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# *Office of Inspector General*

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## **FINANCIAL ANALYSIS OF TRANSPORTATION-RELATED PUBLIC PRIVATE PARTNERSHIPS**

*Federal Highway Administration*

*Report Number: CR-2011-147*

*Date Issued: July 28, 2011*





# Memorandum

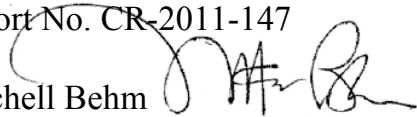
**U.S. Department of  
Transportation**

Office of the Secretary  
of Transportation  
Office of Inspector General

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Subject: **INFORMATION:** Financial Analysis of  
Transportation-Related Public Private Partnerships  
Federal Highway Administration  
Report No. CR-2011-147

Date: July 28, 2011

From: Mitchell Behm   
Assistant Inspector General for Rail, Maritime and  
Economic Analysis

Reply to  
Attn. of: JA-50

To: Federal Highway Administrator

Between 2004 and 2006, two toll roads built in the 1950's—a 157-mile road in Indiana and a shorter road in Illinois known as the Chicago Skyway—were leased to Cintra/Macquaire, a private consortium. These leases were established through unique financing mechanisms known as Public Private Partnerships (PPPs). Under these agreements, Cintra/Macquaire made multibillion dollar payments to the State of Indiana and the City of Chicago, and obtained control of the Indiana Toll Road and the Chicago Skyway for 75 and 99 years, respectively.

In general, PPPs create contractual arrangements between public agencies and private companies, and lead to greater private-sector participation in the financing and delivery of public projects than traditional public financing arrangements. These arrangements have spurred debate among stakeholders. Some question whether PPPs serve the public interest, while others point to PPPs as a means to address the nation's infrastructure funding problems. In February 2009, the National Surface Transportation Infrastructure Financing Commission reported that the nation's surface transportation system is in “physical and financial crisis” due to shortfalls in Government infrastructure spending, and estimated that the annual average shortfall, or funding gap, from 2008-2035 would be approximately \$138 billion.<sup>1</sup>

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<sup>1</sup> This represents the total funding necessary to both maintain and improve the highway and transit systems, expressed in 2008 dollars, under the Commission's baseline revenue forecast.

This report presents the results of our financial analyses of transportation-related PPPs. Our objectives were to: (1) identify financial disadvantages to the public sector of PPP transactions compared to more traditional public financing methods; (2) identify factors that allow the public sector to derive financial value from PPP transactions; and (3) assess the extent to which PPPs can close the infrastructure funding gap.

To conduct our analyses, we worked with a team of contractors led by Charles River Associates International and financial consultants, Scott Balice Strategies. We based our analyses on representative examples of projects that illustrate features of typical transportation infrastructure projects. We patterned these examples after, but did not exactly replicate, seven proposed or implemented PPP highway projects—six in the United States and one in Europe. We compared the cost of financing our example projects through PPPs and traditional financing. We conducted our analysis from the perspective of a state or local government decision maker selecting a financing alternative. However, our analyses did not consider the impacts of factors such as risk sharing arrangements or the ability of the private sector to deliver a project more expeditiously, which can be significant, and are necessary to arrive at an effective financing decision. We also developed a flowchart of our analysis for decision makers to consider in choosing between PPP financing and traditional financing. Exhibit A describes our scope and methodology in more detail.

## **RESULTS IN BRIEF**

PPPs have several financial disadvantages when compared to traditional public sector financing. Specifically, PPPs have a higher cost of capital than traditional public financing, and they incur certain tax obligations that do not exist for public entities. PPPs experience higher costs of capital because interest on PPP debt is taxable while interest on municipal bonds, used by public agencies to pay for infrastructure projects, is tax exempt. Consequently, bond purchasers will accept lower returns on municipal debt in exchange for the advantages they gain from the tax exemptions. PPPs also face higher costs of capital because, unlike public financing, they involve equity investors who own stakes in the projects, share in the profits, and expect to earn higher rates of return for the risk they undertake. The private sector also must pay Federal, state and local taxes on certain assets and net revenues that the public sector generally does not. Our analysis found that the impact of these taxes on the relative value of a PPP can be as significant as the higher cost of capital.

Certain private sector efficiencies can meaningfully offset PPPs' cost disadvantages. Principal among these efficiencies are those which lower new

facility<sup>2</sup> design and construction costs, and efficiencies in revenue generation such as toll rate increases, decreases in toll evasions, and more profitable rest stop concessions. Innovative financing mechanisms may also improve PPPs' financial attractiveness. Two Federal programs provide access to these mechanisms—a program established under the Transportation Infrastructure Finance and Innovation Act (TIFIA), and the Department of Transportation's (DOT) Private Activity Bonds (PABs). The TIFIA program offers secured direct loans, loan guarantees and lines of credit. PABs are tax-exempt bonds issued by public entities to provide low-cost financing for private projects that serve a public purpose. Both programs can significantly lower PPPs' costs of capital, making them more competitive with traditional financing. In contrast, another means for improving the attractiveness of PPPs—efficiency in operations and maintenance (O&M) activities—generally does not produce savings of sufficient magnitude to overcome PPPs' cost disadvantages. Overall, the difference in the relative values that PPP financing and conventional public financing can provide must be determined on a project-by-project basis after careful consideration of all factors.

We found that PPPs are not likely to significantly decrease the infrastructure funding gap because private sector investment in transportation through PPPs generally does not entail new or incremental funds. Rather, the funds paid upfront to the public sector under a PPP are paid in exchange for future revenues, often in the form of tolls. In other words, a PPP primarily changes the timing with which funds become available, not the amount of the funds. A PPP only provides additional funds to the extent that the private sector is willing to pay more for a project—a roadway, for example—than the public sector expects to earn from the project over time. According to our analysis, only two of the seven example PPP projects we examined would provide incremental funds directly. Our analysis also showed how another project could provide incremental funds through the use of innovative financing mechanisms.

## **BACKGROUND**

PPPs establish contractual arrangements between a public agency and a private entity. However, each agreement may assign responsibility and allocate risk differently. A PPP may assign the private sector responsibility for the design and construction of a highway link or only require the private sector to operate and maintain the link. Risks that may require allocation include potential construction cost overruns and insufficient toll receipts to pay for operations and maintenance (O&M). Contracts under which the private sector assumes responsibility for both the design and construction of a transportation facility,

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<sup>2</sup> In this report, the term “facility” refers to all types of transportation infrastructure (e.g. a bridge or road).

often along with the risk of associated cost overruns, have become fairly common in the U.S. Apart from these contracts, at least 30 surface transportation PPPs have been negotiated in the U.S. in the last decade.

States and localities currently fund over 55 percent of the investments in surface transportation infrastructure, either by constructing facilities on their own or by providing matching shares for Federal investments. Under traditional financing methods, state and local governments typically fund transportation investments with municipal bonds, which are repaid through tolls and state taxes. The Federal shares of highway and transit investments are paid out of the Highway Trust Fund, which is supported primarily by Federal fuel and related excise taxes. Large surface transportation facilities are frequently financed, built, maintained, and operated by facility-specific public entities, such as turnpike authorities, which have access to municipal bond markets and collect tolls.

Our analyses compared PPPs to traditional financing and operating methods by performing financial valuations of representative projects under alternative scenarios. Specifically, we compared the value of each project when implemented with a PPP to its value when implemented through a public, facility-specific agency. Our vantage point during these calculations was that of a state or local government seeking to determine which financing option to use. While our general approach could be applied to a variety of transportation projects, we focused on highway infrastructure projects. We performed our analyses on example projects that illustrate different aspects of actual highway infrastructure projects, such as contract length and patterns of revenues and costs. The examples include both greenfield projects, which involve the construction of new facilities, and brownfield projects, which involve existing facilities. All examples resemble implemented or proposed PPP highway projects, but do not replicate them exactly. We did not analyze specific detailed proposals, or render judgment on them. Our example projects are as follows:

1. A 40-year greenfield toll road project modeled after a proposed two billion dollar toll road of about 30 miles in length near Austin, Texas;
2. A 50-year brownfield toll road project of about 550 miles in length, patterned after the Pennsylvania Turnpike;
3. A 90-year brownfield toll road project under 10 miles in length, patterned after the Chicago Skyway;
4. A 75-year brownfield toll road project, involving 157 miles of roadway and patterned after the Indiana Toll Road;

5. A 25-year brownfield toll road project involving a 1,370-mile network of highways in eastern France, modeled after the French highway known as the Autoroutes Paris Rhin-Rhone;
6. A 50-year greenfield project involving multiple segments, and patterned after a proposed toll road in the Houston area; and
7. An 80-year greenfield highway expansion project, patterned after Virginia's I-495 Capital Beltway and involving the addition of variably priced HOT lanes.

