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## Public-Private Partnerships: A Public Economics Perspective

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Fiscal Affairs Department

**Public-Private Partnerships: A Public Economics Perspective**

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**Abstract**

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Public-private partnerships (PPPs) involve the supply by the private sector of infrastructure and services deriving from infrastructure assets which have traditionally been supplied by the public sector. PPPs are spreading all over the world. It may be quite plausible that such arrangements were initially an attempt to evade expenditure controls and hide public budget deficits. But if they are properly designed and transparently reported, PPPs can enhance the efficiency of the provision of services that were formerly supplied solely by the public sector. This paper provides a public economics perspective on PPPs.

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	Contents	Page
I.	Introduction.....	3
II.	The Scope of Public-Private Partnerships.....	4
III.	Build-Operate.....	5
IV.	Identification of the Endogenous and Exogenous Risks.....	7
V.	“White Elephants” .....	8
VI.	Cost-Benefit Analysis: Prices and Discount Rates .....	9
VII.	The Allocation of Risk between the Public and Private Partners .....	11
VIII.	Transfer of the Facility.....	15
IX.	Pigouvian Taxation .....	16
X.	Off-Budget Investments and Resource Accounting .....	17
XI.	Political Economy Considerations.....	20
XII.	Case Study: Cross-Israel Highway .....	21
XIII.	Conclusion .....	25
Table		
1.	The Toll Markup Due to the Free Transfer of the Facility .....	16
References.....		26

## I. INTRODUCTION

PPPs were initiated in the United Kingdom in the early 1980s. They constituted an element in the broader process of privatization undertaken (or accelerated) by the Thatcher government. Broadly speaking, privatization does not refer merely to the transfer of state-owned enterprises to private investors, but also to a shift of public sector activities to the private sector. Indeed, PPPs enter into this broader category. But they do this in a restricted way; not every transfer of the delivery of public services to the private sector is referred to as a PPP. For instance, the state may outsource the issuance of driver licenses to the private sector. This would not be normally referred to as a PPP. The latter term is usually reserved to an undertaking which involves a sizable initial investment in a certain facility (a road, a bridge, an airport, a prison), and then the delivery of the services from this facility.

Many formerly state-owned enterprises perform ordinary activities that have been routinely undertaken by the private sector. It is quite widely accepted that such enterprises probably should not have been run by the state in the first place. Therefore, the involvement of the state in these enterprises should, and hopefully does, end upon their privatization. This is not, however, the case with the activities relegated to PPPs. These activities have some public good features. A road, for instance, is usually referred to and studied by the public economics literature as a congested public good. As any beginning student of welfare economics learns, congested public goods are characterized by externalities and market failures. Therefore, they are not privatized once and for all; rather, the state continues to be involved in some way or another, and one option is to set up PPPs.

Yet one may argue that PPPs are not genuine partnerships that properly or efficiently share risks and liabilities (and profits). Rather, they are a means to disguise conventional contracting undertakings that are subject to standard budgeting processes as some new undertakings that are carried out off budget.<sup>2</sup> This claim might have been particularly valid at the beginning, when most PPPs took the form of private-finance initiatives (PFIs), in which the private contribution was primarily to provide financing. Put differently, the private involvement amounts to little more than providing the government with a channel through which it can finance infrastructure investment by implicit (or hidden) budget deficits and debts. In the words of Spackman (2002), “Early financing proposals were designed mainly to evade expenditure controls.”

However, PPPs have come a long way since their embryonic stages as PFIs. In many instances, they have developed into genuine partnerships aimed at properly pricing scarce public resources and efficiently sharing and managing risks. They may still be far from

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<sup>2</sup> It should be noted that carrying out an activity off budget does not necessarily imply that transparency is impaired. In principle, full transparency may be maintained for off-budget items. But when a government wishes to conceal a certain item from the public eye, or from the international institutions and the business community, it will usually prefer to carry it out off budget.

perfect, but it would be inappropriate to dismiss them altogether as merely a tool to make the government accounts look stronger. In a preface (written in January 2001) to a PPP manual for South Africa's national and provincial government departments (National Treasury PPP Unit, 2004), Trevor Manuel, the Minister of Finance, states: "...the availability of state resources for these purpose [to meet the socioeconomic needs of all South Africans, and in particular, to alleviate poverty] must be used to leverage much-needed private sector investment in public infrastructure and services." Indeed, the desire to raise private financing is explicitly acknowledged. But he immediately goes on to say: "The benefits [of PPPs] do not consist in an increase of funds, but in the better management of scarce resources."

Whether or not they were "born in sin," PPPs are now spreading worldwide. They are used in transportation infrastructure, such as roads, bridges, tunnels, rail, air and sea ports; utilities, such as water and electricity supply, sewage, and waste disposal; prisons; schools; hospitals. Furthermore, when properly designed and transparently reported, they can play a useful role in enhancing the efficient provision of services that were previously supplied solely by the public sector. This paper provides a public economics perspective on the advantages and disadvantages of PPPs.

The next section of this paper describes briefly the scope of PPPs. Section III analyzes some common feature of PPPs, most notably build-operate arrangements. Section IV introduces the notions of exogenous and endogenous risks. Section V points to the role of PPPs in rationalizing public investment decisions, and the importance of a proper cost-benefit analysis is discussed in Section VI. Section VII analyzes risk sharing between the public and private partners. Section VIII discusses how the pricing of the service is affected when the facility is transferred to the public partner at the end of the partnership (the end of the concession period). The role of user charges as Pigouvian taxes and their implications for the efficiency of PPPs are analyzed in Section IX. Section X addresses the off-budget character of PPPs and resource accounting. Political economy considerations associated with PPPs are covered in Section XI. A case study (the Cross-Israel Highway) is presented in Section XII, and Section XIII concludes.

## **II. THE SCOPE OF PUBLIC-PRIVATE PARTNERSHIPS**

The design of an efficient PPP project depends crucially on the basic underlying economic environment in which it operates. Therefore, it would be inappropriate to prescribe a *model* arrangement between the public entity and the private entity in a PPP project. Because these projects are becoming popular in many fields they are carried out in a large variety of circumstances and uncertainties, so that each case may have to be examined, designed, and executed with a close reference to its own characteristics.

Nevertheless, this should not be interpreted to mean that there can be no universal rules to follow. There is a widespread consensus among economists that transparency is crucial in the case of PPPs. Because PPPs may be used to channel public activities off budget and away

from the public eye, all public liabilities must be properly reported, if not properly quantified according to some generally accepted accounting standards.<sup>3</sup> These liabilities could be either direct (materialize in any event) or contingent (materialize only if a certain event occurs); and either explicit (legally binding) or implicit (binding by some social norms, habits, tradition).<sup>4</sup> Indeed, several countries have recently tried to identify and quantify all government obligations.<sup>5</sup>

We aim to analyze and discuss some basic features that are common to most PPP projects. These projects come under a variety of forms. A detailed description of these forms may be found in a report of a staff team from the Fiscal Affairs Department of the International Monetary Fund (IMF, 2006). The most common forms are some variant or another of design-build-finance-operate (DBFO), in which a concessionaire from the private sector designs, builds, and finances a certain facility (e.g., an airport) and then operates it as well, or build-operate-transfer (BOT), in which a concessionaire finances and builds a facility, operates it, and transfers it to the government at the end of the concession period. The build-operate (BO) combination features in all of these arrangements.

