

TRANSPORTATION

Public–Private Partnerships: Some Lessons After 30 Years

The savings policymakers usually claim for these projects are illusory, but well-designed contracts can deliver public benefits.

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Public–private partnerships (PPPs, also known as P3s and concessions) emerged in recent decades as a new organizational form to provide public transport infrastructure. Around the world, traditional provision continues to be the dominant procurement option, but investment in PPPs over the last 30 years has been substantial, adding €203 billion of infrastructure spending in Europe and \$535 billion of spending in developing countries. Most investments are in roads, seaports, and airports, but in some countries investment via PPPs has been significant in other types of infrastructure, such as hospitals and schools. In comparison, PPP investments in the United States have been small.

The post-COVID-19 world will probably bring a renewed impetus to PPPs, and it is possible that the United States will jump on the bandwagon. The reason is that infrastructure spending is seen as a lever to a faster recovery, but fiscal budgets will be tight, and governments will have accumulated large debt burdens. Politicians will likely argue that PPPs allow them to increase spending without using scarce tax dollars or incurring additional debt.

This argument is flawed. In the absence of efficiency gains, the present value of the fiscal effect of a PPP project is the same as with traditional provision of the same project. Consequently, PPPs do

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not free up government resources in any meaningful sense. Below, we explain the logic of this equivalence result.

This implies that the choice of infrastructure provision via PPPs should be made only if they are more efficient than traditional provision. We argue that experience has shown that the main efficiency gains of PPPs are improved life-cycle maintenance and earlier completion of projects. Those benefits can be substantial.

However, PPPs are routinely renegotiated, and this undermines their potential efficiency gains. The prevalence of renegotiations suggests they are not accidents, but an equilibrium outcome of the incentive structure within the infrastructure project environment. In fact, the evidence indicates that renegotiations are sometimes due to poor project and contract design, and other times to opportunistic behavior by firms.

Finally, many PPPs are funded with user fees. This can be efficient, but when PPP contracts have a fixed term, concessionaires are subject to excessive demand risk, which is largely beyond their control. Indeed, exogenous demand risk in transport projects promises to be even larger in a post-COVID-19 world in which new mobility patterns will emerge, driven by significant technological change and also by behavioral changes in social interactions and mobility. A present-value-of-revenue (PVR) contract, in which the PPP contract lasts until the concessionaire collects its bid in the auction, significantly reduces the risk borne by the

concessionaire and the likelihood of contract renegotiations. We present novel evidence from Chile that shows that PVR contracts are renegotiated significantly less than fixed-term concessions. In the remainder of this article we examine these issues.

A FISCAL ILLUSION

PPP's are funded by a combination of user fees and government transfers. For example, when demand is sufficiently high, a road can be funded entirely with tolls, while government transfers are usually the main funding source for schools and hospitals. Under a Build-Operate-Transfer PPP contract, the firm finances, builds, operates, and maintains the project. The duration of the contracts is long because the firm needs to recoup the capital costs of the project; it usually lasts 20–40 years in the case of a highway. The facility reverts to the government when the concession ends. At that point, the government can initiate a new concession, request additional investments to revamp the existing infrastructure, or take over the project.

The fact that the project is financed by the concessionaire has made PPPs attractive to policymakers and politicians because they can argue that PPPs relax current fiscal constraints. The government can thus seemingly build infrastructure without an increase in government debt or raising taxes. However, this is an illusion.

Table 1 explains why. It compares the intertemporal budgetary



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effect of traditional provision and a PPP when the infrastructure is funded by government transfers, as is common in school or hospital PPPs. Assume the project costs 100 units to construct. As the first line shows, a PPP “saves” 100 in current spending and debt, but ultimately taxpayers will pay 100 to fund the infrastructure, just as in a traditional project. The only difference is that under traditional provision, future governments use revenue from taxes to pay bondholders. In contrast, with a PPP they use tax revenues to pay the concessionaire.

Table 2 shows that the same reasoning applies for PPPs funded with user fees. Once again, the government apparently “saves” 100 in current spending and debt. Moreover, it does not need to raise any taxes. Nevertheless, relative to conventional provision, it relinquishes the 100 in user fee revenue it would have obtained from users, which the concessionaire uses to pay off the investment. Because the highway is paid for with user fee revenue in both cases, the fiscal effect is identical.

