u'(\frac{1}{2} - \epsilon) \left( 1 + \frac{d(R - \epsilon)}{de} \right) = 0, \]
where we have used the fact that \( \phi - (R - \epsilon) = 0 \) in equilibrium. Also, in equilibrium
\[ R - \bar{\epsilon} = \phi = \frac{\alpha}{1 + \alpha} \phi. \]

It is clear from (2.8) that \( \phi \) is maximized when \( \epsilon = \epsilon^* \). Thus efficient bargaining implies that \( \frac{d(R - \epsilon)}{de} = 0 \) when evaluated at \( \epsilon = \epsilon^* \). Hence, \( \bar{\epsilon} = \epsilon^* \), which completes the proof. ■

Note that the split of the surplus, and the ex post rent made by the concessionaire depends on his bargaining power, \( \alpha \). Nevertheless, ex ante competition in the auction implies that the concessionaire will not make rents overall, as any ex post rent is undone ex ante by lowballing. This has an interesting implication, namely that an ex post auction that forces a competitive price \( \epsilon^* \) on additional works does not prevent spending anticipation—it just eliminates lowballing.\(^{13}\)

Second, note that with PPP contracts the initial bid for the project is
\[ B = \frac{1}{2} - \frac{\alpha}{1 + \alpha} \phi(\epsilon^*), \]
and the amount renegotiated is
\[ R = \epsilon^* + \frac{\alpha}{1 + \alpha} \phi(\epsilon^*). \]

\(^{13}\)This, however, does not imply that lowballing is irrelevant. In Engel et al. (2009b) we show that the anticipation of renegotiation generates adverse selection—firms that are good at renegotiating but bad at building. In that case an ex-post competitive auction is equivalent to make \( \alpha = 0 \), and solves the adverse selection problem.
Thus, a renegotiation should be expected to include additional compensations for the works originally contracted and also add works not contemplated in the original contract. In other words, “cost overruns,” which are often cited in practice as the reason for renegotiating, are wrought endogenously by lowballing.

Third, lowballing implies $B < I_1 = \frac{1}{2}$ whenever $\alpha > 0$. Hence, some of the additional compensation of the concessionaire is paid by the current budget.

Last, renegotiations are effective means to anticipate spending only if a significant part of the amounts renegotiated, $R$ in our model, are not be paid by the current administration—this is the main prediction of the model.

### 2.2.3. A suggested solution

Spending anticipation is not inherent to PPPs. Indeed, relative to conventional provision PPPs neither change the information structure, nor show significant differences as far as delegation is concerned—both delegate infrastructure procurement to a government agency, which reports directly to the executive, not to any independent overseeing body. Rather, the problem is caused by defective accounting standards which interact with two characteristics of PPPs.

The first characteristic is bundling of finance and construction, which allows the incumbent to contract with a financier that can lend money to the government via a binding PPP contract. The second characteristic is that PPP laws and regulations impose some constraints on the original PPP contract. As we already mentioned, many countries require that PPPs pass a standard social cost-benefit analysis; others require PPPs to pass a value-for-money test. It is the imposition of this constraint on the original PPP contract that makes a renegotiation necessary to anticipate spending. With no spending limit the incumbent would just contract $I_1$ from the outset.

All said, the problem has a remarkable simple solution that can be implemented even within existing budgetary practices: just force the government to compute as current investment any infrastructure procured via PPPs and count as government debt any revenue that the concessionaire will receive in the future.\(^{14}\)

To see why this solves the problem, we return to our model. Note that in that case $B + R$ would be registered as government infrastructure spending in period 1, and the government’s net borrowing would appear to be $B + R - T_1$. Thus a cap on total spending $B + R$, or on net borrowing equal to $\frac{1}{2} - T_1$ would lead to $B + R \leq \frac{1}{2}$. In other words, now the cap forces the government to cut other investments in order to renegotiate. In fact, this result is part of a more general one. As we show in Engel et al. (2007), from the point of view of the public finances there are compelling reasons to treat PPPs just like any other public investment.