### III. BUILD-OPERATE

This section addresses the issue of why this build-operate combination is so prevalent in PPP projects. An obvious alternative is conventional provision, under which the public entity first contracts with a private builder to construct a facility (e.g., a multilane highway), and then either contracts with a concessionaire to operate the facility for a specified period of time or operates the facility by itself. So, what kind of an advantage is there to be gained when *bundling* these two activities of building and operating under a PPP arrangement? A simple and useful answer was provided by Hart (2003).<sup>6</sup> Suppose there are two kinds of investments that can be made in the construction stage of the road. One, termed *productive*, improves the quality of the road and reduces the cost of operation. For instance, the use of concrete rather than tarmac in building a road does both because concrete is much more durable than tarmac. The other investment, termed *unproductive*, reduces the service and the cost of operation but also complicates delivery of the service. For instance, one can build an extremely tight screening system in order to detect people evading tolls (i.e., free riders). This may slow down traffic on the road and reduce the quality of the service, but it may also lower operation costs (or increase toll revenues).

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<sup>3</sup> This would be true even though such comprehensive standards may yet to be developed.

<sup>4</sup> See Brixi and Mody (2002).

<sup>5</sup> For a notable example, see Echevery and others (2002).

<sup>6</sup> See also Riess (2005).

Under the conventional arrangement (“unbundling”), the constructor has no incentive whatsoever to incur the cost of either of these two investments. Under a PPP, the concessionaire internalizes the cost-reduction feature of these two investments, but not the quality-change feature. As a result, the concessionaire underinvests (from a social point of view) in the first kind of investment, because it does not internalize its quality-enhancing feature; and it overinvests (from a social point of view) in the second kind of investment, because it does not internalize its quality-reduction feature. Therefore, in general, one cannot tell whether bundling is preferable to unbundling.

This example does provide an indication as to the circumstances under which a PPP arrangement is preferable, however. If the characteristics, especially the quality-related characteristics, of the facility (the road in our example), can be well specified and, more importantly, well monitored and verified by the public partner at a relatively low cost, then a conventional arrangement (unbundling) may be adequate. However, public monitoring and verifying of the quality of a facility that is built to last for a long time are often very costly.<sup>7</sup> In contrast, if the quality of the service can be well specified and easily verified, such as the uninterrupted flow of traffic at a certain minimum average speed throughout the day, at no more than a certain noise level, then a PPP arrangement can work fine.<sup>8</sup> In this case, the specification of the quality of the service dictates to the concessionaire the quality of the facility itself, with no need to directly verify it beforehand (at the construction stage).

The specification of the quality of the service yields another advantage in favor of a PPP arrangement. In most cases, the capacity of the facility may have to be expanded over time. For instance, the number of lanes in each direction of the road may have to increase in order to adequately accommodate a rising volume of traffic. The size and the timing of the expansion do not have to be prespecified in a PPP contract. Again, it may suffice to specify that traffic should be able to flow at a certain minimum speed throughout the day which would persuade the concessionaire to add another lane to the highway in due time so as to avoid excessive road congestion which slows down traffic. Alternatively, the PPP contract may specify that the road must be enlarged when the volume of traffic surpasses a certain level per hour or per day. Similarly, a PPP contract for an airport may specify the number of incoming and outgoing flights per gate and/or the number of passengers per square meter of terminal space, in order to ensure the appropriate expansion of the facility at the appropriate time.

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<sup>7</sup> One should bear also in mind that a high level of public monitoring and supervision may lend itself to bribery and corruption.

<sup>8</sup> Another example of specifying the quality of the service can be drawn from water projects. There are several techniques or methods to desalinate water (some may be protected under patent rights). The government does not have to specify the size of the desalination and the technique to be used. It may suffice to specify that the public partner provide at least a certain quantity of water per year, with no more of a certain level of salinity, at a price not to exceed a certain cap.



#### IV. IDENTIFICATION OF THE ENDOGENOUS AND EXOGENOUS RISKS

It is important to identify the circumstances under which a PPP operates. Modern economic theories of procurement (whether by the public sector from the private sector or wholly within the private sector) consider the procurement problem as that of *ex ante* asymmetric information coupled with moral hazard.<sup>9</sup> Namely, the seller is better informed about production costs and quality than the buyer. After carefully examining the construction management literature and speaking with industry participants, Bajari and Tadelis (2001) report that they “have found little evidence that either the contractor or the buyer has private information at the onset of the procurement project. They both, however, share uncertainty about many important design changes that occur *after* the contract is signed and production begins, such as design failures, unanticipated site and environmental conditions, and changes in regulatory requirements.”<sup>10</sup> These uncertainties are *exogenous* to the private builder of the facility or the private provider of the service. To a large extent, they are also exogenous to the public entity that sponsors the facility. Even regulatory changes may be exogenous to the public entity, because they may be instituted by the legislators, by local governments, or by rulings of the courts.<sup>11</sup>

Similarly, there are exogenous uncertainties on the revenue or benefit side of public investment projects. In transportation infrastructure projects, future demand is surely not certain. The use of a subway system may be severely depressed by terrorist threats. The volume of traffic on a highway may depend on fuel costs, GDP growth and population growth. The demand for electricity from a new power plant is a function of, among other things, GDP growth, the degree of industrialization, or the development of energy-saving technologies. Neither the government nor the private concessionaire is *a priori* better informed about these (risky) variables.

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<sup>9</sup> See, for example, McAfee and McMillan (1987) and Laffont and Tirole (1993).

<sup>10</sup> As an illustrative example, Bajari and Tadelis (2001) describe the adaptation process in the building of the Getty Center Art Museum in Los Angeles, which is a 24-acre, US\$1 billion facility that took over eight years to construct: “The project design had to be changed due to site conditions that were hard to anticipate. The geology of the project included canyons, slide plans, and earthquake fault lines, which posed numerous challenges for the team of architects and contractors. For instance, contractors ‘hit a slide’ and unexpectedly moved 75,000 cubic yards of earth. More severely, in 1994 an earthquake struck. Cracks in the steel welds of the building’s frame caused the contractors to reassess the adequacy of the seismic design standards that were used. The project design also had to be altered due to the regulatory environment—107 items had to be added to the building’s conditional use permit. These problems were very hard to predict, both for the buyer and the contractor.”

<sup>11</sup> In fact, PPPs that are of quite a long duration serve the current government to precommit future executive and other branches of governments.

## V. “WHITE ELEPHANTS”

We shall analyze in more detail the treatment of risk in PPP arrangements. For our purposes at this stage, it suffices to realize that the costs and the benefits cannot be determined for certain. In this context, PPPs may play a useful role in enhancing a proper cost-benefit analysis and reducing the likelihood of building “white elephants,” such as a multilane highway that runs from nowhere to nowhere.

