Rising Tide of Next Generation U.S. P3s —and How to Sustain It

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INTRODUCTION

Infrastructure public-private partnership (P3) activity in the U.S. has taken off since 2015. Today more than 30 states are procuring at least one project as a P3 and over 200 projects are in the pipeline—well above prior levels of activity. P3 projects in the pipeline today are also much more diverse in asset class than the classic toll road P3. Road projects are now the minority, with social infrastructure accounting for 24% of the total, followed by broadband and water.[1]

Just a few years ago, infrastructure investors were lamenting the lack of a pipeline of P3 projects in the U.S.; only in 2012 did more than 10 U.S. P3s close. State and local governments have long financed public infrastructure through the municipal bond market, using conventional design-bid-build procurement. Conventional procurement generally involves separate bond financing, design procurement, and construction procurement, followed by government-led operation and maintenance. In contrast, Europe has relied more on P3s to attract private investment into infrastructure, bundle together financing and multiple project phases into a single contract, and achieve efficient risk transfer.

Rising adoption of P3s has increasing relevance as the U.S. is facing an ongoing crisis in public infrastructure investment. The Global Infrastructure Hub—a joint initiative of G20 governments—estimates that if the current pace of investment continues, U.S. infrastructure investment in transportation and water alone will fall $3.7 trillion short of investment needs between now and 2040.[2] Recognizing the need to reverse years of underinvestment in traditionally public infrastructure, the Obama Administration called for expanding the sources of private investment. The Trump Administration's infrastructure plan calls for a $100 million Incentives Program of competitive grants where fully 70 percent weight would be placed on "securing and committing new, non-Federal revenue" for investment, operations, maintenance, and rehabilitation.[3] The criterion of "new, non-federal revenues" clearly invites an expanded role for P3s, although it could in theory be met simply by expanding conventional procurement at the state and local level, backed by user fees or dedicated taxes.

Developing a robust U.S. P3 market will require the development of sustainable risk allocation mechanisms that ensure projects are successful for both investors and sponsoring governments. Projects that enter P3 procurement must be carefully selected and contracted with a payment mechanism that allocates risks appropriately for the project and the procuring government's needs. Avoiding financial failures and political backlash will be essential to encouraging state and local governments to bring more projects for P3 procurement.

This paper illustrates the trends in today's rapidly growing P3 market and highlights reasons for the take off in alternative procurement. We then present a menu of incentive structures for successful long-term risk sharing, and highlight key questions for designing a viable P3. In doing so, we draw on our experience gained in designing and advising on rate setting in European P3s as well as our work with regulated utilities in the U.S. and around the world.

I. BACKGROUND

Broadly defined, P3s transfer responsibility for some combination of designing, building, financing, operating, and maintaining public infrastructure projects to private sector partners under concession, lease, or other contractual arrangements. The goal is to harness private capital, management expertise, and innovation to optimize what would conventionally be government-directed efforts, even when private firms are hired to execute design or construction. In addition to simply expanding access to capital resources, incentive-based P3 contracts have been relied on to provide additional budget and schedule discipline as well as, in many cases, to assure timely maintenance.

We define P3s to involve private financing, bundling together at minimum the design, build, and finance (DBF) aspects of a project. Most U.S. P3s also incorporate at least one of long-term private operation and maintenance. The full design/build/finance/operate/maintain (DBFOM) combination is most common, although some projects are DBFO or DBFM.

The stereotypical P3 is a toll road where the private partner receives the right to collect and retain toll revenue. But P3s deliver other assets as well. Recent long-term P3s include, for example, the Purple Line light rail line in the Maryland suburbs of Washington, DC and a water supply system for San Antonio, Texas. Both projects involve all phases: design, build, financing, operation, and maintenance.[4]

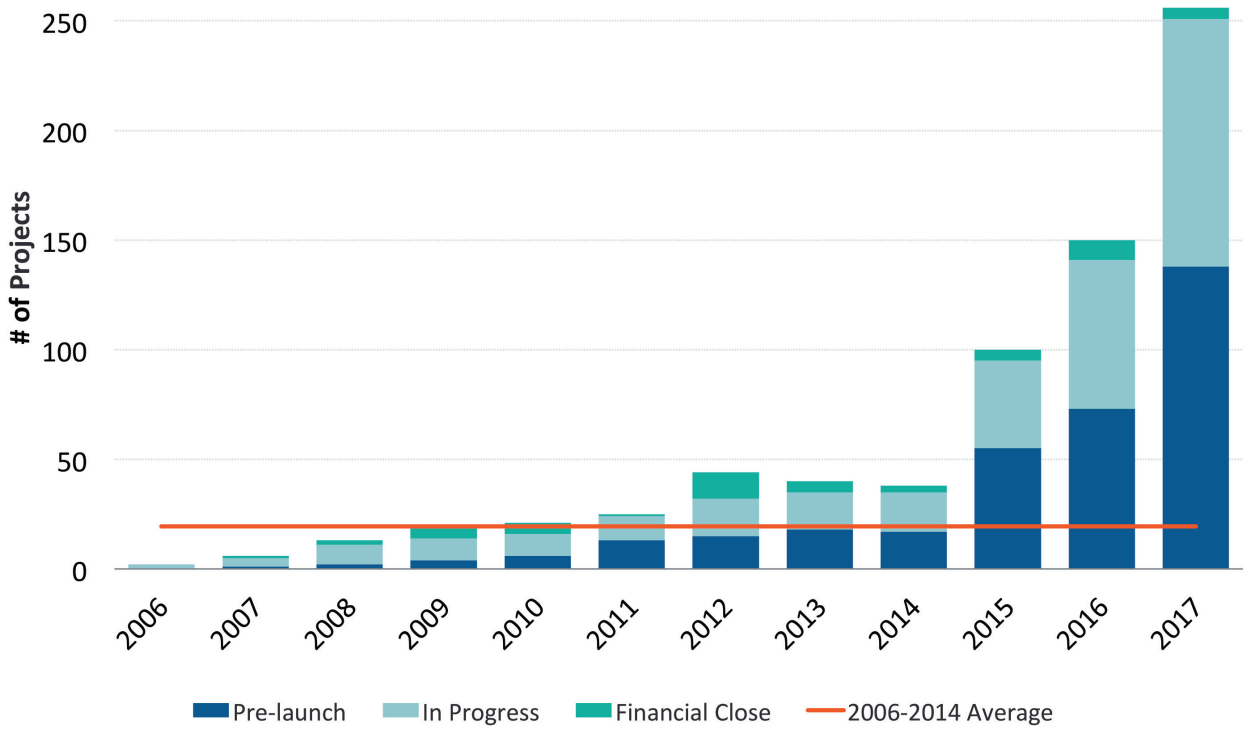
All P3s need a dedicated revenue stream to compensate private sector investors, but as further explored below, the classic "user fee" configuration is not always required. In 57% of the U.S. P3s closing in the last three years, government will pay investors in the form of availability payments, or variations thereof. Generally, in an availability payment project, the procuring government entity pays the private partner a stream of payments out of tax or other revenue, provided the asset is available for use and meets contracted quality and often performance standards. Availability payments are set in the project contract, either in dollars (subject to quality and performance) or by formula; formula-based availability payments may involve deductions due to shortfalls in quality or performance, adjustments for traffic or other usage, or both. Whereas many user fee projects involve identifying new revenue streams and imposing new fees, availability payment projects often rely on the same revenue sources as a conventionally-procured project. Recent projects procured as availability payment P3s include the replacement of 558 bridges across Pennsylvania and the construction of a fiber network to deliver high speed Internet throughout Kentucky. The aforementioned Purple Line project was also structured as an availability payment P3.

II. TODAY'S P3 MARKET

A. BASE CASE OUTLOOK

After years of very limited P3 use, the pipeline of U.S. projects is steadily growing with projects across a wide range of sectors and over 30 states. The sharp increase in P3s since 2015 is seen in Figure 1, which shows the inventory of P3 projects at the end of each year, by stage of development. Today, over 200 public infrastructure projects are currently in procurement as a P3 ("in progress") or have been announced by project sponsors as in development for P3 procurement or potential P3 procurement ("pre-launch"), with over 100 in each category.[5] At the end of 2017, the number of such P3s was more than 10 times its 2006-2014 average of 19 projects.

FIGURE 1 **The Number of U.S. P3s in the Pipeline Skyrocketed in 2015**



Notes: Project counts reflect the year-end project status. This excludes projects that were classified as cancelled, on hold, moved forward without private financing, were a stake sale, or were refinancing. The 2006-2014 average line represents the average number of projects that were in pre-launch or in progress during those years.

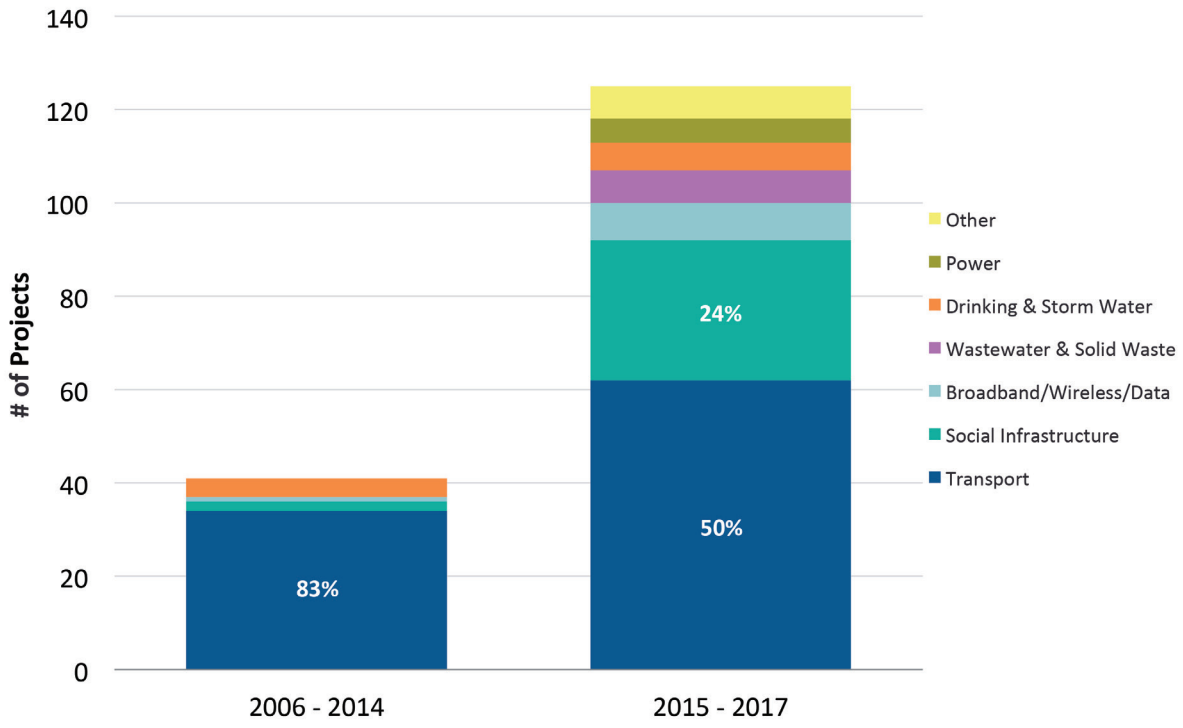
Looking only at projects reaching financial close would not reveal the takeoff in transactions under consideration and in progress. The average time from transaction launch to financial close is 2.4 years. Six P3s launched in or after 2015 reached financial close by the end of 2017: Denver Airport Jeppesen Terminal, Wayne State University Student Residential Facilities, Ohio State University Energy Project, Kentucky Wired, I-395 in Virginia, and State Street Redevelopment in Indiana.