\(^{14}\text{It can be shown that this requirement is independent of the source of the payments, whether the public budget or revenues generated by the project. See Engel et al. (2007).}\)
Including privately-financed assets in the public sector’s balance sheet has been already proposed by Donaghue (2002, p. 9). As he states, however, the conventional approach has been to classify assets as owned by the concessionaire during the term of the concession. One exception is the auditor-general of New South Wales in Australia, who determined that the asset and liabilities of privately financed bulk-water treatment plants belonged to the public sector’s balance sheet.\footnote{Harris (1998), cited in Irwin (2007, p.113)}

\subsection*{2.3. Revenue guarantees}

Many PPP contracts include minimum revenue guarantees—a promise that the government will pay the difference between the toll revenue generated by the project and a given minimum guaranteed income. Accounting for revenue guarantees has proven difficult, and while a literature has developed, there isn’t any consensus about how to do it.\footnote{See, for example, Hemming et al. (2005), Irwin (2007),}

In another paper (see Engel et al. (2007)) we have shown that revenue guarantees are contingent subsidies from the point of view of concessionaires. But, as Hemming (2005, p. 40) notes, accounting for guarantees is still very poor. Part of the reason is that, as we have already noted, in many countries guarantees are poorly documented. Also, because in practice guarantees are contingent, there is no consensus how to deal with risk. Last, and perhaps more important, Hemming (2005, p. 40) notes, under current accounting standards future obligations will probably remain hidden. On the one hand, cash accounting makes guarantees apparent only when they are paid, in which case they appear as current expenditure. Accrual accounting, on the other hand, records the guarantee as a liability only if the government considers that the probability of making a payment is higher than 0.5 and can make a reasonable estimate of the payment. But even then, unless the government makes a provision and sets funds aside, guarantees are recorded only when they are called.

Hence, in terms of our model a guarantee $G$ would be just another source of revenue for the concessionaire. And if the guarantee is callable in period 2, it will elude period’s 1 spending cap. Two implications follow. First, as far as spending anticipation is concerned, revenue guarantees and renegotiations are almost perfect substitutes. It follows that better accounting for guarantees will stimulate renegotiation, while the opposite is the case if renegotiations are restricted. Second, the solution to the problem is the same as with renegotiations: force the government to compute as current investment any infrastructure procured via PPPs.
3. Evidence from the Chilean PPP program

3.1. PPPs

Chilean PPPs were launched in 1993 with the El Melón tunnel concession. As shown in Tables 2 and 3 (column 1), between 1993 and 2006, the Ministry of Public Works (MOP by its Spanish acronym) awarded 50 PPPs: 26 roads, 10 airports, three jails, two water reservoirs, five public transportation infrastructure projects and four other miscellaneous projects. As shown in Table 3, however, roads are the main component of the PPP program as they account for 89% of the $11.3 billion invested (column 4)\textsuperscript{17,18}.

3.2. Renegotiations

At the time of counting there had been 148 renegotiations—each concession had been renegotiated three times on average. Total investment rose from $8.5 billion to $11.3 billion, an increase of $2.8 billion or nearly one-third. As can be seen from Figure 3, however, there is variation among different concessions. Amounts invested in urban highways built in the capital, Santiago, and jails increased by more than 50%.

3.3. How and what is renegotiated?

There are two channels whereby concession contracts are renegotiated. In a \textit{bilateral renegotiation} either MOP or the concessionaire initiates bargaining and an agreement is struck if both agree. The agreement is then formalized in an extension of the original contract, which describes the renegotiation, values additional investments, indicates the timing of additional payments and states the sources of funds that will be used to pay for the amounts renegotiated.