Because costs and benefits cannot be projected accurately, ex post (actual) costs and benefits will almost certainly differ from initial estimates. Thus, the net benefit from some projects may be negative or less than expected, whereas the net benefit of other projects may be greater than expected. However, as Prud’homme (2004) reports, costs are generally underestimated and benefits overestimated, and by large amounts, in public infrastructure projects. As Prud’homme puts it, “errors of 50 percent or more seem to be the rule rather than the exception.” For example, the actual number of passengers that used the channel tunnel between the United Kingdom and France in its first year of operation was less than 25 percent of what was predicted by *Service National des Chemins de Fer* (SNCF), the French-owned railway company. In 2003 actual revenues from the tolls were about a third of predicted levels. As Tanzi (2005) puts it, “this happened in a densely-populated area connecting two of the richest cities in the world (London and Paris) and two G-7 countries!” Similarly, Strong, Guasch and Benavides (2004) report cost underestimates and benefit overestimates for toll roads in Argentina, Brazil, and Mexico.

These findings may be interpreted as providing some indication that prediction errors are biased.<sup>12</sup> It is possible that public agents, motivated by self-interest, behave strategically. That is, out of a desire to maximize the volume of activity, which can serve to justify their existence, public agents engage in a sort of “wishful thinking” and underestimate costs and overestimate benefits or revenues. A PPP may be useful in sorting out the economically viable from the economically unviable projects, and rejecting the latter. The private sector will not be generally willing to enter into a public infrastructure undertaking in which it does not expect to recover all of its costs, including capital (direct or opportunity) costs. Therefore, the private sector will doublecheck the estimates of the public agents concerning costs and revenues. In this way, the private sector may serve as some safeguard, albeit perhaps imperfect, against white elephants.

This is true even when, as under many PPP arrangements, the government provides the concessionaire with a guarantee against certain cost overruns or revenue shortfalls. Consider, for example, a PPP arrangement for a toll road. Suppose the government provides the concessionaire with some initial design and agrees to compensate it for any cost increases resulting from changes in this design or from the occurrence of some specified events. For

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<sup>12</sup> Note, however, that we may be missing data on projects where the costs were overestimated and the benefits underestimated; such projects may have been discarded because of yielding negative net benefits.

instance, due to some public or political pressures by environmentalist groups, the government may decide to change the path of the road, so as to pass through a tunnel rather than across mountain landscape. A PPP contract may specify that in such a case, the concessionaire will be compensated by the government for its extra costs. Similarly, the government may agree to compensate the concessionaire if some contaminated land is found along the path of the road that needs to be treated, causing both a time delay and a cost increase. Also, the government may agree to compensate the concessionaire for future exchange rate changes, or for future increases in the price of steel (which may constitute an important component of the cost of bridges and overpasses). Still, the *baseline* cost (under the original design and the original assumptions about price and exchange rate levels, etc.) is at least partially, if not fully as in this example, borne by the concessionaire. Therefore, it will not take at face value the original cost (under)estimates prepared by public agents eager to undertake the project.

The same is true with respect to the benefit side. Public agents typically provide some forecasts of the use of the road—baseline estimates. The government may offer the concessionaire insurance by compensating the concessionaire if the actual use turns out to be less than the baseline scenario. As long as this compensation is not full—that is, as long as the concessionaire is *not fully* compensated for revenue shortfalls—it bears some of the risk of such shortfalls. Again, the concessionaire cannot afford to take at face value the original revenue (over)estimates prepared by investment-eager public agents.<sup>13</sup> Thus, PPPs may serve as a safeguard, though not foolproof, against white elephants, which have not been uncommon in many countries, developed as well as developing.

## VI. COST-BENEFIT ANALYSIS: PRICES AND DISCOUNT RATES

The scrutiny done by the private sector under a PPP is important for another reason. A key issue in any cost-benefit analysis is the prices at which costs and benefits are evaluated. Proponents of a certain public infrastructure project may argue for calculating costs on the basis of out-of-pocket costs for the government. Thus, a case may be made for evaluating the cost of labor at (lower) after-tax wages rather than at (higher) before-tax wages, for indeed all taxes paid on labor are after all recollected by the government.<sup>14</sup> In a second-best world like that of Davis and Whinston (1965), one cannot totally dismiss this argument in all circumstances.<sup>15</sup> However, following the work of Diamond and Mirrlees (1971), the public

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<sup>13</sup> We shall elaborate more on the importance of less-than-100 percent revenue guarantees.

<sup>14</sup> See also Spackman (2002) for a related issue concerning interest costs.

<sup>15</sup> An even stronger (Keynesian) argument is to evaluate the cost of labor, especially low-skill labor, at zero in times of relatively high unemployment rates, for the social opportunity cost of unemployed labor is supposedly zero, or even negative, if unemployment benefits are saved. However, one has to recall that high unemployment will not necessarily persist throughout the construction stage of the project. Also, the unemployed labor may be utilized in another, more beneficial, project.

economics literature has established the superiority of *aggregate production efficiency* under quite general circumstances. That is, it is socially efficient for the production sector to maintain efficiency even though second-best economies, plagued by distortionary taxes and subsidies, are generally inefficient. An implication of this efficiency requirement is that all production activities, whether carried out by the private or the public sector, must be evaluated at the same prices—the prices (including those of labor) faced or paid by the private sector. Among other things, labor should be properly evaluated at the wages paid by private producers, namely the (higher) before-tax wages, in cost-benefit analyses of public investment projects. With a PPP the private sector is the final “referee” of the project, therefore the economic viability of the project will be calculated at socially appropriate prices.

A related issue is the discount rate to be used in evaluating (discounting) future costs and benefits.<sup>16</sup> The private sector typically borrows at a higher rate than a financially solvent government. Thus, the private sector employs a higher discount rate than the government. In most, if not all, infrastructure investment projects, the bulk of costs have to be incurred up front, whereas the benefits accrue much later. Therefore, an increase in the discount rate tends to have a significant negative impact on the attractiveness of a project. Hence, a project that has a positive net benefit when evaluated by the government may have a negative net benefit when evaluated by the private sector, and, consequently, may be rejected by the private sector. At first glance, this may seem to be a deficiency of PPPs, but, after careful scrutiny, the contrary, turns out to be true.

Savers are indeed willing to lend money to the government at a lower rate (a “risk-free” rate) than they are willing to lend money to the private sector. This is because savers correctly perceive that the government will not default on its loan, whereas the private sector may. The government is indeed less risky than a private borrower from the point of view of the savers, as they are willing to finance a (risky) infrastructure project at a lower interest rate when it is carried out by the government than when it is carried out by the private sector. But this has nothing to do with the underlying, fundamental riskiness of the project itself. The latter risk does not change depending on whether the project is undertaken by the government or the private sector. Put another way, savers know that if, for instance, the project fails to generate enough revenues in order to pay the interest or repay the principal, then the government can use its power to tax its citizens in order to cover the project revenue shortfalls. The explicit extra cost of private borrowing (over government borrowing) is merely replaced by a contingent tax liability when a project is built and financed by the government. Thus, one concludes again that an infrastructure investment project should be evaluated at the private sector prices (namely, discount rates), as is indeed the case with PPPs.

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<sup>16</sup> See also Grout (1997).