The illusion stems from the fact that fiscal accounting rules seldom use the appropriate convention in the case of investments in PPPs. The rules do not indicate an implicit increase in net government borrowing, which the government will pay off in the future. Thus, governments can evade conventional fiscal constraints and indulge in politically attractive infrastructure spending. It follows that fiscal accounts should record investments in infrastructure via PPPs in the same way they record traditional public investments.

The lure of this illusory off-balance-sheet financing seems to have been the main driver for the use of PPPs in Europe. For example, in the United Kingdom, the Private Finance Initiative fostered off-balance-sheet finance spending. The effect was to encumber the UK with average annual payments of £7.7B for 25 years, beginning in 2017–2018, or about 0.5% of the national budget until the mid-2030s.

Portugal received €20 billion in PPP investments in roads, hospitals, and other projects between 1995 and 2014. Of this amount, 94% was spent in highways that used “shadow tolls” that the government paid to the concessionaire per user. Government-guaranteed minimum revenue from the tolls amounted to 1% of the country’s gross domestic product annually over the period 2014–2020, though it will fall to an estimated 0.5% of GDP by 2030.

In the United States, the Chicago Skyway, a 7.8-mile toll road that links downtown Chicago to the Indiana state line, shows yet another way that PPPs have been used to increase current expenditure. The city built the road in the 1950s (with subsequent extensions), but in 2005 it sold a 99-year operating lease for the road to a private concessionaire in exchange for \$1.83 billion. The city used the money to retire the remaining Skyway bonds, save some funds for the future, and devote almost all the remaining \$475 million to increase current spending. Yet, the efficiency gains

TABLE 1

Fiscal Accounting: Funding from Government Transfers

	TRADITIONAL PROVISION	PPP
NOW	<ul style="list-style-type: none"> ■ Issue 100 in debt ■ Spend 100 on infrastructure 	<ul style="list-style-type: none"> ■ “Save” 100 in debt ■ Spend 100 on infrastructure
FUTURE	<ul style="list-style-type: none"> ■ Collect 100 in taxes ■ Pay 100 to bondholders 	<ul style="list-style-type: none"> ■ Collect 100 in taxes ■ Pay 100 to the concessionaire

TABLE 2

FISCAL Accounting: Funding from User Fees

	PUBLIC PROVISION	PPP
NOW	<ul style="list-style-type: none"> ■ Issue 100 in debt ■ Spend 100 on infrastructure 	<ul style="list-style-type: none"> ■ “Save” 100 in debt ■ Spend 100 on infrastructure
FUTURE	<ul style="list-style-type: none"> ■ Collect 100 in user fees ■ Pay 100 to bondholders 	<ul style="list-style-type: none"> ■ Give up 100 in user fees ■ Concessionaire collects 100 in user fees

in the process were minimal, estimated at a reduction in operating costs of \$1 million a year.

BETTER AND LESS EXPENSIVE MAINTENANCE

The economic case for a PPP rests on efficiency gains. These do not stem from private participation per se, but from the different incentives embedded in PPP contracts (if they are not renegotiated). The literature notes that a PPP is a long-lasting contract between the government and a private firm that bundles finance, construction, maintenance, and operations. The theoretical benefits brought about by PPPs arise in part from bundling design, building, operation, and maintenance. The reasoning is that because the concessionaire will operate and maintain the project, it will design and build the project to minimize life-cycle costs. Moreover, if there is strict monitoring of compliance with the conservation standards, it is in the concessionaire’s interest to design and build the project so as to maintain the infrastructure at minimum life-cycle costs.

The theoretical advantages of bundling have proven difficult to test and document, but the benefits in terms of maintenance are clear. Many governments do not perform regular, continuous maintenance because building new infrastructure or repairing severely deteriorated projects is politically more attractive. In both cases, the benefits are obvious to the public and contrast with the lack of perceived benefits from routine maintenance. Moreover, the annual logic of public budgets makes it difficult to set aside funds for future maintenance at the time the project is built. Indeed, a study suggests that one-third of expenditures on new infrastructure should be allocated to maintaining existing projects.

The cost of poor maintenance under traditional provision can be high. Not only is the quality of service poor, but the cost of intermittent maintenance, which often involves costly rehabilitation, has been estimated to lie between 1.5 and 3 times the cost of continuous maintenance. We estimate that maintenance

savings are somewhere between 10% and 16% of initial investment.