Contracts can also be renegotiated before a panel of three members, one designated by MOP, another by the concessionaire and the third, who must be a lawyer, by mutual agreement. In the first stage the panel attempts a conciliation. If the conciliation fails, then the panel arbitrates. In either case, there is no appeal to the panel’s verdict. Each concession has its own panel and only the concessionaire can initiate a dispute.

Note that bilateral renegotiations may be revised by other government agencies, particularly the Ministry of Finance, but are not subject to any independent review. By contrast, renegotiations before a panel are subject to the examination of outsiders (even though they are chosen by MOP and the concessionaire).

As can be seen in Figure 4, 78 of the 148 renegotiations were bilateral and 70 were made before a panel. Nevertheless, 83% of the renegotiated amounts, or $2.3 billion, were awarded after

\textsuperscript{17}Chile’s GDP is currently about $100 billion.

\textsuperscript{18}A detailed description of the data base is in Engel et al. (2009).
a bilateral renegotiation. Of these, 84%, or $1.96 billion, were additional investments and the rest, $360 million, correspond to additional payments for the originally contracted works. According to the records, 66 of the 78 bilateral renegotiations were initiated by MOP.

3.4. When do renegotiations occur?

As we pointed out in the Introduction, industry participants often argue that PPPs are renegotiated because they are long-term, incomplete contracts and circumstances change during the life of the concession. For example, traffic on a road may grow faster than expected, which may warrant the enlargement of the highway before the concession expires. Contrary to this view, however, our model assumes that renegotiations occur during construction.

Figure 5 shows that 51 of the 78 bilateral renegotiations and 78% of the total was awarded during construction, which is evidence against the “long-term, incomplete contracts” thesis. Moreover, renegotiations are not evenly distributed over time, but tend to bunch in specific years. Indeed, almost half of the amounts were awarded in 2001 and 2003. Last, it is interesting to note than less than half of the $490 million awarded by an arbitration panel, a different renegotiation procedure, occurred during construction. Of course, our data is subject to censoring, because at the time of counting most concessions had not completed their term. Nevertheless, the point is that renegotiations during construction are significant—clearly, more than just the “long-term, incomplete contracts” effect is at work.

3.5. The timing of compensations

The main implication of our analysis is that future administrations pay what incumbents renegotiate. Figure 6 shows that only 35% of the $2.3 billion awarded in bilateral renegotiations was paid by the administration who renegotiated. Most of the rest will be paid by future administrations, and some by users via higher tolls. It is interesting to contrast bilateral renegotiations with arbitration panels. Note that 61% of the amounts awarded by a panel were paid by the administration who faced the dispute.

3.6. Renegotiation caps

When a concession is auctioned in Chile, firms must submit an estimate of the cost of the project as part of their bid. The current Chilean concessions law states that additional investments added during the term of the concession cannot exceed 15% of this estimate, unless the concession contract says otherwise. In that case, the binding limit is what the concession contract says. This is an attempt to cap renegotiations, and it is useful to see whether these caps are effective. Of the 50

\footnote{We could not determine the split for arbitrations from the available information.}
concession contracts, 39 established ad hoc caps. These range from 5% to 15% during construction and from 10% to 30% for the whole term of the concession.

In Table 4 we show data for each concession that exceeded its cap. For each we compute the renegotiation cap, we add all up all caps and compare the sum with the total amount renegotiated.

Column 1 indicates that 16 concessions exceeded caps during construction, and 11 had exceeded caps during the term of the concession at the time of counting. During construction, total caps added up to $367 million; renegotiations added up to $1.6 billion, 4.3 times the cap. During the term of the concession total caps added up to $483 million; renegotiations added up to $1.6 billion, 3.3 times the cap. Indeed, it seems that caps imposed by law are ineffective.
References

Appendix

A. Stochastic renegotiation

A more realistic situation for the government is that the election is in doubt only in certain cases, while in others it is fairly certain that it will be reelected. In the case of certain reelection, 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 \( \pi \), there is a shock which makes for a weak government whose reelection probability depends in part on its infrastructure investments in the first period. We model this as:

\[
G(I_1, I_2) = u(I_1) + p(I_1)u(I_2),
\]