## VII. THE ALLOCATION OF RISK BETWEEN THE PUBLIC AND PRIVATE PARTNERS

An important issue in PPP arrangements is the sharing of risk between the public and the private sector or, more concretely, the transfer of risk from the public to the private sector. As pointed out, much risk is exogenous<sup>17</sup>, and the private partner neither is better informed about this risk than the public partner, nor can more efficiently manage or bear it. On the contrary, one may argue that the public sector is less risk-averse than the private partner, so that the former should bear all the exogenous risk. In the words of Dewatripont and Legros (2005): “It is thus in the interest of the State to insulate the contractor against exogenous risk.”

Note, however, that insulating the private partner from exogenous risk does not necessarily imply that the public partner bears this risk. Consider, for example, inflation risk. The general price level is undoubtedly exogenous to the private partner. In fact, it is largely endogenous to the public (i.e., government), since inflation is primarily an outcome of present and future monetary policies. The public partner may choose to insulate the private partner against inflation risk, but this does not mean that the public partner would compensate the private partner for future rises in the general price level. This risk may instead be shifted to the users of the facility, say a toll road, by linking the toll to the consumer price index (CPI), for example.<sup>17</sup> Similarly, in a PPP in the rail sector, where the locomotives operate on diesel fuel, the risks associated with the future prices of diesel fuel could be shifted to the users by linking the fares to these prices through some formula that takes into account the weight of fuel costs in total costs.<sup>18</sup> But not all risk is exogenous to the private partner. Some risk is endogenous to the private partner and can be partially managed or controlled by actions or efforts made by the private partner.

On the cost side, there are many risk elements that are either exogenous to the private partner or endogenous to the public partner, and it is inefficient to make the private partner bear them. The general price level, the general construction index, oil prices (which affect, in particular, the price of bitumen, a material used to make tarmac), and steel prices are all beyond the control of the private partner. Design changes, new environmental or safety regulations are not only exogenous to the private partner, but also endogenous to a large extent to the public partner, because the latter often initiates design changes and new

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<sup>17</sup> Note that when a risk is shifted to the public partner, it usually means that the risk is shifted to the public at large (or to the public in a certain area, if the public partner is a regional government). The group of users of a facility is typically a smaller group than the public at large. In general, user charges can be thought of as conforming to the “benefit approach” to taxation, as distinct from the “ability-to-pay approach.” See Musgrave and Musgrave (1989).

<sup>18</sup> In this case too, one can think alternatively of fixing the fares in nominal terms. Then, again, the private partner would insure herself against future increases in fuel prices by purchasing forward contracts (if available), and set the fares accordingly from the onset. As these forward contracts would reflect the expected prices in the spot markets, then a priori the users of the rail would likely be indifferent between the two alternatives of setting the fares.

regulations. The public partner or the users (that is, the final beneficiaries of services provided by a PPP) should therefore bear the associated risk. This is usually done either through direct compensation from the government to the private concessionaire or by allowing the concessionaire to raise user charges (such as the toll on a road or the price of water from a desalination plant).

There are also risk elements that are endogenous to the private partner, and/or the private partner is better informed about them than the public partner. Even putting aside design changes, new regulations, oil and key commodity price changes, occurrence of adverse effects (such as contaminated land, the discovery of new archeological sites), and the like, still there remains quite a lot of risk concerning production or construction costs. The quantities of the various inputs, such as labor, sand, cement, and similarly their future prices, can only be estimated *ex ante* (and for some of these inputs, such as labor, for instance, there are no forward markets). Under conventional contracting (unbundling), a fixed-price bid may lead the contractor to compromise on the quality or durability of the facility by saving on input quantities or by employing low-quality materials. Assuring high quality is the reason why in many construction projects (and in almost all construction projects in the area of transportation) the bid is a fixed-variable price, rather than a fixed price. That is, the price  $P$  offered in a bid (or in a negotiated contract) is

$$P = w_1 X_{1E} + w_2 X_{2E} + \dots + w_n X_{nE} + P_0 ,$$

where  $w_i$  is the price of the  $i$ th input,  $X_{iE}$  is the quantity of the  $i$ th input, as precalculated (estimated) by the buyer-government,  $i = 1, 2, 3, \dots, n$ , and  $P_0$  is all other costs. That is, the bidder does not offer merely a single, total lump-sum price  $P$ . Rather, the bidder offers also for each input a price  $w_i$  that it will charge or refund for deviations of the actual (*ex post*) quantity of the  $i$ th input from the estimated quantity  $X_{iE}$ . The actual price  $P_A$  paid at the end will be

$$P_A = w_1 X_{1A} + w_2 X_{2A} + \dots + w_n X_{nA} + P_0,$$

where  $X_{iA}$  is the quantity of the  $i$ th input that is actually employed. Naturally, these deviations are subject to authorization by an independent supervisor, typically appointed by the buyer.

In contrast, in a PPP, which bundles together construction of the facility and its operation for an extended period (25–30 years) the concessionaire has an incentive to build a facility of good quality that will last and will not involve heavy maintenance costs. In this case, all the endogenous risk associated with the production costs mentioned above is shifted to the concessionaire. The public partner is insulated from all risk, which is often a major source of cost overruns under conventional contracting. This is a major advantage of PPP arrangements. The concessionaire's incentive to keep the facility in good condition is further enhanced when it is also required to transfer the facility in good condition to the government at the end of the concession period. This is the case with BOT projects.

Similarly, on the revenue side, there are many risk elements that are exogenous to the private partner. A major source of uncertainty in infrastructure projects is future demand. The latter depends crucially on macroeconomic variables, such as population growth, GDP growth, fuel costs, the degree of urbanization, and more. These risks are efficiently borne by the government. Furthermore, some other factors are endogenous to the government as they constitute policy variables. For instance, the demand for the services of an underground metro in a certain city may crucially depend on whether the (local) government will enact means to restrict access by private cars to the city center. Similarly, the volume of traffic on a toll road may depend on whether the government will develop an alternative fast rail service and at which (subsidized) rates; it depends also on whether or not the government will develop access roads to the toll road according to the planned timetable. The demand for water may depend on the price subsidy that may be determined ex post for socioeconomic or merely political considerations.

There still remain many risk elements that are endogenous to the private partner. Consider again the case of a toll road. The uncertain demand depends also on some hard-to-verify actions or efforts undertaken by the concessionaire-operator. The operator can encourage demand by investing in aggressive advertisement and marketing, by providing clean and comfortable rest areas along the road, by providing fast and good breakdown services, or by charging a toll below the maximum level allowable in the concession agreement (if demand is elastic). If the government guarantees the private partner a fixed revenue, as in the case of a *shadow toll* paid by the government on behalf of the motorists according to a prespecified traffic volume,<sup>19</sup> then the concessionaire-operator has no incentive whatsoever to boost traffic on the road. On the contrary, because a higher volume of traffic would probably inflict higher maintenance costs on the concessionaire-operator, it has an incentive to depress traffic. Therefore, some revenue-sharing arrangement, between the public and private partners, would seem to be efficient, as it would maintain an incentive for the concessionaire to take demand-enhancing measures. Typically, demand is set out as a benchmark. If actual demand falls short of this benchmark, then the public partner pays to the private partner a fraction  $\alpha$  of the deficit; if actual demand exceeds the benchmark, the private partner transfers to the public partner a fraction  $\beta$  of the surplus.<sup>20</sup>

In this context, it is important to distinguish between two alternative terms by which the demand guarantee is set out. One way is to set out the guarantee in terms of the quantity of demand; the other is in terms of revenue. The first seems to be more efficient, because revenue is the quantity multiplied by the price *actually collected*, and the private partner may be required to exert some effort to actually collect the proper price. Consider again the case of a toll road. Collecting tolls is not a costless or effortless activity. The collection of tolls may be relatively simple if there are manual toll booths at all entrances to and exits from the

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<sup>19</sup> A “shadow toll” is quite common under PFIs.