The dollar value of projects in progress at the end of 2017 exceeds the total value of transactions reaching financial close in 2010-2017. Moreover, the dollar value of in progress projects counts only the 47 transactions with declared dollar values. Another 62 in progress transactions do not yet have declared sizes.

B. BEYOND TOLL ROADS: P3S NOW SPAN THE PUBLIC INFRASTRUCTURE SPECTRUM

Not only has the number of projects skyrocketed, but the P3 projects in the pipeline today also span a much more diverse range of infrastructure assets than in the past. From 2006-2014, over 83% of U.S. P3s[6] were in the transportation sector. Today, transportation projects represent only half of the total. Fully 50% of P3s introduced since January 2015 are in other sectors, with social infrastructure accounting for 24% of the total, as Figure 2 shows.

FIGURE 2 **Projects Cover More Diverse Infrastructure Assets: Half the 2015-2017 Projects are Outside Transportation**

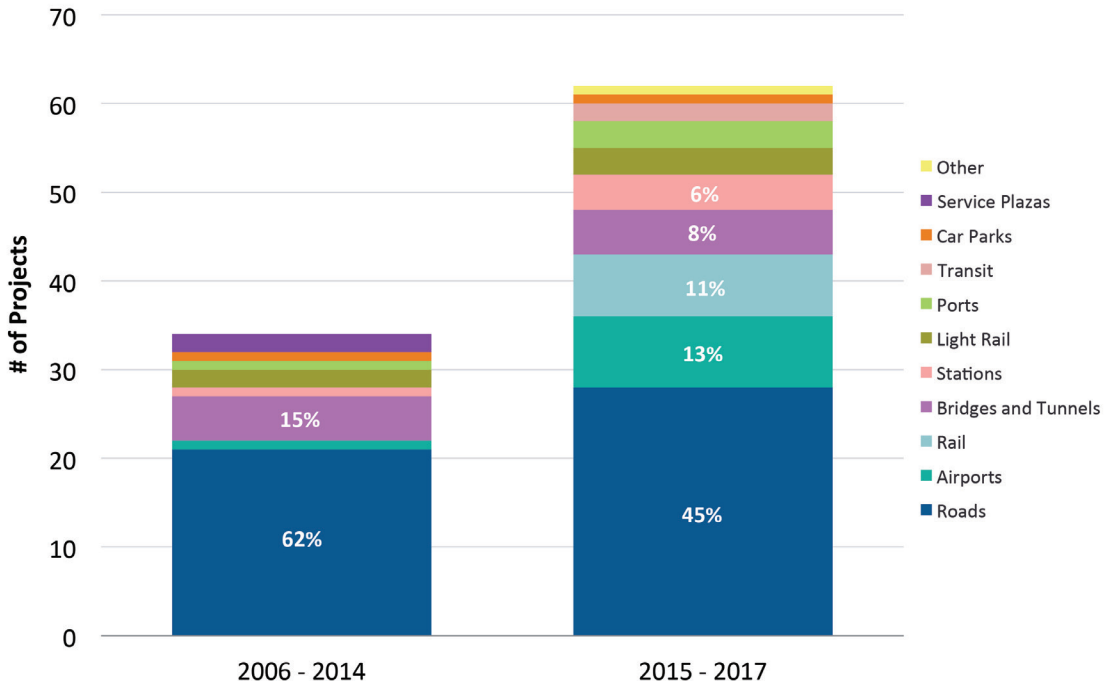


Notes: Includes projects that are pre-launch, in progress, or have reached financial close.

For years, the classic U.S. P3 was a toll road. No more. Roads represent 45% of U.S. P3 transport projects in any phase during 2015-2017, including those in late-stage development for P3 procurement, in P3 procurement, and reaching financial close. Rail/light rail and airport P3s rank second and third with 16% and 13% shares of transport P3s since 2015, as Figure 3 shows. Other substantial categories include bridges and tunnels, parking facilities, and ports.

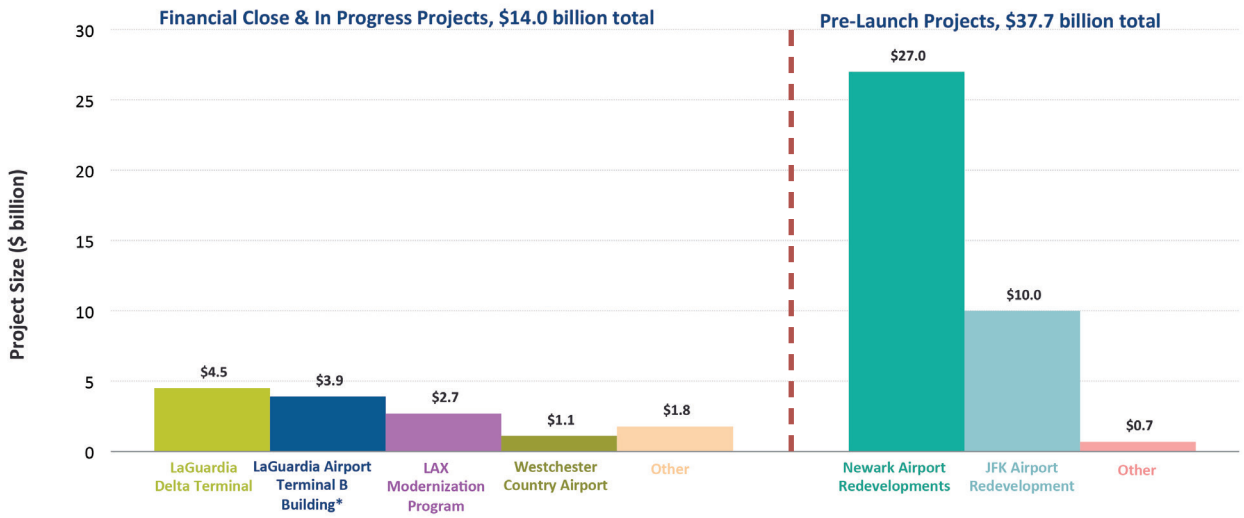
Airports are now turning to P3s to develop, operate, and maintain a wide range of large, new investments. Airport projects in the P3 procurement process and at financial close are valued at $51.7 billion. Another seven P3s at the pre-launch or in-progress stages do not have a declared value yet: Century City Cargo Complex, Hartsfield-Jackson Atlanta International Airport, JFK Terminals 5, 6, 7 JetBlue Redevelopment, LaGuardia Airport AirTrain, San Diego Airport Terminal 1 Redevelopment, South Suburban Airport, and Virginia Regional Airport Runway Maintenance.

FIGURE 3 Not All Toll Roads: Other Modes Now Dominate Transportation P3s



Notes: Includes projects that are pre-launch, in progress, or have reached financial close.

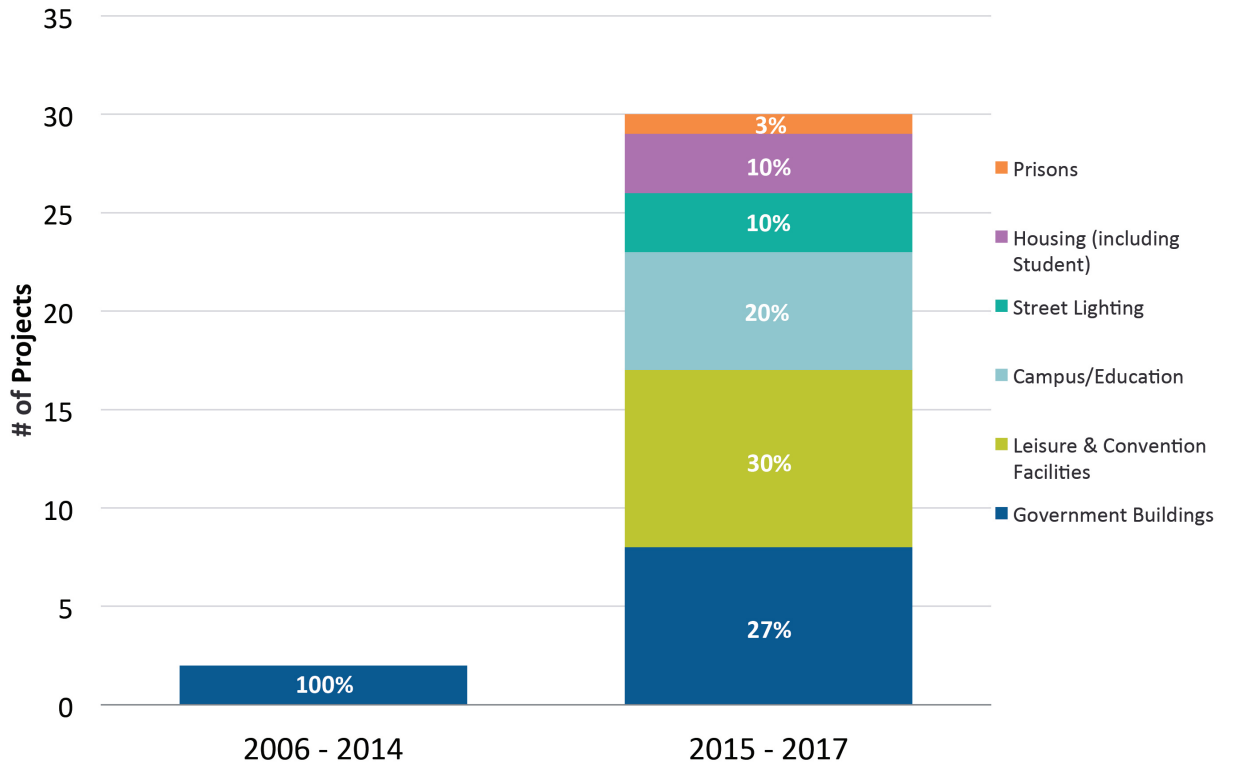
FIGURE 4 Airport P3s Exceed $51.7 Billion, Including Pre-Launch