## **PPPs HAVE INHERENT COST DISADVANTAGES**

PPP financing faces higher costs than traditional public financing primarily for two reasons. First, PPPs pay higher costs for capital which results, in part, from the differential tax treatment of PPP and public debt. PPPs also typically incorporate equity financing, and equity investors generally require higher rates of return than are paid to debt holders. Second, the private sector must pay Federal, state and local taxes from which the public sector is typically exempt.

### **PPPs Pay Higher Costs for Capital**

PPP financing has a higher cost of capital than traditional public financing because interest on the debt that a PPP issues is taxable. Conversely, interest payments on municipal bonds that public sector entities use to finance projects are exempt from Federal taxation and sometimes from state taxation. Bond purchasers accept lower returns on municipal debt than on private bonds because of the tax exemptions. PPP financing also has a higher cost of capital because PPPs typically incorporate equity financing in which investors own stakes in the projects and share in the profits. Investors generally expect to earn higher rates of return on equity investments than on debt investments. Consequently, the larger the equity component in a PPP's financing structure, the higher the cost of capital compared to public financing. For example, for the 50-year brownfield project in Project Example 2, we calculated the cost of capital of PPP financing to be 7.16 percent and 6.29 percent for public sector financing.<sup>3</sup>

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<sup>3</sup> We incorporated multiple factors in our derivations of these estimates. For PPP options, these factors included shares of debt and equity, debt structure, and likely ratings of project bonds. For public sector options, they included availability of junior versus senior debt, presence or cost of bond insurance, and yield on municipal bonds.

The disadvantage of the cost of capital in PPP financing has a greater impact on greenfield projects than on brownfield projects, primarily because of the greenfield projects' more uncertain revenue streams. This uncertainty leads equity investors to demand even higher rates of return. For example, using similar market transactions as a guide, we imposed a 16.0 percent cost of equity on the 40-year greenfield project in Project Example 1. This cost was much higher than the 12.5 percent cost of equity we assumed for the 50-year brownfield project in Project Example 2. With the same financing structure, this difference resulted in a cost of capital of 8.21 percent for the greenfield project compared to 7.16 percent for the brownfield project.

The valuations of greenfield projects are also more sensitive to the cost of capital than those of brownfield projects.<sup>4</sup> A greenfield project's construction costs occur early on, and consequently are discounted relatively little. The revenue stream, on the other hand, is comparatively small in any given year and stretches out over the life of the project, so its present value is significantly affected by discounting. Increases in the cost of capital translate into increases in the discount rate. Increases in the discount rate reduce the present value of a greenfield project's revenue stream much more than the present value of the project's construction costs. By comparison, a brownfield project's costs, primarily O&M expenditures, are spread out over time, so discounting reduces them in a manner similar to revenues.

The impact of a PPP's cost of capital on its valuation also increases with the length of the project contract. The farther in the future that revenues and costs occur, the more discounting affects their present values. Because of the difference in discount rates, future net revenues are discounted more heavily for PPPs than for public sector financing. As a result, long-term PPP projects face larger disadvantages than short-term PPP projects in providing the value when compared to the value available through traditional public sector financing.

### **The Private Sector Pays Taxes That the Public Sector Does Not**

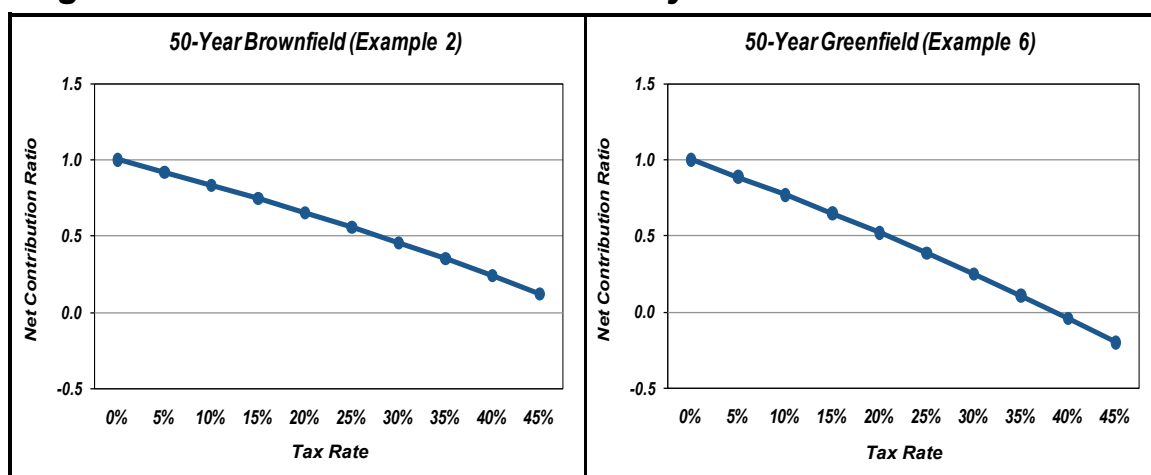
The Federal, state and local taxes on certain assets and net revenues that the private sector must pay constitute another cost disadvantage for PPP financing compared to traditional financing. The public sector is typically exempt from such taxes. In Figure 1 on the next page, we illustrate the impact of different tax rates on the values of two PPP projects compared to the values of their publically-

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<sup>4</sup> To see this difference in sensitivity, it is necessary to understand the basis of project valuation. Valuations of multi-year projects are quoted in terms of "present values"—their lump-sum worth today—in order to make them comparable. In financial analyses, the determination of today's value of a revenue or expense occurring in the future is accomplished by discounting the revenue or expense at a rate equal to the cost of capital. Since interest, or the cost of capital, compounds over time, revenues and expenses are discounted more heavily the further in the future they occur. See the Scope and Methodology section for further discussion of present value.

financed alternatives. To do this comparison, we use a measure called the net contribution ratio. We calculate this ratio by dividing each PPP's value by the value that we would obtain using the public sector financing alternative. A net contribution ratio greater than one for a PPP means that the PPP yields greater value than the public sector option, whereas a net contribution ratio of less than one indicates that the PPP yields less value than the public sector option. Figure 1 shows that the PPP projects' net contribution ratios, and consequently their relative values, decline rapidly as tax rates increase.