PPPs solve the maintenance problem if the quality of the services provided by the infrastructure asset is contractible. It then suffices to include service quality specifications in the contract and to enforce them on a regular basis during the lifetime of the contract. The firm is aware of the increased costs of reactive maintenance and of the penalties associated with insufficient maintenance and will manage the project so that it is always correctly maintained.

RENEGOTIATIONS

PPPs are routinely renegotiated. This has been well known since José Luis Guasch examined nearly 1,000 Latin American concession contracts awarded between the mid-1980s and 2000 and found that 54.4% of projects in transportation (including roads, ports, tunnels, and airports) had been renegotiated. When Mexico privatized highways in the late 1980s, Mexican taxpayers incurred costs of more than \$13 billion following renegotiation of the initial contracts. In Chile, 47 out of 50 PPP concessions awarded by the Ministry of Public Works between 1992 and 2005 had been renegotiated by 2006, and one of every four dollars invested had been obtained through renegotiation.

In a 2019 paper, we analyzed 535 renegotiations of 59 highway PPPs in Colombia, Peru, and Chile. Renegotiations per concession/year averaged 9.5% of initial investment in Colombia, 3.6% in Peru, and 1.3% in Chile. More than 45% of renegotiations (by dollar amount), occurred during the construction stage. It is also relevant that at least 60% of the increased spending from the renegotiations devolved onto future administrations.

Industry participants often claim that circumstances change over the life of a concession. Because most PPP contracts last for several decades, renegotiations of inherently incomplete contracts are to be expected. While there is some truth to this argument, it ignores two disturbing features of most renegotiations. First, they often occur shortly after contracts are awarded. For example, Guasch found that the average time to renegotiation was only 2.2 years after the concession was awarded, and 60% of all renegotiated contracts were renegotiated within the first three years after the concession award. We have shown elsewhere that, in the case of Chile, PPP renegotiations during the construction stage have awarded 78% of total amounts renegotiated.

Second, renegotiations tend to favor the concessionaire. For example, Guasch finds that two-thirds led to tariff increases, 38% to extensions of the concession term, and two-thirds to reductions in investment obligations. In the case of Chilean PPPs, we find that most renegotiations imply the public ends up paying more for the works than originally contracted. Thus, while in principle renegotiations may allow governments to expropriate concessionaires after they have sunk their investment, in practice it seems that the private partner benefits the most, at least in Latin America.

The prevalence of renegotiations suggests that they are not accidents, but an equilibrium outcome of the existing incentive

structures. The evidence suggests that many renegotiations are due to poor project and contract design. Thus, better project and contract design would lead to fewer renegotiations and more efficiency in equilibrium.

One driver of renegotiations is that PPPs involve a long-term relation between the concessionaire and successive administrations. Thus, the current administration can ask for additional works and pay for them with an extension of the concession term or with obligations that will be fulfilled by future administrations. This implicit additional spending does not go through the usual budgetary oversight process even though it reduces the resources available to future administrations. Treating a PPP as current government investment and debt would eliminate the incentive to use renegotiations to increase current infrastructure spending.

A second driver of renegotiations is the expectation of obtaining rents in bilateral bargaining after adjudication of the contract. This stimulates “lowballing” when competing for the contract and fosters moral hazard and adverse selection. Moral hazard stems from the fact that mistakes or sloppiness in design, project planning, and contract structuring—both by the government and the concessionaire—can be renegotiated away, to the detriment of the public. Adverse selection stems from the fact that renegotiations give an edge to firms that are good at lobbying or, worse, are willing to pay bribes. Indeed, our recent work on the Odebrecht corruption case in Latin America finds a strong link between bribe-paying, lowballing, and renegotiated amounts.

The remedy to moral hazard and adverse selection is to eliminate the expectation of economic rents arising from bilateral renegotiations. To do so, the contract should limit the present value of a concessionaire’s compensation during the life of the contract to the amount determined by the original bid (the so-called “sanctity of the bid” principle). Moreover, any works added to the original project should be auctioned off to the lowest bidder and the concessionaire should be excluded from bidding. To ensure the sanctity of the bid, renegotiations should be reviewed by an independent panel and all contract modifications should be easily accessible to the public via the internet so that an informed public can question the reasons for renegotiations and the amounts involved.

Chile reformed its PPP law in 2010, making it mandatory to bid out any additional work on a project and excluding the concessionaire from participating in the new contract. Moreover, the law established a permanent independent board, the Panel Técnico de Concesiones, to review renegotiations and for conflict resolution between the contracting authority and the private party. The panel hears a case and issues a nonbinding recommendation within 30 days. In 40% of cases, these recommendations have been followed immediately. The remaining cases proceed to mandatory arbitration, where the panel’s recommendation is usually followed.