*LaGuardia reached financial close. The LAX Modernization Program is comprised of the Automated People Mover ($1.9B) and the Consolidated Rent-A-Car ($0.9B). Other projects that have reached financial close include Kansas City Airport Terminal A ($1B), Denver Airport Jeppesen Terminal ($0.7B), and San Diego Airport Cargo Facilities ($0.2B). Other in progress projects include Hollywood Burbank Airport ($0.4B) and Des Moines International Airport Terminal ($0.3B).

Social infrastructure P3s have taken off with the recognition that the procurement and long-term maintenance benefits can be captured with an availability payment model. At the end of 2014, the Long Beach Courthouse (2010, $495 million) was the sole P3 to reach financial close. Four more social infrastructure transactions have now reached financial close totaling at least $1,722 million: University of California Merced Campus Expansion (2016, $1,200 million), Long Beach Civic Center (2016, $473 million), Michigan Freeway Lighting (2015, $49 million), and Wayne State University Student Residential Facilities (2017, unknown transaction size). The range of social infrastructure projects now under consideration spans public buildings, college campuses, convention centers, streetlights,[7] and health care facilities, as shown in Figure 5.

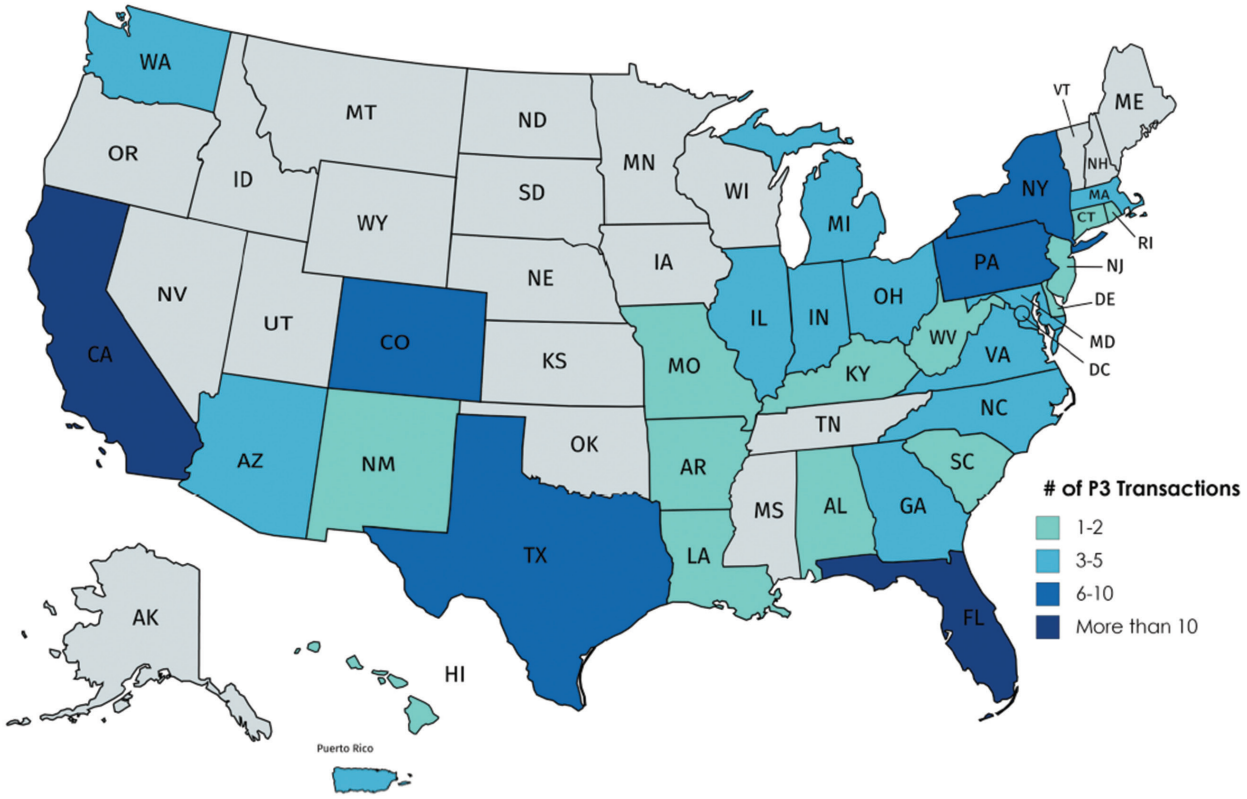
FIGURE 5 **Fastest Growing P3 Sector: Social Infrastructure P3s Span Schools to Streetlights**



Notes: Includes projects that are pre-launch, in progress, or have reached financial close.

Since 2015, 30 states plus the District of Columbia and Puerto Rico have launched a P3 transaction or reached financial close on at least one P3. The map in Figure 6 illustrates the number of P3s in each jurisdiction: 28 jurisdictions, including the District of Columbia and Puerto Rico, have launched a project since 2015 and have P3-enabling legislation for, at minimum, transportation projects.[8] The four states pursuing P3s without enabling legislation may be able to obtain sufficient authority to undertake at least certain P3s from existing procurement statutes.[9] Five additional states that have not previously launched a P3—Iowa, Kansas, Oklahoma, Oregon, and Utah—currently have at least one P3 in development.[10]

FIGURE 6 **30 States, DC, and Puerto Rico Have Launched at Least 1 P3 Since 2015**



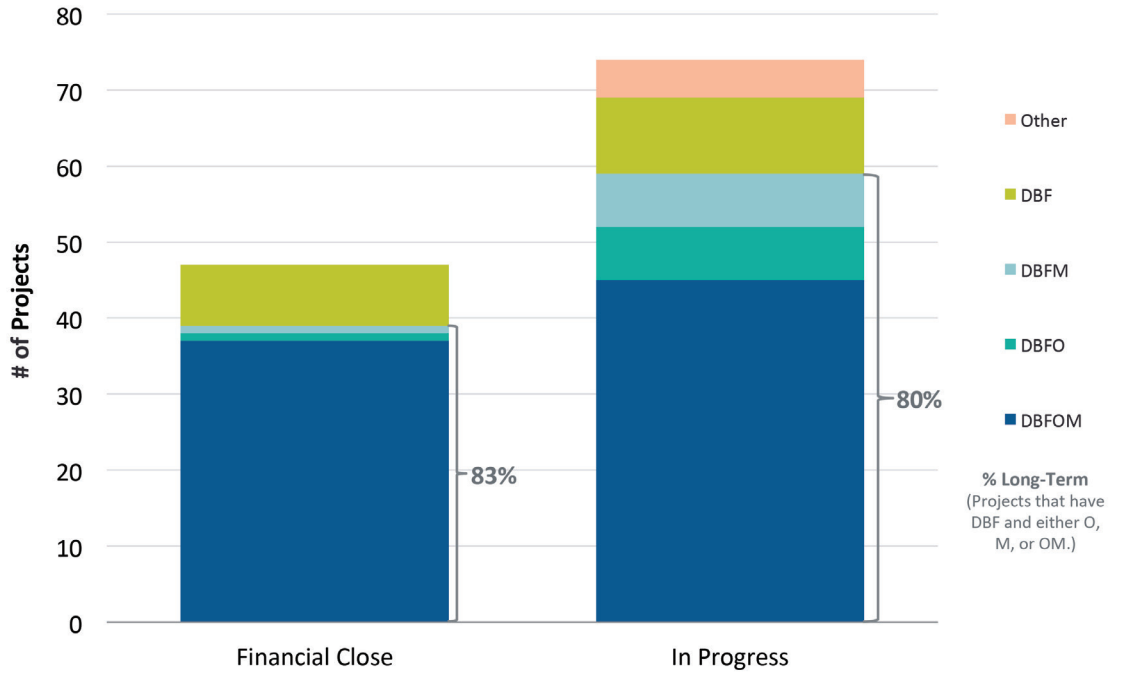
Note: Including projects that have reached financial close or are in progress. Excludes pre-launch projects. Created using mapchart.net.

P3 project sponsors have overwhelmingly been seeking not only project delivery and financing, but also long-term operation, maintenance, or both: 80% of transactions in progress and 83% of transactions that have reached financial close include design, build, finance, and at least one of operation or maintenance. With a few exceptions, these projects include maintenance, where transferring maintenance can harness private sector incentives to accomplish timely upkeep, as discussed in more detail below. Figure 7 shows the delivery model breakdown by transaction status.

In general, P3s are better suited for large projects, or a single contract, that bundles many small projects together, due to the longer procurement and negotiation timelines and corresponding higher transaction costs. At the same time, larger projects (or groups of smaller projects) also present an opportunity to tailor risk allocations, while scaling a project to a size attractive to private sector investment. For the public sponsor, right-sizing project costs (as opposed to contingency costs) with increased certainty for timely delivery and proper performance may justify the higher transaction costs to get to the final P3 agreement.