**Figure 1. Private Tax Rate Sensitivity**

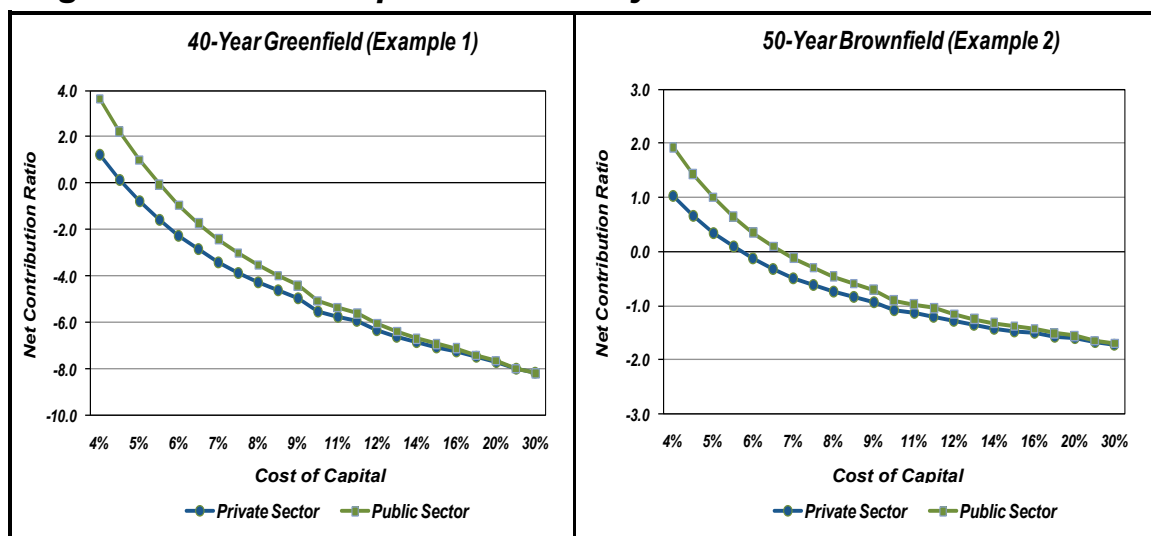


Source: OIG analysis

The PPP tax disadvantage is greater at lower costs of capital. Taxes constitute a stream of expenses incurred only by the private sector. When these future costs are discounted less heavily, they contribute more substantially to the difference between the present values of the PPP and public sector alternatives. Figure 2 on the next page illustrates this effect using net contribution ratios in which the denominator is the value of a public sector alternative with a fixed cost of capital (the public sector base case). In this instance, we also calculate the net contribution ratios for public sector options with different costs of capital. As the cost of capital falls, the valuations of both the PPP and the public sector option increase relative to the public sector base case. However, the PPPs' net contribution ratios rise more slowly than those of the public sector options. This slower rise is caused by an increase in the impact of the tax streams on the PPP project's valuations, an increase that results from the decline in the discount rate. This effect visibly expands the wedge between the relative valuations of each project undertaken with the different financing methods.



**Figure 2. Cost of Capital Sensitivity**



Source: OIG analysis

Note: Figure 2 assumes a 5% base cost of capital and residual cost of capital for the public sector base case, and a 35% total tax rate on private sector taxable income.

## EFFICIENCIES AND INNOVATIVE FINANCING PROGRAMS CAN OVERCOME PPPs' DISADVANTAGES, BUT NEITHER PPP NOR TRADITIONAL FINANCING IS ALWAYS PREFERABLE

Efficiencies in the construction of greenfield projects can overcome PPPs' cost disadvantages, as can efficiencies in revenue generation. Innovative financing programs—in particular, the options available under TIFIA and PABs—can also offset PPPs' cost disadvantages by providing them with less costly and more flexible sources of capital. However, generalizations about which approach—a PPP or traditional financing—is more advantageous to the public sector cannot be made as each project has its own unique characteristics. We developed a flowchart of our analysis that could guide a decision maker in his or her financing choice.

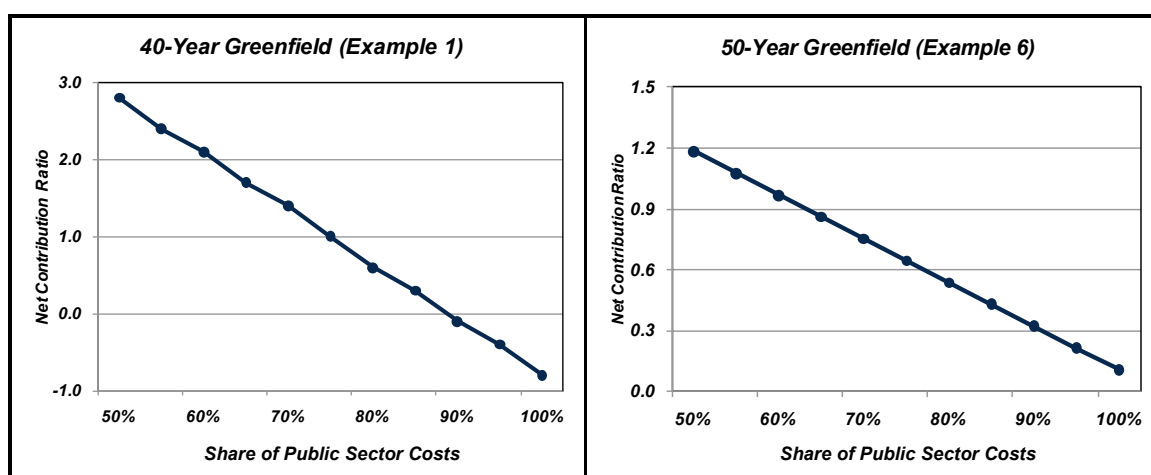
### Cost Efficiencies in New Construction Projects Can Offset PPPs' Cost Disadvantages

Private-sector efficiencies in new construction can sufficiently increase the valuation of a project undertaken with a PPP to make the PPP financing preferable. PPPs could be particularly preferable for greenfield projects due to the magnitude of new construction costs and the fact that these costs occur during the greenfield project's early years.<sup>5</sup> Figure 3 on the next page illustrates these

<sup>5</sup> The costs' occurrence in early project years means they are not significantly discounted.

effects.<sup>6</sup> For each project shown, Figure 3 maps the changes in the net contribution ratio of the PPP alternative against the percentage of the public sector alternative's construction costs incurred by the PPP. The greater the construction cost efficiencies associated with the PPP, the smaller the percentage of the public sector alternative's construction costs it incurs, and the higher the PPP's net contribution ratio. The 40-year greenfield project of Project Example 1 is shown to achieve a net contribution ratio of one—which means it provides the same value as the public sector alternative—when its construction costs are 75 percent of the public sector alternative's construction costs.

**Figure 3. Sensitivity of PPP Valuation to Construction Cost Efficiencies**



Source: OIG analysis

Interestingly, private sector operating cost efficiencies, even when large as a share of total O&M, are not major value drivers for PPP projects because heavy maintenance<sup>7</sup> and O&M costs are small relative to total project costs and revenues, and occur over time rather than in the early years. Consequently, O&M cost efficiencies have little effect on bottom line net contributions, as illustrated by the analyses of two brownfield PPPs shown in Figure 4 on the next page.<sup>8</sup> The net contribution ratios change very little as operating cost efficiencies increase and, in any case, fail to achieve a value of one over the range of efficiencies examined. Even the reduction of heavy maintenance or O&M costs to half their levels in the

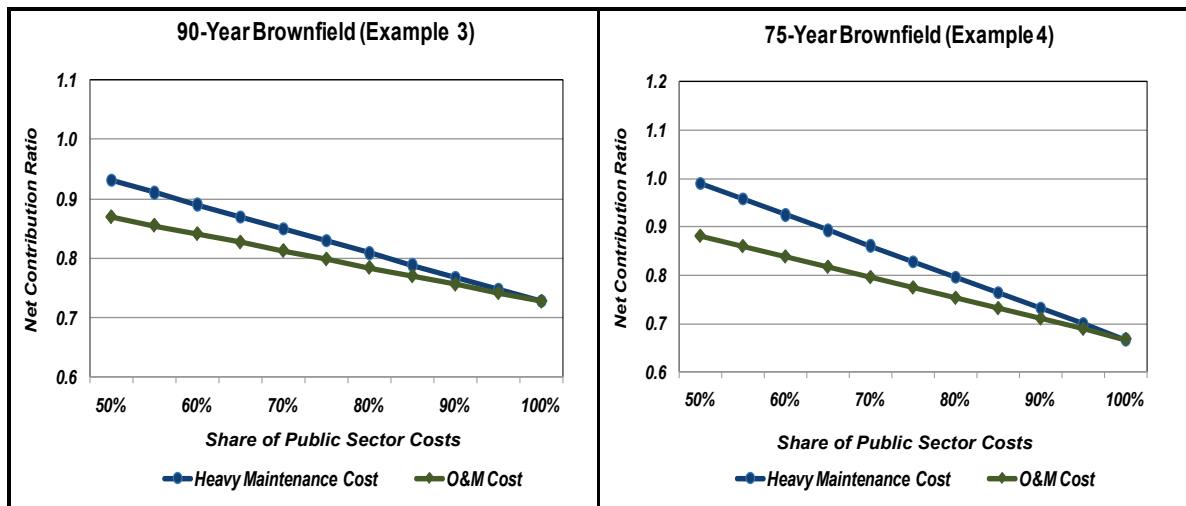
<sup>6</sup> The difference between the public sector alternative and the PPP alternatives in this Figure results from the assumption that the PPPs face a total tax rate of 35 percent. The cost of capital is assumed not to differ between the public and private alternatives.