Table 3 shows the amount that has been renegotiated during construction as a fraction of initial investment before and after the reform. Following the reform, renegotiations during construction shrank dramatically.

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DEMAND RISK AND PVR CONTRACTS

A third driver of renegotiations is the poor contractual allocation of exogenous demand risk. The standard PPP funded by user fees is a fixed-term contract awarded to the firm that bids the lowest user fee for a given term. Because demand is stochastic, a fixed-term contract assigns most of the demand risk to the concessionaire. This makes sense when the infrastructure is, for example, a container terminal, where demand responds to effort by the concessionaire. But demand for roads, bridges, and tunnels depends mostly on exogenous factors such as macroeconomic activity, a variable whose forecasts are notoriously unreliable. Thus, in a fixed-term contract, the winning bid internalizes exogenous risk by asking for a user fee that generates enough additional expected revenue to compensate for demand risk.

The general principle is that exogenous demand risk should be borne by the party best able to bear it. If the concessionaire assumes demand risk, taxpayers are in fact purchasing insurance against an exogenous risk, which they would bear under public provision. This is not cost-effective. Indeed, in practice, when using fixed-term contracts, governments need to pledge minimum revenue guarantees in order to make projects bankable. Moreover, fixed-term contracts tend to be renegotiated in times of severe economic stress, as is occurring presently because of the COVID pandemic, which shifts risk from the concessionaire to the government.

Usually, having a private party face demand risk is a way to ensure that the firm will try to attract demand, for example, by good maintenance in the case of infrastructure. However, in the case of highways and other transport infrastructure, the degree of competition usually is limited. Moreover, the service quality provided by a road, tunnel, or bridge can be contracted and enforced, so having the concessionaire bear demand risk serves no purpose.

Thus, for these projects, a PVR contract can be used to shield the concessionaire from exogenous demand risk, replicating the demand risk allocation of a standard non-PPP infrastructure project—that is, traditional provision. Under a PVR contract, the regulator sets the discount rate and user fee schedule, and firms bid the present value of user fee revenue they require to finance, build, operate, and maintain the infrastructure. The firm that makes the lowest bid wins the auction and the franchise ends when the present value of user fees collected equals the winning bid. The term of the concession automatically adjusts to demand shocks, limiting the demand risk borne by the concessionaire.

The PVR contract has several advantages. First, it reduces risk because demand fluctuations and their associated revenue variations lead to a longer or shorter contract term. Indeed, we have estimated using Chilean data that, rela-

TABLE 3

Renegotiations in Chile: Before and After the 2010 Reform

	HIGHWAYS		TRANSPORT	
	Number	Percent of investment	Number	Percent of investment
Before the reform	29	26.1%	44	27.6%
After the reform	15	0.7%	25	0.9%

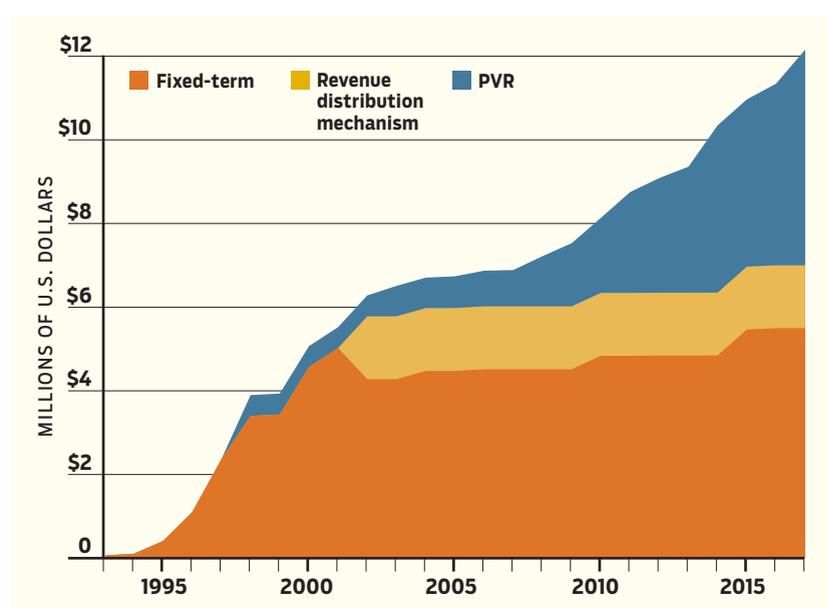
tive to a fixed-term contract, the risk premium reduction with a PVR contract is around 30% of investment. More generally, PVR contracts may be viewed as having a built-in renegotiation clause that is triggered by low demand realizations. When demand is lower than expected, the contract length extends automatically and total revenues for the firm, in present value, are unaffected. In contrast, with fixed-term PPPs there is no need for contract renegotiations. Less risk also implies that minimum revenue guarantees are no longer required to make the project bankable.