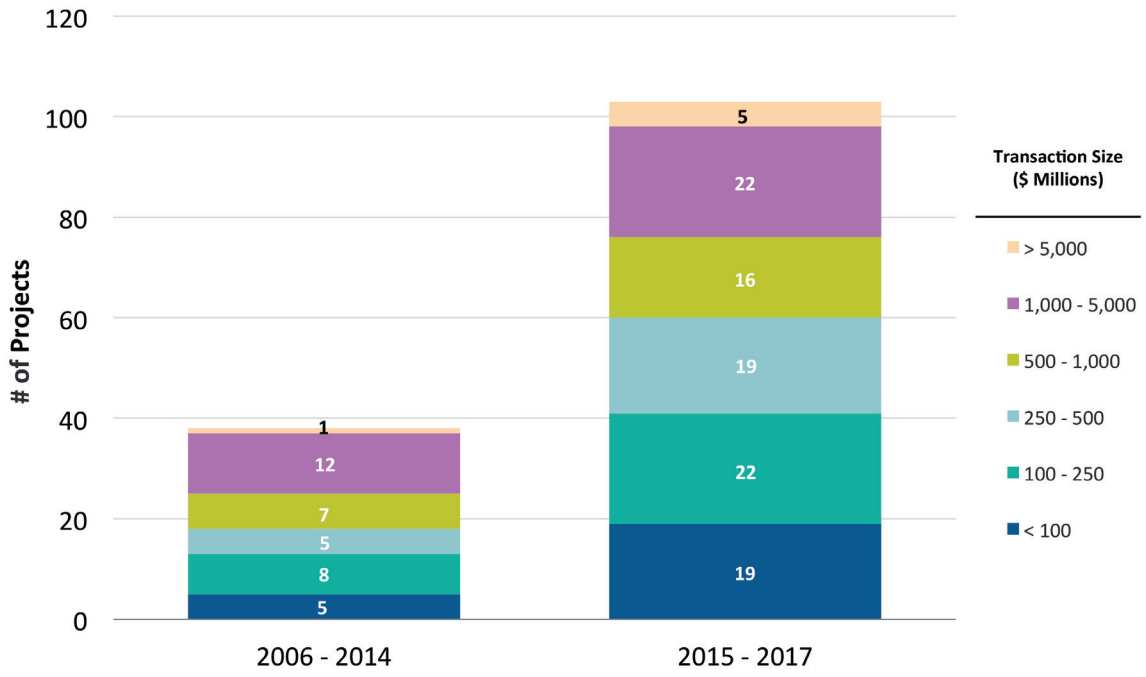
While the distribution of transaction sizes across projects is relatively stable, in spite of the above, the growth of relatively smaller P3s is noteworthy. The number of projects under $100 million jumped from five before 2015, to 19 after, counting projects with a declared dollar value at any stage.

FIGURE 7 Most U.S. P3s Include Operation and Maintenance



Notes: 68% and 90% of transactions report delivery model classification for in progress and financial close, respectively.

FIGURE 8 Smaller P3 Transactions are Taking Place



Note: Includes projects at pre-launch, in progress, and financial close stages. 38% of pre-launch projects, 43% of in progress projects, and 98% of financial close projects report transaction size.

Pennsylvania's Rapid Bridge Replacement project demonstrated that P3s can be used for small and rural projects by bundling them together, as discussed above. Under this $899 million project, 558 bridges throughout Pennsylvania will be replaced and maintained for 28 years. The average cost per bridge is $1.6 million for design, construction, and maintenance.[11] In contrast, the smallest U.S. P3 to date was closed at $25 million for the development of a broadband network in Estes Park, Colorado. Of the P3s with a reported transaction size, only seven U.S. P3s of $50 million or less have been contemplated.[12]

III. WHAT'S DRIVING THE TREND?

The surge in planned P3 projects in the U.S. followed the deterioration in government finances and municipal market conditions in the wake of the Global Financial Crisis. Years of difficulty financing and funding infrastructure helped broaden interest in finding new ways of paying for, financing, and delivering public infrastructure in the U.S., regardless of economic climate. The most important drivers include the following:

- **Pent up demand for public infrastructure from past underinvestment and deferred maintenance.**
- **Constrained public revenues and financing sources following the Great Recession and Global Financial Crisis.**
- **Increasing government recognition of the merits of P3s for the right projects.**
- **Growing interest among private sector investors and other potential private partners.**

A. PENT UP DEMAND FOR PUBLIC INFRASTRUCTURE

1. Underinvestment

U.S. infrastructure was once hailed as the best in the world. No longer. Years of underinvestment dating back before, but exacerbated since, the Great Recession have caused the U.S. ranking to fall to ninth, according to the World Economic Forum.[13]

That the U.S. is substantially underinvesting in public infrastructure is well-accepted, although estimates of the gap vary. The Global Infrastructure Hub estimates that the U.S. will invest 0.8% of GDP ($4.6 trillion) annually across road, water, port, rail, and airport infrastructure through 2040 if the current pace of investment continues—but that the country's infrastructure needs are 75-100% higher, at 1.4% of GDP in near years and 1.6% of GDP by 2040 ($8.2 trillion). In other words, the projected investment gap is $3.6 trillion over 2017-2040.[14] McKinsey puts 2008-13 U.S. infrastructure investment at 2.4% of GDP, down 0.2% from before the Global Financial Crisis, and concludes that investment should be boosted to 3.1% annually for 2016-30.[15] Although the wide variation in assessments reflects imprecision in the estimates, it makes clear that the needs are large.[16]

2. Deferred Maintenance

Maintenance is often perceived as deferrable—and it is in the short term, but not repeatedly. Public infrastructure deteriorated more rapidly during and after the Great Recession as tight state and local government budgets led to repeated cuts in maintenance budgets.

When budgets need to be cut, maintenance often suffers. Failing to maintain infrastructure assets shortens asset life.[17] Because Federal Highway Funds cannot be used for routine or preventative maintenance of highways constructed using Federal Highway grants, such state and local governments must budget for it—as well as the maintenance of its other infrastructure assets—from their own revenues.[18] State and local governments, however, cannot run budget deficits, with rare exceptions. As a result, state and local governments cannot credibly commit to maintaining their infrastructure assets, especially through economic downturns.

B. CONSTRAINED PUBLIC REVENUES AND FINANCING SOURCES FOLLOWING THE GLOBAL FINANCIAL CRISIS

1. Public Revenues

Tighter budget constraints following the Global Financial Crisis have disrupted traditional mechanisms for funding public infrastructure. State and local tax receipts were essentially flat from 2007-2010 and did not see significant growth until 2013 and after.[19] While state budgets have started to recover since that time (on average), there was nonetheless a gap in infrastructure funding that has not yet been bridged.

The Tax Cuts and Jobs Act of 2017 may further constrain high tax states from raising additional revenue given the new limits on the amount of state and local tax that individuals can deduct from their federal income tax.[20] Those states may become more inclined to rely on user fees or other dedicated revenue sources, such as taxes approved by referendum to pay for specified infrastructure projects.

At the federal level, gas tax revenues are no longer adequate for new investment and system renewal. The Congressional Budget Office estimates that the Highway Trust Fund will be insolvent by 2021, as gas tax revenues per mile traveled continue to fall due to more fuel efficient and electric vehicles.[21] The federal gas tax of 18.4 cents per gallon is unchanged since 1993, while construction material costs have risen 74%.[22]

2. Financing Sources

State and local governments in the U.S. have long had unique access to debt funding via the deep and liquid tax-exempt municipal bond market. In theory, municipal bonds should comprise the cheapest capital available to governments. Because municipal bond interest is exempt from federal income tax and state and local tax in the issuing jurisdiction, taxable bond investors will accept lower interest on municipal debt, so long as their interest rate is at least as high as their after-tax interest rate on taxable debt with comparable characteristics. Federally-subsidized access to private capital for public infrastructure through the tax-exempt debt market has historically muted state and local government interest in P3s.

However, tax-exempt municipal bond markets have faced limitations relative to corporate bond markets. Perhaps most fundamentally, the pool of investors with an appetite for U.S. tax-exempt bonds—limited to investors liable for U.S. taxes who benefit from the tax-exempt interest provisions—is a relatively small subset of global bond investors. Also, prior to the financial crisis, municipal bond issuances were frequently supported by bond insurance, shielding investors from having to perform fundamental credit analysis.

The Global Financial Crisis altered the economics of tax-exempt financing. The deterioration in government finances described above was accompanied by the collapse of most bond insurers (caused by their exposure to mortgage securities). In combination, these events led to sharp increases in perceived default risk, reduced liquidity, and hence increased tax-exempt borrowing spreads over Treasuries, which have been about the same as those for corporate bonds in recent years.

These developments showed that the advantages of traditional public infrastructure financing are not necessarily robust in all economic conditions. This relative deterioration in municipal bond market conditions may have served as a reminder to state and local governments of the potential benefits of accessing broader capital markets, including through P3s.

The Tax Cuts and Jobs Act of 2017 may affect the relative attractiveness of municipal financing in ways that vary across states. By imposing new limitations on the amount of state and local government tax that individuals can deduct from their federal income taxes, the Act raises the total marginal tax rate in high tax states while lowering it in low tax states.[23] This has the potential to enhance the demand for municipal debt in high tax states relative to low tax states, also driving a wedge between the borrowing costs of high and low tax states.

C. GOVERNMENT RECEPTIVITY TO P3S

Government officials at both state and federal levels are more readily acknowledging the benefits of P3s. This is not least because the cumulative costs of many years of underinvestment have become increasingly evident. The President's Council of Economic Advisors estimated that inadequate infrastructure causes U.S. drivers to spend 5.5 billion hours in traffic each year, costing $120 billion in fuel and lost time.[24] Businesses pay $27 billion in added freight costs because of the poor condition of roads and other transportation infrastructure.[25] Deterioration of water systems, many older than their useful life, causes over 240,000 water main breaks each year, causing service interruptions and property damage.[26]

Naturally, governments have been motivated to stave off the political consequences of infrastructure failure. Some government officials may have been drawn to P3s as a way to tap new sources of capital. However, more important for the future, project sponsors are gaining an appreciation of using P3s to reduce major infrastructure costs and optimize long-run maintenance.