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

If the incumbent does not need to renegotiate, which occurs with probability \( 1 - \pi \), her payoff coincides with social welfare and equals \( u(I_2) + u(I_1 + \pi \phi) \), because in the second period it can spend the concessionaire’s lowballing. On the other hand, if the shock occurs, with probability \( \pi \), we can use the previous section analysis to obtain the surplus it gets with renegotiation. This surplus is the same as the one defined by (2.8), with \( \pi \phi \) replacing \( \phi \) in (2.8). Since renegotiation occurs after the shock, the surplus is not altered by the fact that the government might have avoided renegotiation. Then:

\[
\hat{S}(\phi; \pi) = u(I_2) + p(I_1 + \pi \phi)u(I_1 + \pi \phi)
\]

We define \( \tilde{\phi}(\pi) \) as the value of \( \phi \) such that \( \hat{S}(\phi; \pi) = 0 \), and proceed as before. Note that \( \tilde{\phi}'(\pi) < 0 \). The default threat of the government leads it to an additional \( \pi \phi \) of expenditure in the second period with probability \( \pi \) if it needs to renegotiate. Then, assuming that the firm has bargaining power \( \alpha \), it gets \( \phi(\pi) = \alpha(\tilde{\phi}(\pi) - \pi \phi) \), which leads to

\[
\phi = \frac{\alpha}{1 + \alpha \pi} \tilde{\phi}(\pi)
\]

It is easy to see that \( \phi'(\pi) < 0 \), i.e., as it becomes more likely that the government needs to renegotiate, the ex-post rents to the firm become smaller.
Table 1
Renegotiation outcomes
(Guasch, 2004)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Percentage of renegotiated contracts with the outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delays on investment obligation targets</td>
<td>69</td>
</tr>
<tr>
<td>Acceleration of investment obligations</td>
<td>16</td>
</tr>
<tr>
<td>Tariff increases</td>
<td>62</td>
</tr>
<tr>
<td>Tariff decreases</td>
<td>19</td>
</tr>
<tr>
<td>Increase in the number of components with automatic pass-through</td>
<td>59</td>
</tr>
<tr>
<td>Extension of concession period</td>
<td>38</td>
</tr>
<tr>
<td>Reduction of investment obligations</td>
<td>62</td>
</tr>
<tr>
<td>Adjustment of annual fee paid by operator to government</td>
<td></td>
</tr>
<tr>
<td>Favorable to operator</td>
<td>31</td>
</tr>
<tr>
<td>Unfavorable to operator</td>
<td>17</td>
</tr>
<tr>
<td>Changes in the asset-capital base</td>
<td></td>
</tr>
<tr>
<td>Favorable to operator</td>
<td>46</td>
</tr>
<tr>
<td>Unfavorable to operator</td>
<td>22</td>
</tr>
</tbody>
</table>
### Table 2
Chilean PPPs, 1993-2006