Second, with a PVR contract, the government has the option to unilaterally buy back the concession by paying a fair price for the contract, i.e., without regulatory takings. This price is equal to the difference between the bid and the present value of toll revenue already collected. Because the concessionaire's winning bid determines the total amount of present value revenues it will receive, the PVR contract is closer to a complete contract than a fixed-term contract. A fair value for an early buy-back option can be calculated at any moment by using standard accounting information.

FIGURE 1

Fixed and Variable-Term Transport PPPs in Chile

Cumulative investment



Third, a PVR contract allows flexibility in setting user fees. This can be valuable for urban highways because user fees can be adjusted for congestion without affecting the present value of revenues for the concessionaire, as long as changes in user fees do not threaten the possibility of obtaining the bid revenue. In the case of a fixed-term PPP, the flexibility to change user fees would increase the revenue and political risk facing the franchise-holder.

Figure 1 shows the cumulative investment in transport PPPs in Chile since the PPP program was launched in 1993 with the El Melón tunnel. As can be seen in the figure, initially all PPPs were fixed term. The first PVR contract was auctioned in 1998, but after 2006 PVR contracts became the norm. Note that a third type of contract—the so-called “revenue distribution mechanism”—appeared in 2002. These were five fixed-term PPPs that were renegotiated and turned into variable-term contracts in 2002 after their revenue plummeted following the 1997 Asian financial crisis and the subsequent collapse in public revenues and exports. By 2017, 29 of the 66 PPPs awarded were variable-term contracts. The cumulative investment in transport PPPs in Chile exceeded \$12 billion. Some 55% of all investment had been made with (or turned into) variable-term contracts.

Table 4 compares renegotiations under fixed-term contracts and under PVR for highway PPPs in Chile. The table reports the value of renegotiations as a fraction of the initial investment, both during construction as well as during the first eight years of operation. The table shows that renegotiated amounts under PVR have been about one-tenth of the amounts under the fixed-term contracts. This is consistent with concessionaires having fewer incentives to renegotiate contracts because low demand realizations have little or no effect on their bottom line.

CONCLUSION

PPPs can be a useful instrument to provide infrastructure if they deliver efficiency gains. However, often these promised benefits fail to emerge. In the course of studying PPPs for 30 years, we have compiled a set of best practices that will help to deliver these net benefits:

- PPPs would be more credible if their effect on the intertemporal fiscal constraint were acknowledged. That is, investment in PPPs should be included in public accounts

as public investment, given their equivalent effect on the intertemporal fiscal constraint.

- Careful planning, project design, and project management help ensure that PPPs fulfill their promise. Planning reduces the frequency of costly mistakes and the need for renegotiations of the contract.
- If renegotiations are made public and are reviewed or approved by an independent panel, the incentives for welfare-reducing contract renegotiations are reduced.
- If any additions to the project after adjudication are tendered competitively, there are fewer incentives to renegotiate the contract.
- If concessionaires do not bear uncontrollable demand risk, the cost of the project is lower.

Chile modified its PPP law in 2010, introducing an independent panel to review contract renegotiations and excluding concessionaires from participating in additions to projects. Moreover, since 2007 Chile has used PVR contracts routinely, shielding concessionaires from uncontrollable demand risk. While we cannot prove causality, these reforms were followed by a substantial decrease in renegotiations. This illustrates the more general point we make in this article, namely that good governance and careful contract design are necessary to reap the benefits from PPPs. **R**

READINGS

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Table 4
Renegotiations in Chile: Fixed-term vs. PVR

PERIOD CONSIDERED	FIXED TERM		PVR	
	Number	Renegotiation (average)	Number	Renegotiation (average)
Construction	20	32.0%	15	3.6%
First 8 years of operation	20	25.2%	15	2.5%
Total (first 8 years of operation)	20	57.2%	15	6.1%