1. State and Local

State and local governments are recognizing the benefits of allocating certain risks historically retained by the government and building in performance incentives to private sector partners in exchange for delegating of some control in the way the private sector manages those risks or configures an asset. Private sector management expertise and innovation can be harnessed to result in procurement efficiencies such as cost containment, faster project delivery, and a commitment to ongoing maintenance. Notably, state and local governments are recognizing that they can address deferred maintenance problems by shifting maintenance to their private partners under long-term P3 agreements. As Figure 7 shows, about 76% and 81% of in progress and financial close P3s include maintenance. Provided that quality standards can be translated into contractual terms and readily verified by the government and its private partner, P3s can create a credible (and financeable) commitment to maintain the assets that the public sector cannot match.[27]

Accordingly, many states have already laid legal groundwork for P3s. By the end of 2014, 26 states, the District of Columbia, and Puerto Rico had already enacted laws authorizing P3s. As discussed above, that number is now up to 33 jurisdictions. In contrast, only 12 states and Puerto Rico had P3 enabling legislation in 2007, suggesting that tighter municipal finances during and after the Global Financial Crisis encouraged states to lay the groundwork for P3 procurement.[28]

2. Federal

Capacity building efforts by federal agencies may also have helped government project sponsors realize that they can achieve the procurement and maintenance advantages of P3s. Responding to years of deferred investment, in July 2014, the Obama Administration launched the Build America Investment Initiative to promote greater private investment in traditionally public infrastructure—including the use of P3s. The Treasury Department explained the rationale as follows:

> The need to reverse years of this underinvestment in infrastructure, despite tighter budgets at every level of government, calls for us to rethink how we pay for and manage infrastructure. … While private investment is not a substitute for government spending on infrastructure, we can better achieve a state-of-the-art infrastructure network by expanding the sources of investment and using those dollars, whether public or private, as effectively as possible.[29]

Much of this initiative was focused on building expertise in state and local governments, so that officials would have the capacity to evaluate whether a P3 is suitable for a given project and manage a transaction. The initiative created centers of excellence to offer technical assistance including the Build America Transportation Investment Center, which Congress expanded in 2015 by establishing the Build America Bureau in the U.S. Department of Transportation, and the Water Infrastructure and Resiliency Finance Center at the U.S. Environmental Protection Agency.

D. ROBUST APPETITE FROM INVESTORS

The success of an earlier federal response to the Global Financial Crisis—the Build America Bond program in 2009-2010—highlighted the breadth of investor interest in infrastructure. In lieu of traditional tax-exempt bonds, the program allowed state and local governments to issue taxable bonds and receive a 35% direct subsidy from the federal government to offset the higher interest costs. Governments in all 50 states, the District of Columbia, and two territories issued taxable debt under the program.

Whereas tax-exempt debt is attractive only to investors who pay U.S. taxes—who are willing to accept lower interest rates because that interest is tax-free—Build America Bonds appealed to bondholders who are not liable for U.S. taxes, such as U.S. and foreign pension funds. The success of the Build America Bonds program demonstrated substantial latent demand for infrastructure debt investments and yielded significant issuer savings.[30]

This investor appetite for U.S. infrastructure-linked debt is unsurprising. Infrastructure investments offer stable returns and asset maturities matching their long-dated liabilities. Accordingly, in the last decade, infrastructure investments have been sought after by long-term institutional investors including U.S. and foreign pension funds, reinsurance companies, and sovereign wealth funds.

Moreover, many investors are seeking infrastructure equity investments. The Global Infrastructure Hub's 2017 survey of institutional investors in infrastructure found that 90% want to increase their investment in infrastructure, up from 65% in 2016.[31]

IV. OPTIONS FOR P3 STRUCTURING

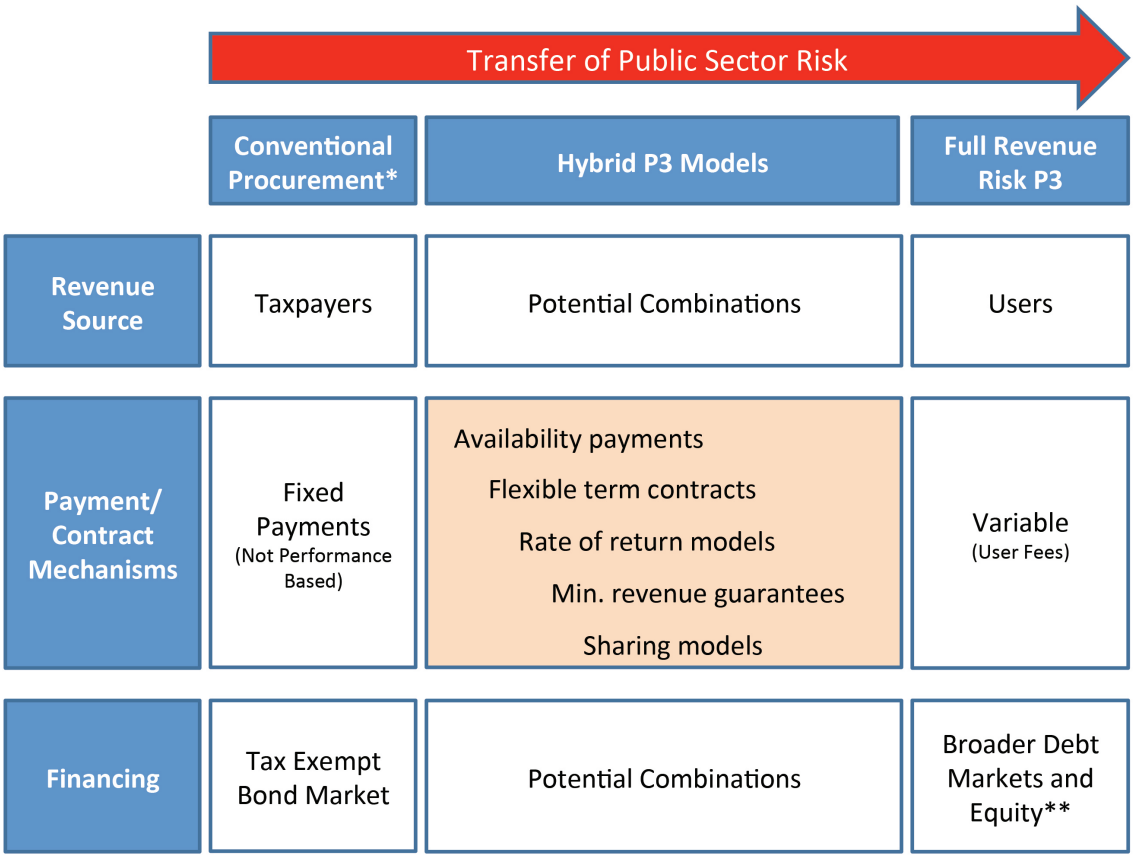
Beyond the stereotypical toll road P3, public sector project sponsors can choose from a menu of P3 options, all customizable to the specific objectives of the project and parties. Key questions in selecting the right structure are the extent of risk transfer the project sponsor wants to achieve, the intended revenue source or sources, and preferred payment mechanism and financing choices. To place these options in context, the matrix in Figure 9 contrasts representative categories of P3 structures with traditional public sector procurement in terms of risk allocation, revenue sourcing, payment mechanisms, and financing.

Traditional public sector procurement is shown on the left hand side of Figure 9. Under traditional procurement, government retains all responsibilities for design, construction, operation, and maintenance for a project and bears all associated risks: design flaws, construction cost overruns and delays, and higher costs for operation and maintenance.[32] The project is funded from general tax revenues, which typically cover fixed payments for debt service on tax-exempt bonds secured by the full faith and credit of the governmental entity.[33]

At the opposite extreme, on the right hand side of Figure 9, is the classic user-fee P3. Consider, for example, a toll road in which a private partner assumes all risks associated with design, construction, operations, and maintenance. Unlike a taxpayer-funded project, such a P3 is funded entirely from user-fees specific to the project and collected by the private partner. The private partner raises its own financing (possibly including tax-exempt private activity bonds). Importantly, in addition to performance risk, a user-fee P3 transfers *demand* risk. In the example of a toll road, demand risk involves the potential that traffic may fall well short of forecasts and cause user fees to be insufficient to cover operations, maintenance, debt service coverage, and returns on equity.

Potential alternatives to conventional procurement and pure demand risk P3s, discussed further below, are shown in the center panel of Figure 9: availability payments, flexible term contracts, rate of return models, minimum revenue guarantees, and sharing models. The next section explains each structure.

FIGURE 9 **Alternative Procurements Transfers Public Sector Risk While Tapping New Capital**



*No User Fees
**May include Private Activity Bonds (PABs)

A. THRESHOLD QUESTION: WHO WILL BEAR DEMAND RISK?

Whether the government or its private partner should bear the demand risk is one of the most critical questions in P3 structuring. Think again of a highway. In the stereotypical toll road P3, the private partner designs, delivers, and manages the road, collecting toll revenue to compensate it for its expenses and garner a return. Many toll road P3s have run into financial difficulty, including bankruptcies, when overly optimistic traffic and revenue projections were not realized. In general, the roads continued to operate seamlessly while control was transferred to government or creditors or sold at a discount to new equity investors—but bad headlines about P3s resulted nonetheless. Traffic projections can also fall short for other reasons, like a downturn in travel during the Great Recession, which was a factor in the Indiana toll road bankruptcy.[34]

Having the private partner bear all the demand risk—upside and downside—makes a P3 as similar to full private ownership as possible. And that can be attractive to investors. But it can also make P3s more politically difficult, more prone to failure, and more costly. Needless to say, imposing tolls or other user fees where they have not applied before is politically difficult. If demand is higher than expected and the project is very financially successful for investors, politicians will risk criticism for having given too rich a deal to private investors at constituent expense. If a project is a financial failure, politicians risk negative headlines, even if that financial failure in no way hurts service to customers. The Indiana toll road is a recent case in point.[35]

While equity investors are attracted to private ownership-like payoffs, infrastructure investments are no exception to the rule that investors demand higher returns for taking greater risk. Higher financing costs relative to municipal bond financing can make undertaking a P3 yet more politically and economically difficult.[36] P3s should be compared with conventional procurement financed with tax-exempt debt, based not only on design and construction costs, but also on costs over the asset lifecycle. However, comparing headline financing costs is easier (no 30-year cost calculations) and the tendency to do so is a common obstacle to P3s.