<table>
<thead>
<tr>
<th><strong>Highways</strong></th>
<th><strong>Urban highways</strong></th>
<th><strong>Jails</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pan American Highway (Route 5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Interurban highways</strong></td>
<td><strong>Other concessions</strong></td>
<td><strong>Water reservoirs</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Acceso Norte a Concepción [1995, 28] [0, 3]</td>
<td>28. Carlos Ibáñez del Campo (Punta Arenas) [2000, 9] [1, 0]</td>
<td>41. El Bato de Illapel [2001, 30] [0, 3]</td>
</tr>
<tr>
<td>11. Acceso aeropuerto AMB, Santiago [1996, 12] [1, 2]</td>
<td>29. Carriel Sur (Concepción) [1999, 16] [0, 1]</td>
<td></td>
</tr>
<tr>
<td>14. Camino internacional Ruta 60 Ch. [2002, 32] [2, 1]</td>
<td>32. Diego Aracena (Iquique) [1995, 12] [1, 0]</td>
<td></td>
</tr>
<tr>
<td>15. Santiago-Colina-Los Andes [1996, 28] [3, 2]</td>
<td>33. El Lou (Calama) [1997, 12] [1, 0]</td>
<td></td>
</tr>
<tr>
<td>17. Santiago-Valparaíso-Viña [1998, 25] [6, 3]</td>
<td>35. La Florida (La Serena) [1998, 10] [0, 1]</td>
<td></td>
</tr>
<tr>
<td>18. Red vial Litoral Central [2000, 30] [1, 2]</td>
<td>36. Regional (Copiapó) [2002, 20] [0, 0]</td>
<td></td>
</tr>
<tr>
<td>19. Ruta interportuaria Talcahuano-Penco [2002, 42] [2, 1]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20. Túnel El Melón [1993, 23] [0, 3]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21. Variante Melipilla [2001, 30] [1, 1]</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| **Airports** | | |
| | | |
| 27. Arturo Merino Benítez, (Santiago) [1997, 15] [2, 9] | | |
| 28. Carlos Ibáñez del Campo (Punta Arenas) [2000, 9] [1, 0] | | |
| 29. Carriel Sur (Concepción) [1999, 16] [0, 1] | | |
| 30. Cerro Moreno (Antofagasta) [1999, 10] [1, 1] | | |
| 31. Chacalluta (Arica) [2004, 15] [1, 0] | | |
| 32. Diego Aracena (Iquique) [1995, 12] [1, 0] | | |
| 33. El Lou (Calama) [1997, 12] [1, 0] | | |
| 34. El Topual (Puerto Montt) [1995, 12] [2, 0] | | |
| 35. La Florida (La Serena) [1998, 10] [0, 1] | | |
| 36. Regional (Copiapó) [2002, 20] [0, 0] | | |

| **Urban public transportation** | | |
| | | |
| 27. Arturo Merino Benítez, (Santiago) [1997, 15] [2, 9] | | |
| 28. Carlos Ibáñez del Campo (Punta Arenas) [2000, 9] [1, 0] | | |
| 29. Carriel Sur (Concepción) [1999, 16] [0, 1] | | |
| 30. Cerro Moreno (Antofagasta) [1999, 10] [1, 1] | | |
| 31. Chacalluta (Arica) [2004, 15] [1, 0] | | |
| 32. Diego Aracena (Iquique) [1995, 12] [1, 0] | | |
| 33. El Lou (Calama) [1997, 12] [1, 0] | | |
| 34. El Topual (Puerto Montt) [1995, 12] [2, 0] | | |
| 35. La Florida (La Serena) [1998, 10] [0, 1] | | |
| 36. Regional (Copiapó) [2002, 20] [0, 0] | | |

| **Others** | | |
| | | |
| 27. Arturo Merino Benítez, (Santiago) [1997, 15] [2, 9] | | |
| 28. Carlos Ibáñez del Campo (Punta Arenas) [2000, 9] [1, 0] | | |
| 29. Carriel Sur (Concepción) [1999, 16] [0, 1] | | |
| 30. Cerro Moreno (Antofagasta) [1999, 10] [1, 1] | | |
| 31. Chacalluta (Arica) [2004, 15] [1, 0] | | |
| 32. Diego Aracena (Iquique) [1995, 12] [1, 0] | | |
| 33. El Lou (Calama) [1997, 12] [1, 0] | | |
| 34. El Topual (Puerto Montt) [1995, 12] [2, 0] | | |
| 35. La Florida (La Serena) [1998, 10] [0, 1] | | |
| 36. Regional (Copiapó) [2002, 20] [0, 0] | | |

Notes: (1) In brackets: [year of the original concession contract, term (years)] [Number of bilateral renegotiations, number of conciliations and arbitrations]. (2) The project was cancelled.
Table 3
Investment and renegotiations in Chilean PPPs
(in $ millions)