<sup>7</sup> Heavy maintenance costs are costs that are typically not part of routine maintenance costs, such as the costs of resurfacing a road.

<sup>8</sup> The difference between the public sector alternative and the PPP alternatives in this Figure results from the assumption that the PPPs face a total tax rate of 35 percent. The cost of capital is assumed not to differ between the public and private alternatives.

public sector alternative is insufficient to raise PPP valuations to equal the value of the public sector alternative.

**Figure 4. Sensitivity of PPP Valuation to Heavy Maintenance and O&M Efficiencies**



Source: OIG analysis

## Efficiency in Revenue Generation Can Overcome PPPs' Cost Disadvantages

Efficiency in revenue generation, an important driver of the valuations of both brownfield and greenfield projects, can make PPP financing preferable to traditional financing. Efficient revenue generation may result from reductions in toll collection leakage,<sup>9</sup> toll rate increases,<sup>10</sup> or increased revenues from other sources, such as rest area concessions.

Based on interviews with analysts familiar with PPP transactions and a review of recent PPP transactions, we assumed that private sector operators could generate 25 percent more in annual gross revenues than public sector operators under similar circumstances. Under this assumption, our comparison of PPP financing to traditional financing for Project Example 1, a 40-year greenfield project, showed the PPP alternative to be preferable, and that its significant increase in the project's gross revenues helped to overcome the public sector's financing cost advantage. The private sector's ability to generate substantially greater toll revenues also contributed to PPP financing being the preferable alternative for the 50-year brownfield project in Project Example 2.

<sup>9</sup> Collection leakage occurs when toll road users evade toll fees.

<sup>10</sup> Transportation PPP projects in the U.S. are relatively new and the ability of the private sector entity to maintain a steady increase in toll rates over an extended period remains untested.

## **Innovative Financing Can Also Reduce PPPs' Cost Disadvantages**

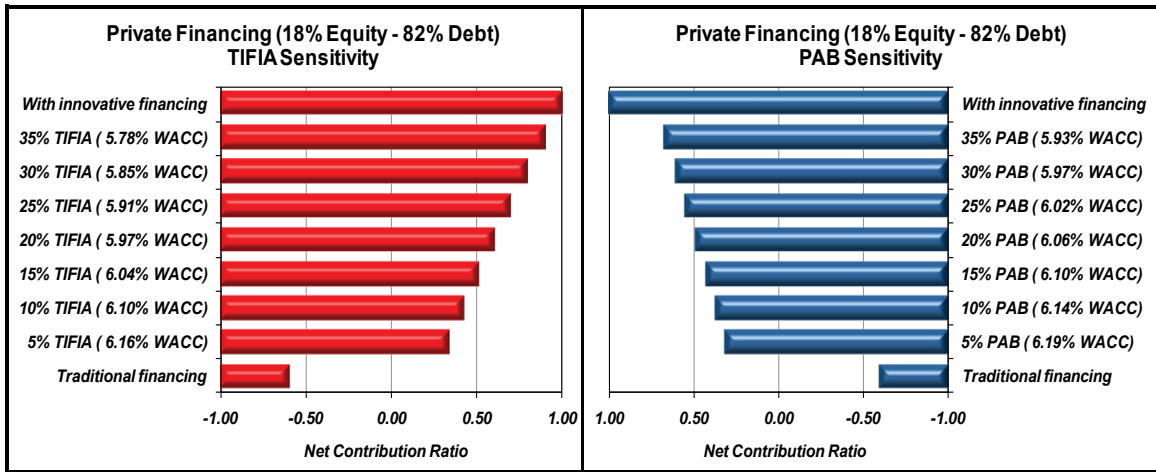
Innovative financing programs, which have been developed to fill market gaps and reduce the costs of capital associated with private investment in transportation projects, can reduce PPPs' cost disadvantages. The programs provide private sector entities with tools to raise additional funds and increase the flexibility with which they can use these funds. Possibilities for innovative financing exist under two Federal programs—the options available under TIFIA, and PABs, which are tax-exempt bonds that public entities issue to provide low-cost financing for private projects that serve public purposes.

TIFIA offers a number of different financing options that can help the private sector reduce its cost of capital, including secured direct loans, loan guarantees, and lines of credit. A line of credit, unlike a direct loan, allows its holder to borrow funds as needs arise. A loan guarantee secures a promise from a third party that the party will assume a debt obligation if the borrower defaults. These guarantees reduce investors' risks and, consequently, the interest rates they require. However, TIFIA credit assistance is limited to 33 percent of project costs. To increase private sector investment in U.S. infrastructure, the PAB program provides access for private developers and operators to financial products that offer the same tax advantages as municipal bonds, which ultimately reduce the private entities' costs of capital.

These innovative financing mechanisms can significantly improve a project's net earnings through their access to capital on more favorable terms. For example, in the 80-year greenfield project in Project Example 7, which incorporated the use of innovative finance techniques, the PPP's cost of capital fell to 6.28 percent compared to 7.61 percent without innovative financing. In this instance, the PPP financing alternative's capital structure included 25 percent TIFIA loans, 25 percent PABs, 25 percent long-term corporate debt, and 25 percent equity. In comparison, the public sector alternative without innovative financing had a cost of capital of 6.29 percent.

Figure 5 on the next page illustrates the potential impact of innovative financing on the net contribution ratio of PPP financing compared to traditional private financing for Project Example 7. The two charts show that progressive increases of either TIFIA or PAB financing as part of overall project financing can significantly increase the net contribution ratio. Moreover, as shown in Figure 6, also on the next page, use of TIFIA financing and PABs together increases the asset's valuation even more.

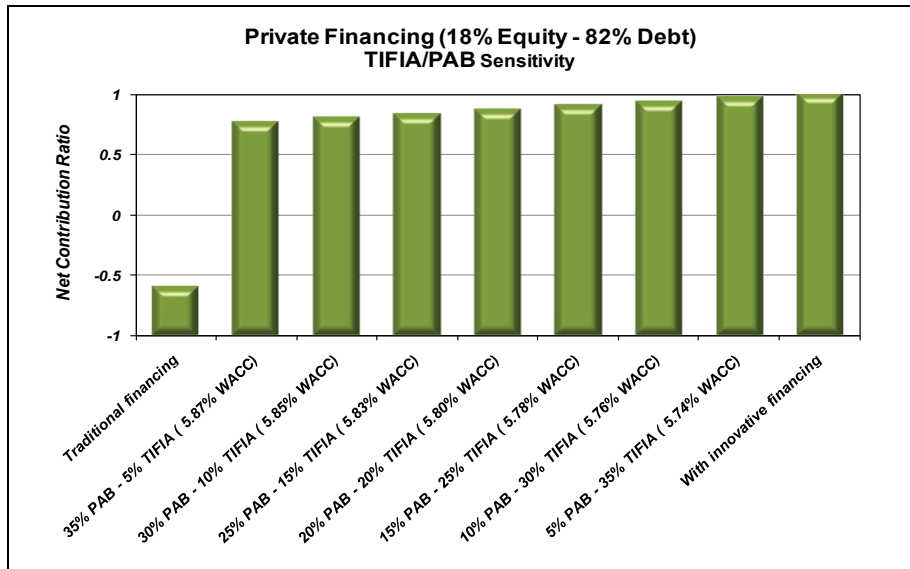
**Figure 5. TIFIA/PAB Sensitivity: 80-Year Greenfield (Example7)**



Source: OIG analysis

Note: Base case debt composition: TIFIA-37%; PAB-37%; senior debt-26%. In other words, we use the full innovative finance option as our base to illustrate the effects of decreasing amounts of innovative finance. We recognize that TIFIA financing cannot exceed 33% of project costs and it does not in our analysis. 37% TIFIA in our base case means 37% of the 82% of total financing comprised of debt, resulting in 30% TIFIA assistance in terms of total project financing costs (i.e. 37% of 82%).