Ensuring investors bear at least some demand risk has the added governance benefit of guarding against the all-too-common political use of infrastructure funds. Private investors are unlikely to engage on bridges to nowhere and other white elephant projects, especially if they will depend on user fees for repayment. Imposing a benefit-cost analysis requirement for project approval can achieve the same goal with conventional procurement and pure availability payment projects. Both the Commonwealth of Virginia and the federal Transportation Investment Generating Economic Recovery (TIGER) grant program consider the economic benefit-cost ratio of all candidate projects before making funding decisions.[37]

B. HYBRID P3 MODELS

These problems have motivated the development of hybrid P3 arrangements—in between conventional procurement and a classic user-fee P3 structure—that can serve to fine-tune the sharing of risks and responsibilities between the public and private sectors. We describe the characteristics of some examples below, in approximate order of public risk transfer (also shown on the left page in Figure 9):

- **Availability payments**
- **Flexible term contracts**
- **Rate of return models**
- **Minimum revenue guarantees**
- **Sharing models**

1. User Fees Not Required: Availability Payments

Although the stereotypical P3 is a toll road, P3s need not involve user fees. They can be funded instead with government revenue, just like a conventionally procured, municipal bond financed project. Under such an *availability payment* arrangement, government compensates the investor with a pre-determined stream of payments if the asset is available and meets contracted standards.[38]

Generally, in an availability payment project, government pays the private partner out of tax revenue. A government project sponsor can also use availability fee arrangements *and* charge user fees—including by having its private partner collect those fees for government, then deposit those fees in its coffers and pay its partner directly from government revenue (including the fees). Another dedicated revenue option is to use tax-increment financing (an additional tax on real estate that benefits from the infrastructure project). For example, the $250 million Kansas City streetcar extension project will receive support from an incremental 1% retail sales tax and special assessments on property and parking lots in the surrounding Transportation Development District.[39]

Fully 48% of U.S. P3s that have reached financial close rely on availability payments. These span transit (as in the Denver FasTracks Eagle light rail project), roads and bridges (such as the Goethals Bridge between New York and New Jersey), broadband (the Kentucky Wired project), and social infrastructure (such as the Long Beach Courthouse). Social infrastructure projects typically rely on availability payments because of limited revenue potential. Canada, which requires that all infrastructure projects above C$100 million be screened to determine if P3 procurement is appropriate, does almost all its P3s on an availability payments basis.[40]

2. Flexible-Term Contracts

Under flexible-term contracts, the private partner bears demand risk, but the contract length will adjust if the demand forecast is wrong. Potential investors bid for a project based on the present value of revenue. Assume that for the baseline forecast, the P3 contract would last 30 years. If demand is higher than expected, investors are compensated faster and the contract ends sooner; if demand is lower than expected, the contract extends until investors are compensated. Government can then start a new operation and maintenance contract or operate and maintain the road itself if it prefers.

As in an availability payment DBFOM P3, the investor knows the present value of payments it will receive. However, the investor takes risk in the form of uncertain timing of those payments.

The United Kingdom (UK) used flexible term contracts for the Queen Elizabeth Bridge over the Thames River and Second Severn bridges on the Severn estuary. In Chile and Portugal, flexible-term contracts have been used for highway P3s, with Chile using auctions to select the winning bidder based on the lowest present value of revenue. Based upon available data, no flexible term P3 contracts exist in the U.S.

3. Rate of Return Models, Rate-Base Contracts, and Price Cap Models

Compensation frameworks from regulated utilities are natural candidates for P3s given the similarities between investor-owned utilities and giving private investors long-term control of a public asset through a P3. Frameworks from investor-owned, regulated utilities have been applied to P3s in both Europe and the U.S. For example, a rate of return model is designed to explicitly provide investors with the opportunity to earn returns on capital commensurate with their risk.[42] In this setting, regulators agree with investors on the amounts of capital investment that will be accumulated in a regulatory asset base (RAB). Investors earn a stipulated rate of return of investment on the undepreciated RAB plus annual depreciation on the RAB.[43] Operating costs can then be separately reimbursed in a manner similar to availability payments, subject to performance.

In utility regulation, a market-based "cost of capital" is routinely determined by examining returns to comparable enterprises. The goal is to achieve a balance between incentives sufficient to attract investment on the one hand, and low-cost, quality service to customers on the other. Investors still bear the risk of assuring prudent investments and efficient operations.[44, 45]

In the U.S., Ohio State University's new P3 for the campus energy grid will compensate investors with a combination of availability payments and rate-base payments common for utilities. An upfront payment of $1.015 billion and subsequent payments totaling $150 million helped sell the project to campus stakeholders and will help achieve the university's strategic plan with investments in campus facilities, competitive faculty salaries, and an augmented financial aid budget.[46]

Price cap models have been applied to airports in both the UK and Italy, including London Heathrow Airport, London Gatwick Airport, Milan Malapensa Airport, Rome Fiumicino Airport, and Venice Airport Marco Polo.[47] These price cap contracts involve forecasting volumes and calculating tariffs subject to a price cap that allows for remuneration of expected allowed costs on expected volumes. Price caps are typically reset every four to five years; over the intervening period, the private partner bears volume risk. Building such periodic reviews into the contract also creates a scheduled opportunity to manage and respond to change, including technological changes. For example, in the context of a road project, periodic resets could create the opportunity to respond to new developments such as autonomous vehicles.

4. Minimum Revenue Guarantees and Contingent Financing

Project sponsors can limit the private partner's downside risk by providing a minimum revenue guarantee. The contract can specify that if revenue falls below an agreed threshold and all other performance standards are met, the government will provide a subsidy equal to the shortfall between realized revenue and the guaranteed level.

In offering a guarantee, the government retains some of the demand risk that it would otherwise transfer to the private partner in a demand risk P3. Limiting the private partner's downside can help bring down its financing costs, thereby also reducing the project's lifecycle costs.

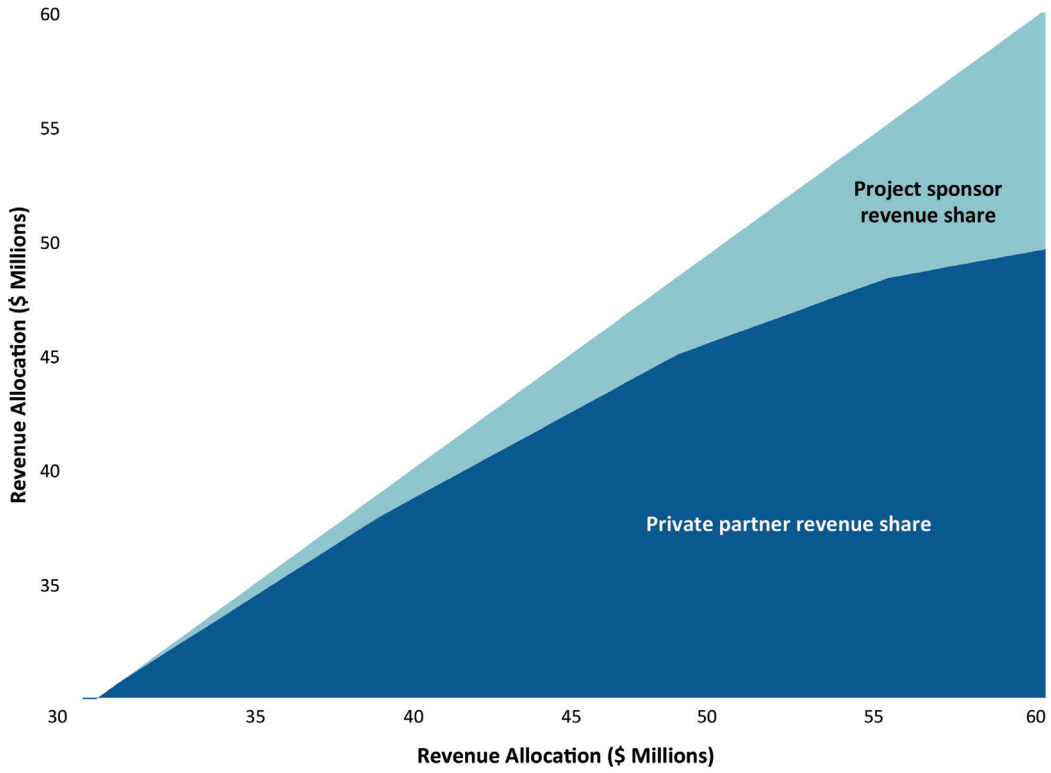
North Carolina's I-77 express lane P3 incorporates a similar contingent financing clause. The private partner can request up to $12 million per year if net revenue is insufficient to meet operating expenses and scheduled debt service payments on the Private Activity Bonds (PABs) and Transportation Infrastructure Finance and Innovation Act (TIFIA) loan, up to a lifetime cap of $75 million.[48]

5. Sharing Models

Under sharing arrangements, government project sponsors and their private partners can agree to share revenue or profit, thereby also sharing risk. The simplest sharing model would involve straight-line sharing of revenue. For example, government could receive 10% of user fee revenue, regardless of revenue levels, with its private partner retaining 90%.

Government will share in the project's upside and downside, aligning its interests with its private partners. If the project is very financially successful, officials are positioned to combat criticism of giving the private sector too sweet a deal by pointing to rising revenues and how they have used those revenues to benefit constituents. Investors benefit by lowering risk of policy decisions that could be negative for project revenue; for example, a government decision to build competing capacity.[49] Insulating the private partner from downside risk can lower financing costs, reduce the risk of project bankruptcy, and protect the project sponsor and local stakeholders against large rate increases. Sharing models can also be designed with sharing rates that vary by revenue or profit levels.[50] Minimum revenue guarantees are a special case of sharing model, where the project sponsor accepts all downside risk below a certain threshold
.
A recent example is the SH 288 toll lane P3 in Harris County, Texas. Private partner Blueridge Transportation Group will pay Texas DOT a percentage of revenues that steps up as higher revenue levels are achieved. The revenue sharing bands work like income tax brackets. In each period, Blueridge retains all revenue up to the first threshold, pays 12.5% of revenue to Texas up to the next threshold, and so on. Thresholds are pre-determined by the contract and rise over time, with a top-revenue sharing rate of 75% if revenue far exceeds forecast levels, as shown in Figure 10.[51]

FIGURE 10 **Texas DOT's Share of Revenues Steps Up as Higher Revenue Levels are Achieved**



Note: Year 1 of revenue payment calculation schedule used.