<table>
<thead>
<tr>
<th></th>
<th>(1) Number of projects &amp; renegotiations$^3$</th>
<th>(2) Average term (years)</th>
<th>(3) Original investment estimate$^3$</th>
<th>(4) Renegotiated amounts$^4$</th>
<th>(5) Total investment</th>
<th>(6) Share of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pan American Highway</td>
<td>8/28/24</td>
<td>23.8</td>
<td>2,875.43</td>
<td>843.46</td>
<td>3,718.89</td>
<td>0.33</td>
</tr>
<tr>
<td>Interurban</td>
<td>13/22/25</td>
<td>26.9</td>
<td>2,118.06</td>
<td>425.63</td>
<td>2,543.68</td>
<td>0.23</td>
</tr>
<tr>
<td>Urban</td>
<td>5/12/0</td>
<td>31.6</td>
<td>2,420.86</td>
<td>1,331.56</td>
<td>3,752.42</td>
<td>0.33</td>
</tr>
<tr>
<td>Highways</td>
<td>26/62/49</td>
<td>26.9</td>
<td>7,414.35</td>
<td>2,600.64</td>
<td>10,014.99</td>
<td>0.89</td>
</tr>
<tr>
<td>Airports</td>
<td>10/9/12</td>
<td>13.2</td>
<td>383.94</td>
<td>48.08</td>
<td>432.02</td>
<td>0.04</td>
</tr>
<tr>
<td>Jails</td>
<td>3/1/4</td>
<td>22.5</td>
<td>221.40</td>
<td>113.41</td>
<td>334.82</td>
<td>0.03</td>
</tr>
<tr>
<td>Water reservoirs</td>
<td>2/2/3</td>
<td>27.5</td>
<td>120.00</td>
<td>24.45</td>
<td>144.45</td>
<td>0.01</td>
</tr>
<tr>
<td>Public transport</td>
<td>5/2/2</td>
<td>14.7</td>
<td>156.81</td>
<td>25.82</td>
<td>182.64</td>
<td>0.02</td>
</tr>
<tr>
<td>Others</td>
<td>4/2/0</td>
<td>23.2</td>
<td>168.72</td>
<td>0.97</td>
<td>169.69</td>
<td>0.02</td>
</tr>
<tr>
<td>Other concessions</td>
<td>24/16/21</td>
<td>17.5</td>
<td>1,050.87</td>
<td>212.73</td>
<td>1,263.61</td>
<td>0.11</td>
</tr>
<tr>
<td>Total or average</td>
<td>50/78/70</td>
<td>22.4</td>
<td>8,465.22</td>
<td>2,813.38</td>
<td>11,278.59</td>
<td>1</td>
</tr>
</tbody>
</table>

Notes: (1) Includes cancelled projects. (2) Projects/bilateral renegotiations/arbitration panel. (3) Excludes cancelled projects. (4) Includes the amounts which were paid to cancel three concessions.
### Table 4
Renegotiation caps and bilateral renegotiations