**Figure 6. Combined TIFIA/PAB Sensitivity: 80-Year Greenfield (Example 7)**



Source: OIG analysis

Note: Base case same as in Figure 5

## Whether PPP or Traditional Public Sector Financing is Preferable Depends on Project Specifics

Generalizations about which financing approach is more advantageous to the public sector cannot be made because project specifics determine which approach is preferable.<sup>11</sup> The impact of input variables on net contribution ratios for PPP transactions in our examples illustrates this point. Figure 7 on the following pages shows the results of sensitivity analyses with respect to key input variables: concession term; toll revenues; construction cost efficiency; O&M efficiency; and, cost of capital.<sup>12</sup> We varied each factor and then measured the effect on the net contribution ratio. Large changes in the magnitude of the Figure's bars indicate large effects from changes in the input variables' values.

Figure 7 also illustrates the following points about PPPs and traditional financing:

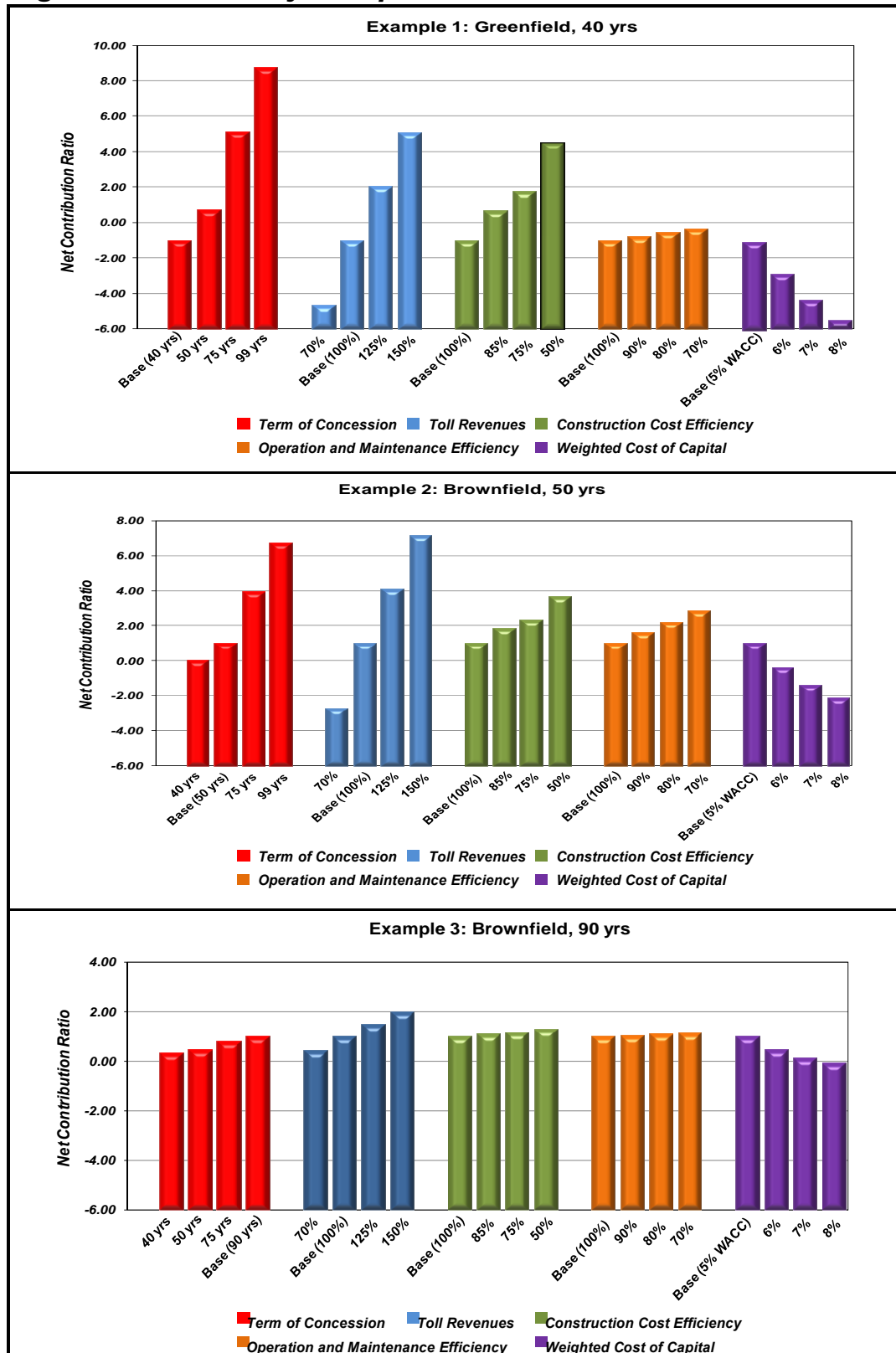
- Each set of variables and each variable's impact magnitudes differ according to project;
- Private sector efficiencies with respect to facility O&M costs are not important value drivers, and, except in Project Example 2, construction cost efficiencies are not primary value drivers for brownfield projects;
- Toll revenues and concession terms are important value drivers for both greenfield and brownfield projects, but concession terms are significantly less important for brownfield projects;
- Cost of capital is a primary value driver in all our examples, except Project Example 5, in which the short contract term reduces its impact, and is especially important in greenfield projects.
- Brownfield projects are less sensitive to changes in variables than greenfield projects, substantiating the fact that greenfield projects contain greater operational, capital and financial risks.

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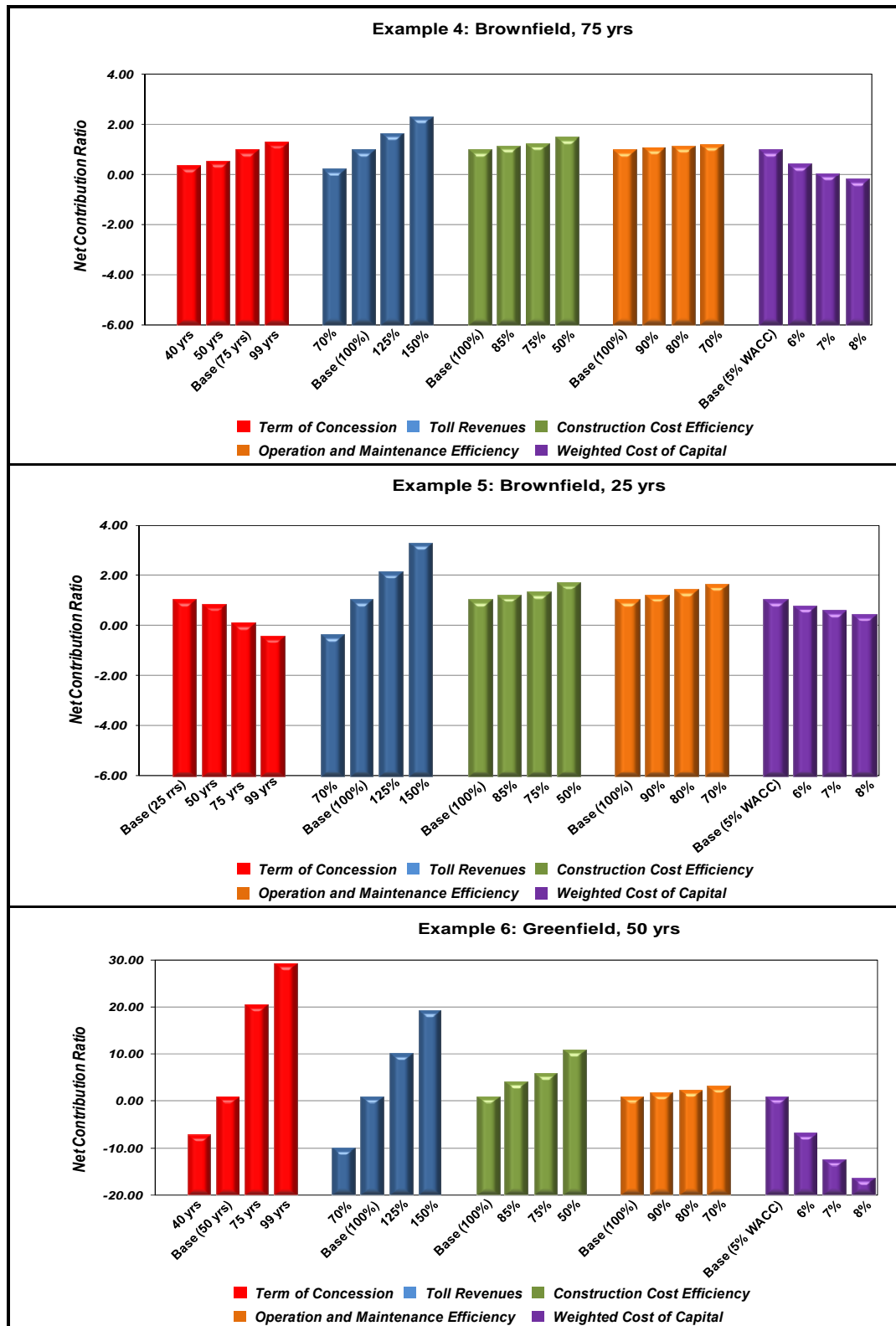
<sup>11</sup> The National Surface Transportation Infrastructure Financing Commission came to a similar conclusion: “[T]here is no overarching guide to the appropriateness of private sector financial participation. Each project’s specific circumstance will determine the suitability of private sector involvement.” *Paying Our Way: A New Framework for Transportation Finance*, Report of the National Surface Transportation Infrastructure Financing Commission, Washington, D.C., February 26, 2009, p. 177.