V. ENSURING VIABLE P3S

Developing a robust U.S. P3 market will require the development of sustainable risk allocation mechanisms that ensure projects are successful for both investors and sponsoring governments. Projects that enter P3 procurement must be carefully selected and contracted with a payment mechanism that allocates risks appropriately for the project and the procuring government's needs. Avoiding financial failures and political backlash will be essential to encouraging state and local governments to bring more projects for P3 procurement.

A. IDENTIFYING SUITABLE PROJECTS

P3s are not suitable for all projects. Developing viable P3s begins by screening projects to determine suitability. One threshold question may be to confirm that the jurisdiction has statutory authority to procure the project in question as a P3. More substantive, however, is determining whether a given project fits naturally into one or more of the risk-transfer structures outlined above. The answer may turn on whether a dedicated revenue stream can be identified or created. For example, projects with an evident potential user fee stream, like well-trafficked highways, have intuitively been strong candidates for P3s. Meanwhile, other projects, such as public buildings, are harder to extract from traditional government responsibility and funding.[52]

Sheer project size is another consideration. As discussed above, P3s may incur substantial incremental costs of structuring, negotiation, and financing which will be most efficient to spread over larger projects. Canada recognizes these fixed costs by requiring all projects over C$100 million to be screened for P3 suitability.[53] Alternatively, small and rural projects can work as P3s if many similar projects are bundled together. For example, Pennsylvania's Rapid Bridge Replacement P3 bundled together the replacement and maintenance of 558 bridges across the state into a single $899 million project.[54]

B. ASSESSING RISK ALLOCATION

When scoping a project for potential P3 procurement, government project sponsors should consider the benefits and costs of transferring risk to private partners. This process should begin by identifying the project's risks and defining government's risk transfer goals, where a guiding rule should be to transfer risks to the party best able to manage them efficiently. For example, a government running a single airport might want to transfer risks to a company that manages many airports and has developed best practices that make its operations more efficient while ensuring safety.[55]

However, every time government transfers risks to the private sector, government will need to pay for that transfer. Ultimately, the logic of risk transfer will need to be validated by a quantitative analysis of benefits and costs of a given P3 project, compared to conventional procurement. Best practice calls for government project sponsors to undertake a cash flow analysis over the project lifecycle—typically 30 years or more—conducted on a probabilistic basis starting with informed, realistic assumptions before launching P3 procurement. Such an analysis is often termed a *value-for-money analysis*. Like any valuation analysis, a value-for-money analysis can involve some subjective decisions, such as the choice of assumptions. Given the political environment in which such analysis is likely to be carried out, the project sponsor may be well served to engage an independent party to conduct a value-for-money analysis in accordance with agreed, transparent criteria.

Importantly, the outcome of a value-for-money analysis may depend not only on the project or proposed P3 structure, but also on timing, as current financial market conditions and tax rates will impact the relative attractiveness of different financing options.

C. IMPLEMENTATION CHALLENGES

In a Request for Proposal (RFP), project sponsors ideally lay out their intended combination of project type (e.g., DB, DBF, or DBFOM), and risk transfer structure in the RFP. Then comes implementation. This will involve many parties and processes, but two merit brief comment here: conducting a competitive bidding process, and optimizing financial resources and incentives.

Competitive bidding will in most cases be at the core of a successful P3 project. A bidding process can be expected to include qualifying candidate partners, bid solicitation, bid evaluation, and final negotiation. A single or possibly multiple rounds of bidding may be needed. Challenges may include dealing with a relatively limited universe of qualified partners, assuring comparability of potentially diverse offerings, and guarding against unsustainable "lowball" bidding (with the consequence of subsequent renegotiation or project distress). These challenges speak to the need for bid evaluation criteria encompassing qualitative as well as quantitative factors.[56] Some of these challenges may be mitigated by allowing shortlisted bidders the opportunity to comment on draft RFP terms before they are finalized, enabling potential deterrents to serious bids to be revisited and thereby promoting a competitive final round.

Separately, a wide range of financial resources may be brought to bear in a particular P3 project, potentially including tax-exempt private activity bonds, taxable debt, private sector equity, and government loans (e.g., TIFIA). Some projects combine P3 components with conventionally procured and financed components using traditional tax-exempt debt and federal grant funding. For example, the Denver FasTracks Eagle light rail used a combination of private financing, federal grants, and TIFIA loans. The $14 billion Los Angeles International Airport (LAX) modernization program is expected to use P3s for at least two components: the automated people mover (a train on a 2.25 mile elevated skyway) and consolidated rental car facility. Assembling these resources optimally

will call for carefully obtaining financing commitments (where relevant), efficient sequencing of financing in construction (e.g., using cheapest financing first, if possible), and recognition of limits and contingencies with respect to project milestones and/or specific uses of funds. These factors will affect the value-for-money assessment, and can thus be anticipated in the planning stages of a project. However, they may also be specific to particular bidder packages, and therefore the subject of negotiation and fine-tuning (again, calling for a confirming value-for-money assessment in the bid evaluation phase).

VI. CONCLUSION

At a time when infrastructure needs in the U.S. have become both acute and publicly visible, state and local governments are already ahead of the current federal administration in addressing the problem. The number of new P3 projects in development is unprecedented and still rising. Notably P3s are being deployed in sectors beyond transportation, and in a variety of risk-transfer structures that depart from established user-fee models.

The increase in P3 activity can be attributed to constrained public resources since the financial crisis, pent up demand for public infrastructure, increasing government recognition of the merits of P3s, and growing interest from investors. However, it is not a foregone conclusion that recent trends will continue. While P3s are well established in other advanced economies, their history in the U.S. is a reminder that P3s remain a relatively minor force in financing and delivering public infrastructure. This is not least because the customary practice of public ownership and tax-exempt bond financing has historically been adequate to the task, while, in some cases, P3 proponents have misallocated risks.

With a fresh awareness of risks and opportunities, P3s may now be poised to play a significant role in addressing the nation's infrastructure crisis, offering government project sponsors a bigger toolbox for delivering projects.

APPENDIX - INFRADEALS

All statistics noted in this report, unless otherwise indicated, were compiled by The Brattle Group from Inframation's global transactions database. Inframation is a widely used infrastructure news source that maintains a transaction database, tracking projects from first consideration of P3 procurement. See (http://inframationgroup.com/).

Inframation Deals
An Acuris company

All values or figures in the report are transactions that occurred 2006 and after. The resulting transactions were then limited to exclude deals that have the current status of "No Private Financing," "On Hold," or "Cancelled." Additionally, any sales that had the words "stake," "sale," or "refinancing" in their name were excluded. The term "In Progress" represents transactions with the following statuses: "Expressions of Interest," "Preferred Proponent" "RFP Returned," "RFQ Returned," "Shortlisted Proponents," and "Transaction Launch."

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ENDNOTES

1. Social infrastructure projects include various facilities that government operates, such as government buildings, convention centers, education and healthcare facilities, housing, and prisons.

2. Estimates of investment in airports, port, rail, road, water infrastructure; excludes telecom and electricity infrastructure, including any investment in publicly-owned assets in those sectors. Includes privately-owned rail and port infrastructure, as the Global Infrastructure Hub estimates investment by sector but does not break down public versus private asset investment. Estimates represent 2017-2040. "Forecasting infrastructure investment needs and gaps." Brattle calculations on Global Infrastructure Hub, Global Infrastructure Outlook. Accessed November 07, 2017. https://outlook.gihub.org/sectors/airport port rail road water/countries/United%20 States. The Global Infrastructure Hub was created by the Group of 20 (G20) national governments to promote the development of a global pipeline of quality, bankable infrastructure projects by facilitating knowledge sharing, identifying opportunities for reform, and connecting the public and private sectors.

3. The White House, "Legislative Outline for Rebuilding Infrastructure in America," February 12, 2018, https://www.whitehouse.gov/wp-content/uploads/2018/02/INFRASTRUCTURE-211.pdf downloaded February 13, 2018.

4. Inframation is a widely used infrastructure news source that maintains a transaction database, tracking projects from first consideration of P3 procurement. All statistics noted in this report, unless otherwise indicated, were compiled by The Brattle Group from Inframation's global transactions database. See http://inframationgroup.com/.

5. "Pre-launch" describes projects that the government sponsor has indicated as considering P3 procurement. In some instances, such as Virginia's Transform 66 express lane project, government announces that it will consider either P3 or conventional procurement. Pre-launch includes such transactions. "In progress" refers to transactions in the following phases, as defined by Inframation: expressions of interest (project sponsor calls for non-binding submissions from potential bidders to gauge interest), transaction launch (sponsor formally launches a tender), RFQ returned (bidders have responded to sponsor request for qualifications), pre-qualified proponents (sponsor has announced pre-qualified bidders based on RFQ submissions), RFP returned (pre-qualified bidders have submitted financial and technical bids), shortlisted proponents (sponsor has announced shortlisted bidders), and preferred proponent (sponsor has announced a winner but transaction has not yet closed).

6. Includes projects that at least have entered late stage development. Excludes secondary market sales of stakes in P3 projects.

7. The majority of street lighting projects involve replacing lights with energy-efficient LED lights. The Washington, DC and Miami-Dade County projects also provide broadband WiFi or enhanced cell phone service. They are often, but not always, sponsored by Department of Transportation authorities.

8. See https://www.ncppp.org/resources/research-information/state-legislation/. Thirty-nine jurisdictions enable P3s to some extent as of January 2017.

9. Those four states are Hawaii, New York, New Mexico and Rhode Island. All of these states with the exception of Rhode Island have drafted or contemplated P3 legislation.

10. Iowa, Kansas, and Oklahoma did not have P3 enabling legislation as of January 2017.

11. http://www.penndot.gov/ProjectAndPrograms/p3forpa/Documents/P3BridgeTeamSelect102414.pdf.