<table>
<thead>
<tr>
<th>Concessions that exceed the investment limit</th>
<th>Allowed increase in investment&lt;sup&gt;1&lt;/sup&gt;</th>
<th>Actual increase&lt;sup&gt;2&lt;/sup&gt;</th>
<th>= (3a)/(2a)</th>
<th>= (3b)/(2b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) During construction</td>
<td>(b) During the concession</td>
<td>(a) During construction</td>
<td>(b) During the concession</td>
<td></td>
</tr>
<tr>
<td>Pan American Highway</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td>80.07</td>
<td>158.65</td>
<td>396.99</td>
</tr>
<tr>
<td>Interurban</td>
<td>5</td>
<td>69.90</td>
<td>34.81</td>
<td>163.36</td>
</tr>
<tr>
<td>Urban</td>
<td>5</td>
<td>190.49</td>
<td>285.74</td>
<td>980.52</td>
</tr>
<tr>
<td>Highways</td>
<td>14</td>
<td>340.47</td>
<td>479.20</td>
<td>1,540.87</td>
</tr>
<tr>
<td>Airports</td>
<td>1</td>
<td>18.40</td>
<td>3.93</td>
<td>20.19</td>
</tr>
<tr>
<td>Jails</td>
<td>0</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Water reservoirs</td>
<td>1</td>
<td>8.40</td>
<td>0.00</td>
<td>10.29</td>
</tr>
<tr>
<td>Public transport</td>
<td>0</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Others</td>
<td>0</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Other concessions</td>
<td>2</td>
<td>26.80</td>
<td>3.93</td>
<td>30.48</td>
</tr>
<tr>
<td>Total</td>
<td>16</td>
<td>367.27</td>
<td>483.13</td>
<td>1,571.35</td>
</tr>
</tbody>
</table>

Notes: (1) We only count those concessions that surpassed investment caps. (2) Includes only those amounts added in bilateral renegotiations which add investments not included in the original contract.
Figure 1
Investment commitments to infrastructure projects with private participation in developing countries (1990–2006)

Source: World Bank and PPIAF, PPI Project Database.

* Adjusted by the 2006 US CPI.
**Figure 2**
Timing of the infrastructure process

- **t = 1**
  - Congress sets spending cap $\bar{T}_i$.
  - Firms bid $B$ for building $I_i \leq \bar{T}_i$.
  - Contract $\{B; I_i\}$ signed.
  - Contract is renegotiated; additional payment $R$ is agreed, against building $\varepsilon$; contract $\{B + R; I_i + \varepsilon\}$ signed.
  - Government issues $D = P_i - T_i$ and pays $P_i \leq \bar{T}_i$ to the concessionaire.
  - Election.
  - Government procures $(1 - (B + R))$; construction company builds.
  - Government pays $(1 - (B + R))$ to the construction company, $(B + R) - P_i$ to the concessionaire and repays debt $D$.

- **t = 2**
  - Incumbent procures $I_i \leq \bar{T}_i$; construction company builds.
  - Incumbent issues $D = I_i - T_i$ and pays $I_i$ to the construction company.
  - Government collects taxes $T_i$.
  - Government collects taxes $T_i$.
  - Government procures $1 - I_i$; construction company builds.
  - Government collects taxes $T_2$.
  - Government collects taxes $T_2$.
  - Government collects taxes, pays $1 - I_i$ to the construction company and repays debt $D$.

(a) Conventional provision

(b) PPP provision
Figure 3
Increases in investment as a percentage of the original estimate

- Panamerican: 29%
- Interurban: 20%
- Urban: 55%
- Highways: 35%
- Airports: 13%
- Jails: 51%
- Water reservoirs: 20%
- Public transport: 16%
- Others: 1%
- Other: 20%
- Total: 33%
Figure 4
How and what is renegotiated

Renegotiations (148)
- $2.8 billion (100%)

Arbitration (70)
- $490 million (17%)

Bilateral (78/66)
- $2.3 billion (83%)

Additional payments
- $360 million (16%)

Additional investment
- $2.0 billion (84%)
Figure 5
When are PPPs renegotiated?

- Renegotiations $2.8 billion (100%)
  - Bilateral (78) $2.3 billion (83%)
    - During construction (51) $1.8 billion (78%)
      - After construction (27) $500 million (22%)
  - Arbitration (70) $490 million (17%)
    - During construction (31) $225 million (46%)
      - After construction (39) $265 million (54%)
Figure 6
Who pays when PPPs are renegotiated?

Renegotiations $2.8 billion (100%)

- Arbitration $490 million (17%)
  - Current administration $299 million (61%)
  - Future administrations and users $191 million (39%)

- Bilateral $2.3 billion (83%)
  - Current administration $812 million (35%)
  - Future administrations or users $1.5 billion (65%)