<sup>20</sup> The two fractions,  $\alpha$  and  $\beta$ , need not be equal to each other.

road. But this method certainly slows down traffic and may require very large spaces for installing manual toll booths, especially on heavily trafficked roads. For these reasons, the exclusive use of electronic means may be preferred by the public partner and imposed in the concession agreement. The collection of the tolls is no longer simple when the use of manual means at the road entrances and exits is strictly forbidden. In this case, a guarantee set in the form of a benchmark traffic volume rather than a benchmark revenue target seems to be a more efficient way of (endogenous) risk sharing, as it enhances the concessionaire's incentive to collect tolls.

An alternative specification of the revenue guarantee (putting aside the possible distinction between quantity and revenue guarantees) is to endogenize the terminal date of the concession. That is, the concession agreement can specify that the concession terminates at the date by which the *discounted* sum of revenue reaches a certain benchmark. Unlike the revenue-sharing alternative discussed above, the public partner has the advantage in this variable terminal date alternative of not having to make out-of-pocket payments to the private partners. Still, this alternative also provides some sort of revenue sharing between the two partners, as the private partner receives all the revenue only until the termination date of the concession (which is pushed earlier), and the public partner pockets all the revenue thereafter. However, it seems that the incentives for the private partner to enhance demand and revenue are weaker under the variable terminal date alternative. The gain that the private partner enjoys when it makes an effort to boost demand is only the saving in maintenance costs as a result of the consequent shortening of the concession period.<sup>21</sup> This gain seems meager relative to the gain under a direct revenue-sharing alternative (with  $\alpha$  in the order of magnitude of 0.7–0.8 and  $\beta$  in the order of magnitude of 0.5–0.6).

A further advantage of the revenue-sharing, fixed terminal date alternative over the variable terminal date alternative is that, under the former, the private partner bears much of the endogenous risk associated with the length of construction period. The fixed terminal date may be specified independently of the completion date of construction of the facility. For instance, the PPP agreement can specify that the concession period is thirty years from the beginning of the project. This period covers both the construction and the operation periods. Thus, the concessionaire has an incentive to shorten the construction period of the facility as much as possible, in order to extend the operation period in which it collects the revenue from the use of the facility. (Note that the public partner also benefits from a longer revenue-generating operation period under a revenue-sharing scheme and the public at large also benefits from a longer period of use of the facility.)

The idea of revenue sharing as a demand guarantee has also some practical advantages. The distinction between endogenous and exogenous risks may not be clear-cut in practice.

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<sup>21</sup> Note that the private partner does not gain anything from merely receiving the toll revenues earlier, because its benchmark revenues (for the determination of the concession terminal date) are defined in present value terms.



Furthermore, their direct implications for the cost and benefit of a PPP may also be hard to separate from each other and to evaluate. For instance, an observed decline in toll revenues from a highway may result if the public partner fails to construct access roads on time, fails to provide a high-quality service, or charges too high a toll (though within the limits set by the concession agreement), or if there is bad weather. It may be impractical to try to decompose the observed decline in revenue into its various causes. A prespecified formula for revenue sharing may thus provide a “reasonable” rule of thumb for risk sharing between the public and private partners.<sup>22</sup>

### VIII. TRANSFER OF THE FACILITY

Another widespread practice in PPPs is the transfer of the facility to the public partner at the end of the concession period. The most common form of a PPP with this feature is the build-operate-transfer (BOT) arrangement. The concessionaire is usually required to transfer the facility in good condition at the end of the concession period. The transfer element seems to be inevitable for no public partner would agree to have an unlimited concession (operation) period, but this element can be distortionary if not properly treated.

In the case of a toll road the length of the concession period and the tolls are typically determined with the aim of making toll revenue during the concession period cover the costs of construction, maintenance, and operation (all in present values). Abstracting from possible externalities, this policy may result in a toll set at a higher-than-efficient level. The users of the road end up paying to finance a facility (the road) which in effect they have not used because the facility is transferred to the government like new (“in good condition”), and proper maintenance costs are also financed by these users. Thus, the tolls cover more than all the economic costs of the PPP project.

Alternatively, the public partner could buy the facility (namely, the road) from the private partner at the “market” price. Because there are no markets for toll roads, the market price would probably be set at the cost of constructing a new facility of similar standards. The public partner can “resell” the facility to a new operator, and so on. Compared to this alternative (transferring the facility to the public partner at cost at the end of the concession period), the commonly used free transfer alternative can result in a significantly higher toll. Table 1 provides some illustrations of the “markup” between these two tolls.

One can think of the users of the facility under the transfer-at-cost alternative as taking a loan from the public partner (through the private concessionaire) in which they pay interest only throughout the concession period and then repay the whole principal at the end of the

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<sup>22</sup> Note nevertheless that revenue sharing or, more generally, risk sharing may induce the private sector to undertake projects that are too risky.

Table 1. The Toll Markup Due to the Free Transfer of the Facility  
(In percent)

Interest Rate (Percent)	Length of Concession Period (Years)				
	10	15	20	25	30
3	290.77	179.22	124.05	91.43	70.06
4	208.23	124.85	83.95	60.03	44.58
5	159.01	92.68	60.49	41.90	30.10
6	126.45	71.60	45.31	30.38	21.08
7	103.40	56.85	34.85	22.59	15.12

concession period. Under the free-transfer alternative, the users pay a fixed annual payment which covers both the interest and the principal, so that at the end of the concession period they owe nothing to the public partner.<sup>23</sup> We essentially have to compare the annual payment on a loan when the principal is repaid at the end and when the annual payment covers the principal too. This comparison depends on the length of the loan period and on the interest rate, as illustrated in Table 1. With an operation period of 20–25 years (which may be common under a concession period of 25–30 years with a construction period of about 5 years) and a *real* interest rate of 4–5 percent per annum, the toll under the free-transfer alternative is about 42–84 percent higher than under the transfer-at-cost alternative.

### IX. PIGOUVIAN TAXATION

The sizable markup of the toll discussed in the preceding section points to another deficiency of PPPs. A PPP project tends to be carried out in a “closed-budget” or “stand-alone” framework. That is, revenues from user charges (for instance, tolls on roads or airport “taxes”) are expected to cover more or less the costs of the facility (construction,

<sup>23</sup> This simplification abstracts from maintenance and operation costs.

maintenance, operation). However, recovering the costs cannot be the sole, or even the major, consideration behind the determination of the level of the user charge. For many, if not all, investments in infrastructure are for congested local public goods. That is, each user of the facility generates an external diseconomy on other users. The user charge must therefore play another crucial role in this setup, that is the role of a congestion toll as a Pigouvian, externality-corrective tax. As was pointed out by Oakland (1972), an efficient congestion toll rarely covers the costs of constructing, maintaining, and operating the facility.<sup>24</sup> This depends on the specific functional form of the congestion externality and the returns to scale in production.