<sup>12</sup> The differences between the public sector base cases and the PPP alternatives in this figure results from the assumption that the PPPs face a total tax rate of 35 percent. The cost of capital is assumed to not differ.

**Figure 7. Sensitivity of Input Variables**



**Figure 7. Sensitivity of Input Variables (cont.)**



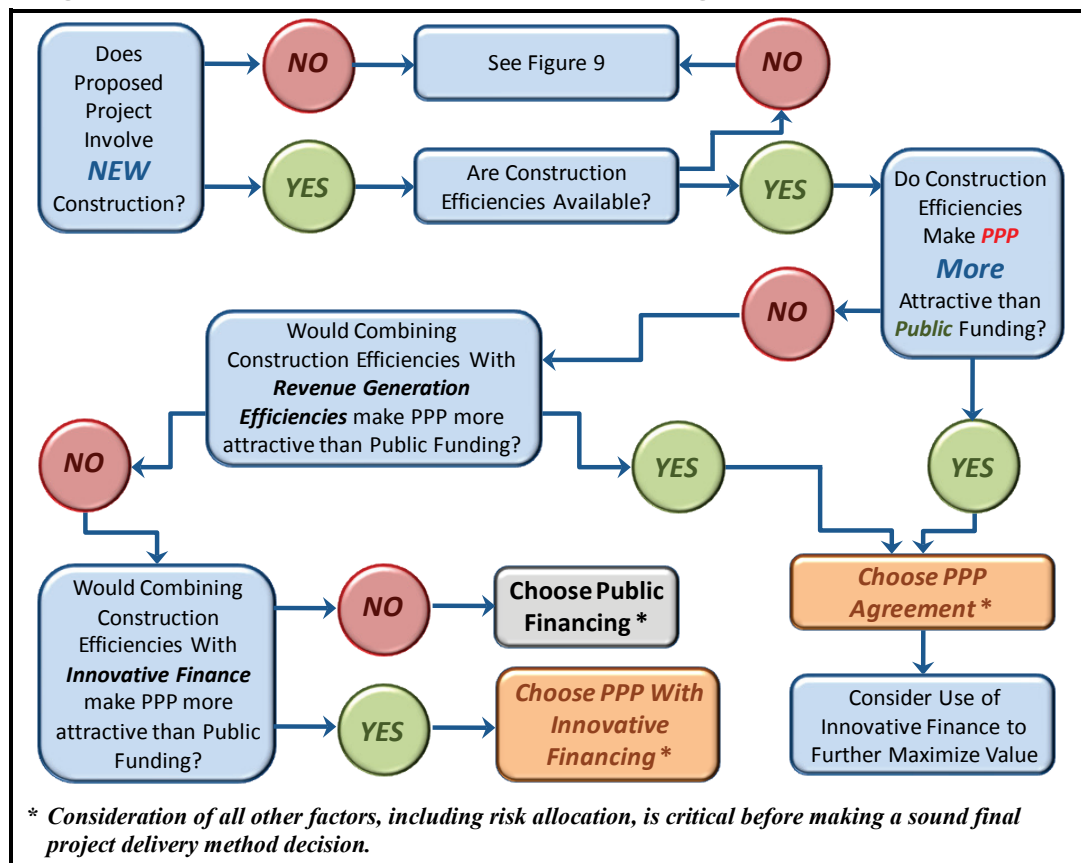
Source: OIG analysis



## Decision Makers Can Use Our Analysis to Assist in Their Selections of Financing Methods

The determination of which financing method, a PPP or traditional financing, best meets a project's needs can be translated into a flowchart, which we developed for decision makers, as depicted in Figures 8 and 9. The first point of comparison, shown in Figure 8, concerns whether or not a project involves new construction. If so, the decision maker must determine whether or not a PPP will provide construction efficiencies. If construction efficiencies exist, then the question becomes whether or not they are large enough to make the PPP more attractive than the public alternative. If they are of sufficient scale, then the PPP is the preferable solution. However, if they are not large enough to overcome the inherent advantages of the traditional option, then the PPP's construction efficiencies and any efficiencies in revenue generation should be considered, since the combined efficiencies may make the PPP the better choice.

**Figure 8. PPP vs. Traditional Financing: New Construction**

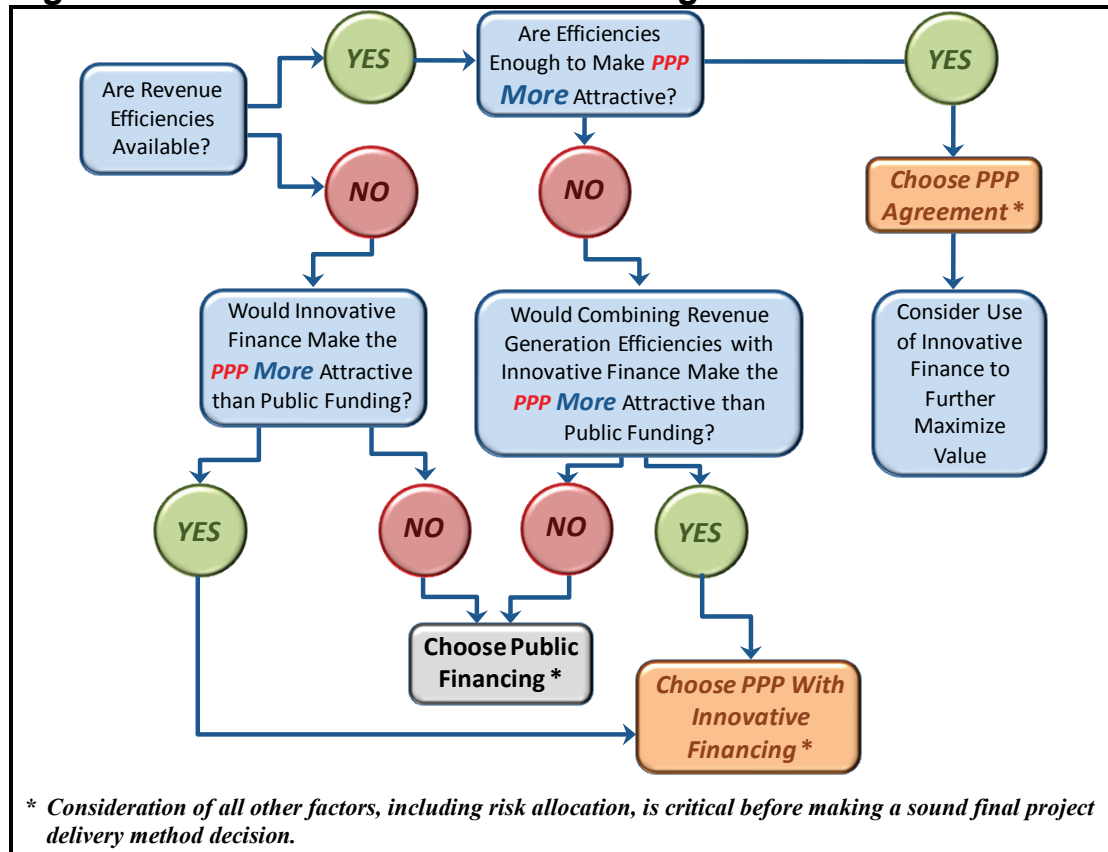


Source: OIG analysis

If the combination of construction and revenue efficiencies does not outweigh the public option's advantages, then the addition of innovative financing could make the PPP more attractive. If the combination of efficiencies and innovative financing cannot achieve the value that the traditional public financing alternative can, then public financing provides the more cost advantageous approach.