Furthermore, major toll highways may be less congested than freeways. The users of a toll road may generate a positive externality, relative to the users of a freeway, in that they reduce the level of traffic congestion on the freeway. For instance, the Cross-Israel Highway (CIH), the only toll road in Israel which was constructed as an international PPP, is rarely congested. In contrast, the almost-parallel coastal freeway is often heavily congested. A more efficient allocation of traffic between the two roads can be achieved by lowering the toll on the CIH and introducing a toll on the freeway. Such a cross-subsidization cannot, of course, emerge when the PPP is a stand-alone enterprise. Therefore, PPPs may distort the efficiency of resource allocation.<sup>25</sup>

One can conceive of a different framework under which efficient tolls may be charged. For instance, a public national or a regional authority may be put in charge of construction, maintenance, and operation of all intercity highways in the nation or the region. This authority may impose tolls on all roads, if required. When deemed feasible and appropriate, this authority can initiate the construction of a new toll road under a PPP. It can use its revenues from other tolls in order to offer a certain grant or a toll subsidy in the specification of the bid for the PPP, so as to enable the concessionaire to charge an efficient toll even in circumstances under which the efficient toll is below the level that would be required in order to cover all costs of the project.

## **X. OFF-BUDGET INVESTMENTS AND RESOURCE ACCOUNTING**

It may be quite plausible that the whole idea of PPPs was “invented” out of a desire to circumvent regular budgetary procedures. In the words of Dewatripont and Legros (2005): “...it is clear that PPPs have been attractive for Governments trying to make their accounts ‘look good,’ thereby (ab)using public accounting rules that do not properly value State assets and liabilities.” Whether this claim is true or not, as we have seen above, properly designed PPPs entail many economic advantages. Nevertheless, in their embryonic stage, PPPs mostly

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<sup>24</sup> See also Oakland (1974).

<sup>25</sup> See also Valila (2005).

took mostly the form of PFIs which may provide little more than window dressing for conventional public investment.

PFI, as its name suggests, provides private financing for public investment. For instance, the government may contract with a private party to construct an office building to be occupied by the government. Instead of the government paying the private party a certain price on completion of construction and taking possession of the building, the government agrees to rent the building from the private partner at a predetermined monthly or annual payment for a predetermined period of time. At the end of this period, the building is transferred to the government at a predetermined price (often zero). Similarly, the government contracts, for instance, with a public party to construct a highway, but instead of paying directly for the construction of the highway, the government “rents” from the private party the services of the highway (on behalf of the motorist users) at a predetermined shadow toll for a predetermined period of time. At the end of this period, the highway is transferred to the government.

Put differently, a PFI bundles together the conventional provision of a public facility with its financing. Instead of first contracting with a private party to construct a facility (a highway, an office building), and then resorting to its tax revenues or borrowing in the domestic or international capital markets to secure the funds required to finance the construction of the facility, the government forces the provider of the facility to provide the financing. It is hardly conceivable that the private party has any comparative advantage over the government in raising funds in domestic, not to mention international, capital markets. But the government accounts certainly look nicer with a PFI than with a conventional (unbundling) arrangement, if the government is able to put in its budgetary accounts only the annual rent (or shadow toll) payment for the facility under a PFI rather than the entire amount of the investment required under a conventional contracting. With the restrictions put on the members of the European Union under the Stability and Growth Pact, PFI may certainly look attractive to many governments.

A similar “advantage” could be obtained with the method of “resource accounting” that has been adopted in the United Kingdom. The latter method postulates that the true annual economic cost of the use of an economic resource (say, an office building) is its annual rental price. Therefore, the cost of using a building must be evaluated annually by its rental price and recorded accordingly in each annual budget over the lifetime of the building rather than the entire purchase price being recorded in the budget for the year it was purchased.<sup>26</sup>

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<sup>26</sup> It is worth noting that the principles of resource accounting are essentially based on generally accepted accounting principles that prevail in the private sector according to which the cost of a fixed asset is not recorded as an expense in the year in which it is purchased but rather depreciated over the lifetime of the asset. In fact, resource accounting is an inherent feature of accounting on accrual (rather than cash) basis.

One should note, however, that the proponents of resource accounting often make a legitimate claim that it promotes the allocative efficiency of the government's use of economic resources. In the example of the office building, a sound case may be made that resource accounting will enhance an efficient use of office space by government as departments will be charged annually for the space that they occupy and will, therefore, internalize the annual cost of occupying an office. In contrast, when they are charged once for the entire purchase price of a building, they have no incentive to save on office space in subsequent years.

Further note that the seemingly advantageous feature of PFI (or resource accounting) in making government accounts look nice dissipates in the long-run steady state. That is, this advantage prevails only in the transition period from conventional to PFI contracting (or from the conventional cash-based accounting to resource accounting). To see this, suppose that the government makes every year an investment in a new public facility of \$1000. Suppose further (merely for computational ease) that the interest rate is zero. Under conventional contracting, the government records every year an outlay of \$1000. Now, suppose that in year 1 the government shifts fully to PFI contracting (or resource accounting). Assume also that each facility lasts intact (like new) for 10 years and then collapses. The annual competitive rent or "shadow rent" of each facility is, therefore, \$100. Then the government budget will show an outlay of \$100 in year 1, instead of \$1000 under conventional contracting. But in year 2, there will be an outlay of \$200 (consisting of a rent of \$100 for the facility built in year 1 and a rent of \$100 for the facility built in year 2), and so on. In year 10 there will be an outlay of US\$1000, exactly as under conventional contracting.<sup>27</sup> Thus, one may argue that in the longer run, possibly after a quite long transition period, PFIs entail only the *real* advantage of a more efficient resource allocation, with no meaningful bearing on how government accounts look. With resource accounting, this "look good" advantage dissipates even faster if the government acts quickly to estimate the "market values" of its existing capital assets and to charge its departments office rents based on these values.

Furthermore, PFIs may play a useful economic role in transition periods. Consider a situation in which infrastructure investment has been largely neglected over a relatively long period. This may give rise to the "infrastructure gap" between the existing stock of the infrastructure capital and some notion of a "growth-maximizing" stock of infrastructure capital.<sup>28</sup> Suppose further that the government decides to embark on a major plan to close this gap. A good case may be established on economic grounds as to whether the government should partially use

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<sup>27</sup> Assuming a positive rate of interest will not change our conclusion. A positive rate of interest will increase by roughly the same amount the rent paid under PFI arrangement and the interest payments on the loans taken by the government to finance the construction of the facilities under conventional contracting.

<sup>28</sup> For instance, Romp and de Haan (2005) and Kamps (2005) provide some analysis in support of the notion that some Central European countries lack "adequate" public capital. Similarly, the Bank of Israel, in its recent annual reports, estimates the "infrastructure gap" in Israel to amount to some 20 percent of GDP.

debt to finance the closing of the gap during this transition period, provided that the public debt is relatively low and increasing it will not harm the risk rating of the country. PFIs indeed facilitate the use of debt, as the latter is a built-in feature of them.

First, if the current generation has a finite time horizon, it may question the rationale from an intergenerational economic justice point of view as to why it should pay taxes at present in order to finance the closing of an infrastructure gap that has been accumulated by preceding generations. Furthermore, the benefits from closing the gap would probably accrue only to future generations. Therefore, from the perspective of economic justice among generations, one can make a case for extending the cost of the transitory increase in investment to future generations as well. That is, it may be appropriate for the government to partially resort to debt to finance the closing of the infrastructure gap.

Second, there are also economic efficiency grounds. Because the *marginal excess burden* of taxation is usually rising, one should attempt to smooth taxes over time in order to minimize the *total excess burden* of taxation.<sup>29</sup> Therefore, efficiency considerations would imply that the transitional acceleration of investment in infrastructure could be financed partly by debt rather than fully by current taxes. In this way, taxes are smoothed over time.

## XI. POLITICAL ECONOMY CONSIDERATIONS

A PPP, even its least advantageous form of a PFI, may have another advantage when political economy considerations are taken into account. True, PPPs may allow the government to shift public investment off budget (and out of the public eye). But one has always to bear in mind that in many political systems, especially with multiparty coalition governments, the alternative to spending money on PPPs may be spending money on other budget items, such as current government consumption or transfer payments. For instance, the treasury may put forth to a cabinet meeting its proposed budget for the coming year, concentrating first on some general guidelines such as certain caps on total expenditure, total revenue, and the overall budget deficit (or surplus). Explaining to cabinet members that these caps are essential to enhance economic growth and macro and financial stability, the treasury may be able to obtain unanimous cabinet approval of its proposed caps.

The real hurdle, however, comes later when allocating total expenditure. In a coalition government composed of many small parties and sometimes even without the prime minister's party enjoying a solid majority within the government, it is quite hard, if not impossible, to resist demands by cabinet ministers to allocate money to their constituencies.<sup>30</sup> Public investment tends to take a long time and the benefits can take much longer to show

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<sup>29</sup> See, for instance, Barro (1979) and Lucas and Stokey (1983). This is true even when parents are altruistic toward their children and the nonnegativity constraint on bequests is not binding.

<sup>30</sup> See Alesina and Perotti (1995) for a nice survey of the political processes of budgeting; they also explain how setting the agenda may affect the budget outcome. See also Alesina and Perotti (1996a and 1996b).

up; also, the benefits tend to be spread over very large populations.<sup>31</sup> Therefore, political parties may not be particularly interested in public investment. Thus, in the budget approval process, either at the government level or more often at the parliament level, public investment may well be cut in favor of other spending (such as defense<sup>32</sup> or social transfers to the elderly).

For this reason, there may be a preference to exclude certain public investment projects from the public budget and to propose lower caps on total expenditure and the budget deficit. It can then resort to PPPs to promote those projects that are fit for such partnerships. Furthermore, it may well be the case that, when a public facility is financed by the private sector, it is *politically* more feasible to impose a user charge, such as a highway toll. When a highway is financed by tax revenues, the users/taxpayers may feel that they have a “right” to use the highway freely, as it was built with their own tax money. Moreover, in many cases, there is a widespread belief among civil service professionals that PPPs are the only means by which large public investment projects can be carried out without compromising fiscal sustainability. Notwithstanding this belief, fiscal responsibility may be seriously hampered unless all government liabilities in connection with PPPs—implicit or explicit, direct or contingent, and at all layers of government—are properly evaluated and recorded.

## **XII. CASE STUDY: CROSS-ISRAEL HIGHWAY**

The Cross-Israel Highway (CIH) is the first PPP undertaken in Israel. It is of the BOT type. It was initiated in 1992, but it took several years to design of the bid, complete the selection process, and undertake the final negotiations, first, between the government (through a state-owned company, established solely for this purpose) and the winning consortium of contractors and, then, between the government, the winner, and the financing consortium. Therefore, actual construction started only at the beginning of 2000. In fact, the very nature of a PPP is that it is very large and involves a complexity of agreements concerning the bundling of the concession, construction, operation, and maintenance, and so concluding a final agreement is very costly in time and money. (The various agreements spread over thousands of pages.) This seems to be a major deficiency of PPPs.<sup>33</sup>

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<sup>31</sup> In many cases the only interest group associated with public investments is the association of builders and contractors. However, the construction industry is usually very competitive worldwide, and its lobby is not always sufficiently strong.

<sup>32</sup> The military establishment and the defense industries often compose a very powerful political lobby.

<sup>33</sup> Currently, there is another major PPP project in process in Israel: an underground metro system for the metropolitan area of Tel Aviv. It was started in about 2002. The deadline for the prequalification offers was postponed several times in order to allow potential bidders to organize in groups; no potential bidder wanted to undertake the whole project by itself. Actual construction is expected to begin only toward the end of this decade.

The CIH PPP covers only the central portion, about 90 kilometer long, of a highway planned to cross Israel from north to south. CIH is a four-lane toll highway. The cost of the initial construction and the toll-collection equipment (see below) amounted to about \$1,200 million. When traffic volume reaches a certain volume, the highway is to be expanded by the concessionaire by one lane on each side. The estimated cost of this expansion could reach as much as 25–30 percent of the initial investment. The tender was an international tender (published in English), and it was hoped that many foreign companies would bid. Despite some initial intense international interest, at the end of the day foreign companies did not seem eager to participate, and the winner was a consortium consisting of two Israeli companies and one relatively small foreign (Canadian) company. The tender took place in the second half of the last decade, after the Camp David Accords and before the eruption of the Second Palestinian Intifada, so that the political and security environment was relatively calm. Therefore, the major deterrent for foreign companies was not political or security concerns.

It appears that the major hurdle for foreign companies was collection of the toll. The tender required that no toll booths or any other obstacles could be established alongside or at the entrances to the highway and that no vehicle would be denied entry. Drivers were not required to prearrange any means of payment before entering the highway. The concessionaire would be expected to use electronic devices to photograph the license plate of a vehicle using the road, identify the owner of the vehicle through the registry of motor vehicles (access to which was granted to the concessionaire by a special law), and send a bill to the owner's address as listed at the registry of motor vehicles. The concessionaire was allowed to employ fairly stiff means to collect overdue bills, such as confiscating vehicles of owners with long-overdue bills whenever they used the highway again (the concessionaire is to monitor in real time all the vehicles on the highway).

The government offered no construction grant whatsoever; the highway was to be transferred to the government free of charge at the end of the concession period,<sup>34</sup> so that the tolls were the almost exclusive source of revenues for the concessionaire.<sup>35</sup> The tender specified a set of criteria according to which the winner would be selected, but the level of the toll was by far the dominant criterion. The offer with the lowest toll would be the winner. The method of collecting the toll that was required in the tender was indeed very novel and innovative. It was not tried before anywhere else, except in a city road in Canada which was operated by a public entity (and, therefore, would not be particularly concerned about revenue). It also required a sizable amount of investment in electronic equipment. Apparently, the collection of the tolls was deemed too risky for the foreign companies.<sup>36</sup>

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<sup>34</sup> See Section VIII for a discussion of the problems that may arise in this case.