If no efficiencies in construction are available, then the question becomes whether efficiencies in revenue generation can be found under a PPP. Figure 9 illustrates the decision making process in this situation. If existing efficiencies are sufficient to make the PPP option more attractive than the public sector alternative, the PPP should be chosen. When efficiencies in revenue generation are present but are not of sufficient size to make the PPP a better value, then the addition of innovative financing should be considered. If the combination cannot overcome the traditional option's value, then public financing is the best choice.

**Figure 9. PPP vs. Traditional Financing: Revenue Efficiencies**



Source: OIG analysis

It is important to emphasize that decision makers should always consider various innovative financing tools when implementing a PPP arrangement. These tools may further enhance a PPP's value through reductions in the cost of capital.

Our analysis is purely financial, and the preceding flowcharts illustrate that financial analysis. A determination of whether to use a PPP or public financing ultimately needs to incorporate a broader range of factors than we considered in our analyses. Principal among these additional factors are different risk allocations and the possibility of more expedient project delivery. These factors can significantly affect a project's ultimate value.

## **PPPs ARE NOT LIKELY TO SIGNIFICANTLY REDUCE THE INFRASTRUCTURE FUNDING GAP**

PPPs are not likely to significantly reduce the infrastructure funding gap because they change the timing with which funds become available, but generally do not increase overall funding levels. Only to the extent that a PPP achieves efficiencies that the public sector cannot achieve does the PPP provide funding greater than the amount the public sector could receive through traditional financing. The fact that PPPs have limited roles in the growth of infrastructure investment funding is illustrated by our examples. In only two of the seven, Project Examples 1 and 2, did we determine that PPP financing would directly deliver a superior net financial contribution to the public sector entity than traditional financing methods. We show how Project Example 7 could do so, but only with the addition of innovative financing.

When a PPP pays funds up front to the public sector, the payments are in exchange for future revenues associated with the asset, usually in the form of tolls.<sup>13</sup> In these instances, States and other project sponsors must obtain the legal authority to levy tolls for the PPP. However, if tolling or toll rates are not politically expedient, the PPP is less attractive. Furthermore, despite their functioning as important system links, many components of the national transportation system will never fully self-fund from users and direct beneficiaries because the traffic on them is too low-density.

## **CONCLUSION**

PPPs offer an alternative means for the completion of transportation infrastructure projects. However, PPPs can only provide additional funds for transportation investments to the extent that the private sector can achieve efficiencies large enough to offset the disadvantages of PPP financing. For highway projects,

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<sup>13</sup> Such PPPs differ from arrangements found in other countries. In Canada, for example, some PPPs incorporate provisions, such as availability payments or shadow tolls, that require the government to pay the private entity for its operation and maintenance of a facility on the basis of the facility's meeting certain usage standards or levels.

efficiencies in construction and revenue generation are potentially of sufficient scale to provide such an offset. The determination of whether PPP or traditional financing offers greater value must be made on a case-by-case basis because of each project's unique properties. Our analysis focused exclusively on the financial trade-offs between PPPs and traditional financing. Any decision about whether to use a PPP or a traditional public project delivery method should include consideration of factors such as risk allocation and expediency of project delivery.

## **AGENCY COMMENTS AND OFFICE OF INSPECTOR GENERAL RESPONSE**

Although we made no recommendations, we provided copies of this report to the FHWA Administrator on May 24, 2011. On July 21, 2011, we received FHWA's response which is included in its entirety as an appendix to this report. In its response, FHWA emphasized the need to consider factors outside of our analysis, especially the valuation of risk, in the PPP decision making process. However, FHWA stated that based on a full consideration of risk valuation, innovative financing options, and the potential to leverage public investment, PPPs offer viable options for the advancement of transportation solutions. We agree. As we noted in our report, our analyses did not consider the impacts of other factors, including risk sharing arrangements, which can be significant. Instead, our report clarifies and provides guidance on a number of factors that enter into a financial analysis of PPPs which we recognize constitutes only a portion of the comprehensive assessment required for an effective PPP decision.

If you have any questions concerning this report, please call me at (202) 366-9970, or Betty Krier, Program Director, at (202) 366-1422.

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cc: Audit Liaison, OST, M-1  
Audit Liaison FHWA, HAIM-13

## **EXHIBIT A. SCOPE AND METHODOLOGY**

The objectives of our analyses were to: (1) identify financial disadvantages to the public sector of PPP transactions compared to traditional financing methods; (2) identify factors that allow the public sector to derive financial value from PPP transactions; and (3) assess the extent to which PPPs can close the infrastructure funding gap. Our quantitative comparison of PPP financing to conventional municipal bond financing involves a purely financial valuation of projects under alternative scenarios.

We worked with a team of contractors led by Charles River Associates International and financial consultants, Scott Balice Strategies. We used published literature to establish a foundation for our work. We constructed representative examples of infrastructure projects to provide a basis for our analyses. We based those representative examples on actual proposed or implemented projects selected to illustrate various features of highway infrastructure projects. We used interviews with investors and other market participants along with data on actual projects and market conditions to help construct the representative examples. In our selection of these examples, we sought coverage of a range of infrastructure finance issues. Some of the key considerations in example selection were:

- Mix of greenfield and brownfield projects—our representative examples include three greenfield and four brownfield projects, a proportion that reflects the U.S. market;
- Variation of evaluation periods—evaluation periods in our examples range from 25 to 90 years;
- Revenue and cost variation—our examples exhibit considerable variation in revenue and cost streams;
- Availability of innovative federal financing mechanisms—we developed one example specifically to illustrate the use of federal innovative financing mechanisms.

The PPP greenfield projects we analyzed are all of the design, build, finance and operate (DBFO) type, meaning that the private partners are responsible for the design, construction, operation, maintenance, and finance of the facilities. The brownfield projects are all long-term lease concessions in which the public sector leases a facility to a private partner who then assumes responsibility for facility operations and maintenance (O&M). Under a DBFO or a lease concession PPP, the private partner pays a lump sum upfront to the public sector to obtain control

of a highway for a certain time period, and collects some or all of the revenues associated with the highway during that period.

To value multi-year projects, we used present values. The present value of a cash flow due at some date in the future is the amount which, if it were on hand today, would grow to equal the amount expected at the future date. For example, if one could earn 5 percent interest, \$1,000 now would be worth \$1,050 a year from now, and \$1,000 is the present value of \$1,050 next year. The determination of the present value of a future cash flow is known as "discounting," and the interest rate used in the calculation is called the "discount rate." The higher the discount rate or the farther in the future a cash flow occurs, the smaller the present value of a particular cash flow or, in other words, the greater the degree to which the future cash flow is discounted. In our analyses, we used the after tax weighted average cost of capital to discount future cash flows.

We created a discounted present value cash flow valuation model to quantitatively compare the investment value of the representative infrastructure projects using traditional financing with tax-exempt debt and as a PPP using private financing. We treated the choice of project financing mechanism as an investment decision. In other words, we asked the question: "what is the value of the transportation asset in terms of its financial contribution to the public sector?" The model quantified the cost of traditional municipal financing as compared to PPP financing. To obtain revenues, costs, and other financial inputs for the model, we gathered data from relevant financial documents, annual reports, published and unpublished project documents, existing databases, and assumptions in the absence of any other information.

One critical model input derived from our assumptions was the revenue growth rate. For all the U.S. based examples, the base case public sector alternative assumed an annual revenue growth of 5 percent. With gross domestic product growth averaging 4.2 percent between 1999 and 2007, and annual traffic growth in the country usually estimated at about 1 percent, an overall revenue growth rate of 5 percent annually was considered to be a reasonable value for the base case scenarios. The annual growth rate for the French example, Project Example 5, was assumed to be 2.2 percent because the toll setting formula in France is much more conservative than in the U.S., and toll increases usually are pegged to a fixed percentage, usually 70 percent, of the consumer price index. Similarly, in all the examples, the base case also assumed an annual growth in O&M and heavy maintenance of 3.89 percent, which was the producer price index annual escalation rate for maintenance and repair construction between 1999 and 2007.

The valuation model compared the net contributions—derived from the project's gross contributions—provided to a state or local government entity from the

## **Exhibit A. Scope and Methodology**

project under the two financing alternatives. The gross contribution of a project consists of the monetization of its future cash flows less its financing costs. For a public financing, this consists of the proceeds from the primary debt offering, such as senior lien bonds, that could be financed plus the present value of any residual cash flow available to the government after payment of debt service through the financing term. Subordinate financing, such as junior lien bonds, served as a proxy for this residual. In PPP financing, the monetization of future cash flows consists of the total amount of capital that can be raised by the private sector, from both debt and equity, which would be used to make an upfront payment to the government. In a PPP arrangement, our model assumed that the equity financing component was subordinate financing. In either type of financing, the total gross contribution included the present value of the debt service reserve fund<sup>14</sup> that would be available at the end of the valuation period. However, the initial cost of funding the debt service reserve was included as a cost item with the financing costs.

Subtracting the present values of construction, expansion, and heavy maintenance costs from the gross contribution produced the net contribution. Construction costs were broadly defined. They included general contractor and overhead costs, architectural and engineering fees, preliminary engineering, final engineering, environmental mitigation, right-of-way, utility relocation, construction engineering and inspections costs necessitated by the construction of the facility. Expansion costs included the construction costs of any additional lanes and other associated expenses, such as construction or expansion of toll facilities. Heavy maintenance costs consisted of non-routine maintenance costs, such as resurfacing costs.

We also used our model to conduct sensitivity analyses—assessments of how much project values change when some factor is changed—of each example project. For example, we evaluated the effects of changes in the cost of capital and the length of the agreement on project values under the competing implementation methods.

Although debt markets were under stress during the time we conducted our analyses, we did not focus on those market conditions, but emphasized general principles of market function and ways to incorporate market conditions into financial valuations. However, our analyses acknowledged both current and recent, but less constrained, market conditions when we applied the valuation model to representative examples in order to compare the relative efficacy of public and private financing approaches.

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<sup>14</sup> The debt service reserve fund is a set aside of debt proceeds for the benefit of the debt investor in the event that funds from operation are insufficient to pay debt service.

While we considered the value of the transportation asset from the perspective of a state or local government, we did not consider the case in which a PPP transaction is used as a vehicle to generate funds for some other purpose outside of transportation infrastructure. Such an analysis might take into account financial benefits that are outside the transaction, such as the use of proceeds or revenue share. These considerations are potentially relevant factors in decision analyses of PPPs, but we did not incorporate them in our analyses.

We compiled the information and results in this report between January 2008 and April 2011. We believe that the data and information we collected, the sources from which we obtained them, and the ways in which we used them, provide reasonable basis for our findings and conclusions based on our stated objectives.



**EXHIBIT B. MAJOR CONTRIBUTORS TO THIS REPORT**

<b><u>Name</u></b>	<b><u>Title</u></b>
Betty Krier	Supervisory Economist/ Program Director
Michael Day	Economist
Keith Klindworth	Economist
Susan Neill	Writer/Editor

## APPENDIX. AGENCY COMMENTS



# Memorandum

Subject: **INFORMATION:** Response to the Office of Inspector General Draft Report on “Financial Analysis of Transportation-related Public Private Partnerships”

Date: July 21, 2011

From: Victor M. Mendez   
Administrator

In Reply Refer To:  
HIN-1/HAIM-10

To: Calvin L. Scovel III  
Inspector General (J-1)

Public Private Partnerships (P3), which offer an alternative and innovative means to leverage Federal funding on transportation projects, are highly complex and dependent on project specific variables. As a result, the applicability of P3s to any given project must be determined on a case-by-case basis. While the Office of Inspector General (OIG) report provides some insights on financial metrics, as recognized in the OIG report, it is not a comprehensive analysis of applicable factors for P3 decisionmaking. Large projects are unique and complex and require each public sponsor to carefully review the financial and policy implications of its delivery options – from traditional design-bid-build through a long-term concession such as a P3. A key and often decisive element not addressed by the OIG report involves the valuation of risk. Absent these specific valuations, it is impossible to draw any definitive conclusions regarding the comparative financial merits of a P3 option.

A comprehensive analysis of P3 financial viability must evaluate risk versus reward. Starting with the premise that the private sector will have a higher cost of capital, the public sponsor must place a dollar value on the risks a

private partner would be willing to assume. While the OIG report recognizes the private sector's added value as a combination of "efficiencies" in construction and revenue collection, it does not explicitly recognize the key financial elements of valuing risk, both from a public cost reduction perspective and from the perspective of the private partner. For example, toll road revenue projections depend largely on estimates of future regional economic performance and growth that cannot be precisely determined at the time the project is being financed. As experience has shown, both public and private operators can be overly optimistic when estimating potential revenue, but when the private sector has taken this risk, it is equity investors that absorb any financial loss.

A more comprehensive approach that is being increasingly employed by public sponsors of P3s is project-by-project Value for Money (VfM) analysis of total costs and benefits. A VfM analysis will evaluate the public delivery option directly against the P3 option, establishing a threshold for private firms to meet or exceed. These studies require an analysis of a more comprehensive and project-specific set of detailed factors than is included within the OIG analysis. Since the OIG report does not offer a comprehensive review of the factors associated with P3 decisions, particularly the key consideration of risk valuation in the financial analysis associated with P3s, the reader is cautioned against drawing any larger conclusions from the OIG's analysis. For example, the report's flowcharts are not general decision tools, but simply an illustration within the limited domain of the analysis.

It is also important for the OIG report to recognize that projects are not equally likely to advance under either public or P3 based financing. The availability of innovative financing methods could be a determining factor over whether a project proceeds. A key reason that State and local governments consider P3s is that public financing is often constrained by statutory or policy limits on debt amounts, maturities, and offering terms. Recognizing that public debt financing capacity might be inadequate to undertake the project under consideration, States and localities may face the choice between delivering the project as a P3, or not at all.

While a noteworthy share of P3 development in the United States was essentially the monetization of preexisting highway assets,<sup>15</sup> these types of agreements may represent a smaller share of P3 opportunities in the United States compared to new development and investment. Recognition of this

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<sup>15</sup> Examples include the Chicago Skyway and the Indiana Toll Road transactions in which the public sector leased existing highways to private concessionaires in exchange for a lump sum payment.

potential is based on the Agency's experience with the Transportation Infrastructure Finance and Innovation Act (TIFIA) credit program, which has since 2003 executed loans for seven P3 projects, each of which meets the report's definition of a "greenfield" facility, in California, Texas, Florida, and Virginia. The "brownfield" projects that the report examines (two of which are patterned after Chicago and Indiana) would be ineligible for TIFIA or private activity bonds, the innovative finance tools that the report notes are available for lowering the private sector's cost of capital to the benefit of the public owner. These programs require new capital investment and cannot help finance a mere change of control.

Based on a full consideration of risk valuation, innovative financing options, and the potential to leverage public investment, P3s offer a viable option for advancing transportation solutions. Under the right circumstances with a well-structured arrangement for sharing risk, a P3 can offer the potential to accelerate project delivery, provide capabilities not affordable under public finance options only, and provide a viable investment for the private sector.