<sup>35</sup> The concessionaire was also allowed to pocket some of the revenues from service stations and convenience stores located alongside the highway, but this was inconsequential.

<sup>36</sup> Actually, it is not completely clear why the government insisted on having no toll booths. One explanation, which has some credibility, is that toll booths require a lot of space. Indeed, toll plazas are quite spacious in the

(continued)



In line with the idea of insulating the private partner from exogenous risks, the government offered some demand guarantees. The government would not offer insurance for risks which are endogenous to the concessionaire. Therefore, the government offered less-than-full insurance, which applied only to the use of the highway rather than the revenue from the tolls. Specifically, if actual traffic volume falls in any year below a certain baseline estimate, the government will pay the concessionaire the tolls equivalent to 80 percent of the shortfall; if actual traffic volume exceeds this estimate, the concessionaire will pay to the government the tolls equivalent to 57 percent of the excess use. Note that the guarantee is defined in terms of traffic volume rather than revenue, so that the collection risk, deemed endogenous to the concessionaire, is fully borne by her. For instance, if actual traffic volume happens to exactly match the baseline scenario, then the government pays nothing, even if the concessionaire is unable to collect the tolls due on this traffic volume. In practice, the concessionaire has indeed internalized the collection risk. It offers substantial discounts for users who agreed to prearranged payments (by installing personal electronic transponders in their vehicles with charges made automatically to their credit cards or bank accounts). The majority of the frequent users did take advantage of these discounts. All in all, the collection rate is close to 100 percent.

The concession period was set for 30 years, including the construction period. Defining the concession period to include also the construction period transfers to the private partner the endogenous risk associated with the length of the construction period. This gives the concessionaire a clear incentive to complete construction as soon as practical.<sup>37</sup> Indeed, the construction of the CIH was completed ahead of schedule (in a little over four years instead of five years, as originally estimated by the government).

The government was in charge of constructing some major access roads to the CIH. In view of its demand guarantees, the government had to choose between two spending alternatives: either to spend the amount of money necessary to complete the construction of the access roads according to schedule, or spend money to pay the concessionaire for the shortfall in traffic volume on the CIH, caused by the delays in completing the construction of the access roads. The right choice was quite obvious. Nevertheless, the construction of the access roads was not completed on time, and traffic fell below the baseline estimate, though only slightly, in the first year of operation (2005).<sup>38</sup> (According to the statistical models built to forecast traffic volume, the latter would have not fallen below the baseline estimate in the first year of operation had the government completed the construction of the access roads on time).

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United States. The CIH passes through densely populated areas, and most of the land along its path had to be expropriated from private, primarily agricultural users. Expropriation of land in Israel is very emotional and often involves long court battles. Therefore, in order to minimize the size of the land to be expropriated, it was decided to avoid the establishment of land-consuming toll plazas.

<sup>37</sup> Recall that because the concessionaire is also the operator of the highway, it would not compromise on the quality of the highway in its attempt to speed up the completion of its construction; see Section VII.

<sup>38</sup> According to recent forecasts, traffic volume would meet the estimate in the second year of operation.

Another aspect of risk sharing relates to the inflation, foreign exchange, and interest rates. The risks associated with these are clearly macro risks, exogenous to the private partner. To a large extent, they are also exogenous to the government. The latter cannot bear or manage these risks more efficiently than the consumers. Therefore, the decision to transfer these risks to the users of the road seems quite reasonable. That is, the concessionaire was allowed to change the toll in response to changes in the inflation, foreign exchange, and interest rates. Part of the financing came through dollar-denominated loans,<sup>39</sup> and another part through loans denominated in New Israeli Shekels (NIS), linked to the CPI. Some of the loans were at variable interest rates and some at fixed interest.<sup>40</sup> The toll was, therefore, linked to a weighted index of the changes in the Israeli CPI, the dollar-NIS exchange rate, and the interest rate on the variable-interest loans.

The CIH was the first and major PPP in Israel. As such, it suffers from several growing pains. One cannot escape the thought that government bureaucrats, though having already internalized the notion that the private sector can often do things better or more efficiently than they can do, have yet to internalize how the private sector operates. As one Israeli businessman put it: “They have yet to internalize the fact that the private sector is a *for-profit* organization.” The prospect of making profits is vital for mobilizing the private sector. Nevertheless, the tender for the CPI contained several clauses aimed to prevent the concessionaire from making “excessive” profits. These clauses seriously hampered economic incentives and distorted the efficiency of resource allocation.

We shall briefly discuss two of these clauses. First, the winning consortium established a special-purpose company (the concessionaire) to carry out the project of the CIH. The tender required the consortium to give the government a put option at terms that essentially amounted to transferring to the government almost one-half of the profits of this company! (This is in addition to paying the government 57 percent of the excess of the toll revenues over the baseline estimate.) Not only does such a provision depress the incentives for the concessionaire to invest (unremunerated and unverifiable) in order to increase profits, but it also induces the bidders in the tender to offer a higher toll. With higher profit prospects, the bidder could have settled for a smaller toll.

Second, the tender stipulates that the toll be reduced in the event that actual traffic exceeds the baseline estimate, even though the government receives 57 percent of the revenue from the excess traffic. (It seems that government officials could not live with the idea that the private partner would take 43 percent of the excess revenue.) Note, however, that efficiency of resource allocation would call for exactly the opposite! As explained in Section IX, the toll, serving as a Pigouvian corrective tax, should be efficiently set at the level of the

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<sup>39</sup> Some of these loans, though dollar-denominated, were extended by Israeli lenders (mostly, financial institutions).

<sup>40</sup> There is no advantage to taking fixed-interest rather than variable-interest loans, due to arbitrage possibilities.

marginal congestion. As marginal congestion is usually presumed to rise with the volume of traffic, efficiency considerations would call for raising the toll when the volume of traffic is excessive.

### **XIII. CONCLUSION**

PPPs are becoming nowadays a major vehicle for investment in public infrastructure and other facilities that provide public services. They cover transportation infrastructures, such as roads, bridges, tunnels, rail, air, and sea ports; water and sewage infrastructures; electricity and gas infrastructure; prisons; hospitals; government office buildings; and others.

It may well be the case that PPPs were initiated as a means of evading expenditure controls and hiding budget deficits. They enable a government to spread a certain amount of an investment over many future budget years rather than to report the whole amount of the investment in the year it was carried out, thereby converting a present budget deficit into future budget deficits. But there is nothing inherent in PPPs that leads inevitably to fiscal laxity and imprudence. Needless to say, there is a wide consensus among economists that these sins could and should be corrected: all government liabilities, whether direct or contingent, or whether explicit or implicit, have to be properly evaluated and accounted for.

This paper takes a public economics look at PPPs. They can serve as a safeguard, albeit imperfect, against the construction of “white elephants.” They also can play an important role in enhancing the efficiency of resource allocation. When properly designed, in particular with respect to sharing risks between the public and private partners, PPPs can improve the quality of services previously provided by the public sector, without raising their costs to society as a whole. Their major drawback is their complexity, which renders PPP transactions costly in terms of both money and time and makes them impractical for small undertakings.

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