12. Inframation.

13. World Economic Forum, *The Global Competitiveness Report* 2017-18, p. 302. http://www3.weforum.org/docs/GCR2017-2018/05FullReport/TheGlobalCompetitivenessReport2017%E2%80%932018.pdf (downloaded November 1, 2017).

14. Estimates of investment in airports, port, rail, road, water infrastructure; excludes telecom and electricity infrastructure, including any investment in publicly-owned assets in those sectors. Includes privately-owned rail and port infrastructure, as the Global Infrastructure Hub estimates investment by sector but does not break down public versus private asset investment. Estimates represent 2017-2040. "Forecasting infrastructure investment needs and gaps." Brattle calculations on data from Global Infrastructure Hub, Global Infrastructure Outlook. Accessed November 7, 2017. https://outlook.gihub.org/sectors/airport port rail road water/countries/United%20States.

15. McKinsey Global Institute, *Bridging Global Infrastructure Gaps* (2017), pp. 7, 10. https://www.mckinsey.com/industries/capital-projects-and-infrastructure/our-insights/bridging-global-infrastructure-gaps (downloaded November 1, 2017).

16. A recent RAND study reviewed assessments of national infrastructure investment needs and concluded that they indicate the order of magnitude of investment needs but are not suitable for policy or investment planning.

    Knopman, Debra, Martin Wachs, Benjamin M. Miller, Scott G. Davis, and Katherine Pfrommer. *Not Everything Is Broken: The Future of U.S. Transportation and Water Infrastructure Funding and Finance*. Santa Monica, CA: RAND Corporation, 2017. https://www.rand.org/pubs/research_reports/RR1739.html. Also available in print form.

17. World Economic Forum (with the Boston Consulting Group), *Strategic Infrastructure Steps to Operate and Maintain Infrastructure Efficiently and Effectively* (April 2014), pp. 44-48 at http://www3.weforum.org/docs/WEF_IU_StrategicInfrastructureSteps_Report_2014.pdf (downloaded November 21, 2017).

18. Federal Highway Administration, Guidance on Preservation and Maintenance, February 25, 2016 at https://www.fhwa.dot.gov/preservation/memos/160225.cfm (downloaded November 9, 2017).

19. United States Census Bureau, 2007-2015, "State and Local Finances by Level of Government and by State," United States Department of Commerce, accessed January 11, 2018. https://www.census.gov/govs/local/.

    Revenues fell most sharply in those jurisdictions where property prices fell steeply and unemployment was highest.

20. The Act limits itemized deductions for state and local property taxes to $10,000. Previously, taxpayers who itemized deductions enjoyed a reduction in their federal taxes proportional to their state and local tax bill (contingent on not being subject to the Alternative Minimum Tax). Without the federal tax offset for higher state and local taxes, taxpayers in high tax states will be more sensitive to variation in state and local tax bills. High tax jurisdictions are already facing pressure from high income voters and businesses that employ them to reduce taxes. See, for example, https://www.wsj.com/articles/cuomos-protest-of-federal-tax-law-has-resistance-upstate-1517157214.

21. Congressional Budget Office, 2016 at https://www.cbo.gov/sites/default/files/114th-congress-2015-2016/costestimate/inhofeletteraugust2016htf.pdf (downloaded November 13, 2017).

22. "The Omnibus Budget Reconciliation Act of 1993 increased the gas tax by 4.3 cents, bringing the total tax to 18.4 cents per gallon." See https://www.fhwa.dot.gov/infrastructure/gastax.cfm (downloaded November 14, 2017)

    U.S. Bureau of Labor Statistics, "Producer Price Index by Commodity for Special Indexes: Construction Materials," retrieved from FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/WPUSI012011 (downloaded November 14, 2017).

23. The total marginal tax rate reflects the percentage of one additional dollar of income that an individual would have to pay in federal, state, and local income taxes.

24. National Economic Council and President's Council of Economic Advisors. *An Economic Analysis of Transportation Infrastructure Investment*. Washington, D.C.: The White House, 2014. https://obamawhitehouse.archives.gov/sites/default/files/docs/economic_analysis_of_transportation_investments.pdf (downloaded November 1, 2017).

25. *Ibid.*

26. "Aging Water Infrastructure," United States Environmental Protection Agency: Science Matters Newsletter. https://www.epa.gov/sciencematters/epa-science-matters-newsletter-volume-1-number-1 (downloaded November 1, 2017).

27. U.S. Department of the Treasury, Office of Economic Policy, "Expanding Our Nation's Infrastructure through Innovative Financing," (September 2014) at https://www.treasury.gov/resource-center/economic-policy/Documents/3_Expanding%20our%20Nation%27s%20Infrastructure%20through%20Innovative%20Financing.pdf (downloaded November 21, 2017).

    If quality is not contractible, a PPP contract is more likely to induce the private partner to cut costs in ways that result in suboptimal quality of the infrastructure service.

28. Inframation.

29. U.S. Department of the Treasury, Office of Economic Policy, "Expanding Our Nation's Infrastructure through Innovative Financing," (September 2014) p. 3 at https://www.treasury.gov/resource-center/economic-policy/Documents/3_Expanding%20our%20Nation%27s%20Infrastructure%20through%20Innovative%20Financing.pdf (downloaded November 21, 2017).

30. The Treasury Department estimated that issuers saved an average of 84 basis points on yield compared to traditional tax-exempt debt, for a total of $20 billion in savings. See U.S. Treasury Department, "Treasury Analysis of Build America Bonds Issuance and Savings," May 16, 2011 at https://www.treasury.gov/initiatives/recovery/Documents/BABs%20Report.pdf (downloaded November 13, 2017).

31. Global Infrastructure Hub and EDHEC Infrastructure Institute, "Annual Global Infrastructure Investor Survey: Insights into infrastructure markets," at https://gihub-webtools.s3.amazonaws.com/umbraco/media/1823/gih_edhec-factsheet_art2_web.pdf (downloaded November 13, 2017).

32. U.S. Department of the Treasury, Office of Economic Policy, "Expanding Our Nation's Infrastructure through Innovative Financing," (September 2014) at https://www.treasury.gov/resource-center/economic-policy/Documents/3_Expanding%20our%20Nation%27s%20Infrastructure%20through%20Innovative%20Financing.pdf (downloaded November 21, 2017) and Engel, Eduardo, Ronald D. Fischer, and Alexander Galetovic, *The Economics of Public-Private Partnerships* (New York: Cambridge University Press, 2014).

33. While government typically contracts with private sector entities for the design and construction of the project, this does not rise to the level of transferring risk or funding/financing responsibility.

34. Other examples of deals that have faced issues with traffic projections include: the South Bay Expressway in San Diego, CA; the Pocahontas Parkway in Richmond, VA; and SH-130 in Texas.

    See Mallet, William J. "Indiana Toll Road Bankruptcy Chills Climate for Public-Private Partnerships," (CRS Insights No. IN10156) Washington, DC, Congressional Research Service, 2014. https://www.ncppp.org/wp-content/uploads/2013/02/CRS-Insights-Indiana-Toll-Road-Bankruptcy-Chills-Climate-for-P3s.pdf (accessed November 22, 2017).

35. *Ibid.*

36. As discussed above, since the Global Financial Crisis, tax-exempt borrowing spreads over treasuries have been roughly the same for corporate bonds. See Section III.B.2.

37. "Cost Benefit and Opportunity Cost Analysis Guidelines for the Public-Private Education Facilities and Infrastructure Act of 2002," Virginia Department of Transportation Office of Public-Private Partnerships, accessed February 12, 2018, http://www.p3virginia.org/wp-content/uploads/2016/01/Final-CBA-OCA-Guidelines.pdf.

    "Benefit-Cost Analysis Guidance for Discretionary Grant Programs," U.S. Department of Transportation, accessed February 12, 2018, https://www.transportation.gov/sites/dot.gov/files/docs/mission/office-policy/transportation-policy/284031/benefit-cost-analysis-guidance-2017_2.pdf

38. While at the low end of the spectrum of private risk bearing, availability payments may nonetheless be subject to appropriations risk.

39. "Kansas City Authorities Issues Streetcar RFI," Inframation, accessed on February 14, 2018, https://www.inframationnews.com/news/2637826/kansas-city-authorities-issue-streetcar-rfi.thtml.

40. Canada's Economic Action Plan 2013 mandated that all projects with capital costs of more than $100 million submitted to the Building Canada Fund would be subject to a screen for P3 viability.

41. Engel, Eduardo, Ronald Fischer, and Alexander Galetovic, "Public-Private Partnerships to Revamp U.S. Infrastructure," The Hamilton Project, Discussion Paper 2011-02, February 2011.

42. The rate of return model targets, but does not guarantee, the risk-appropriate return. As a result, it may be combined with some measure of demand risk or hybrid risk sharing mechanisms.

43. For example, for a utility investment of $100,000 million with a ten-year depreciation life, capital recovery would typically consist of annual depreciation plus return. If the allowed return was 10%, the total payment in the first year of asset life would be depreciation of $10 million ($100 million/ 10 years) plus $10 million in return (10% x $100 million).

44. Investors, however, may or may not be shielded from demand risk.

45. Perhaps anticipating wider P3 use of compensation frameworks from regulated utilities, the White House infrastructure plan would extend permission to issue tax-exempt Private Activity Bonds (PABs) to private enterprises if (a) *rates charged for services or use of projects are subject to state or local government regulatory or contractual control or approval*, and (b) the projects are available for public use or the provision of services to the general public. See, The White House, "Legislative Outline for Rebuilding Infrastructure in America," February 12, 2018, https://www.whitehouse.gov/wp-content/uploads/2018/02/INFRASTRUCTURE-211.pdf (downloaded February 13, 2018).

46. "Case Study: Ohio State University Utilities Deal Opens "New Asset Class"," Inframation, accessed on February 14, 2018, https://www.inframationnews.com/analysis/2497246/case-study-university-of-ohio-utilities-deal-opens-new-asset-class.thtml?utm_source=newsletter&utm_medium=email&utm_campaign=infradeals-briefing-%3f2017-10-12.

47. See https://www.heathrow.com/company/company-news-and-information/economic-regulation and http://www.caa.co.uk/Commercial-industry/Airports/Economic-regulation/Licensing-and-price-control/Price-controls/ (both accessed February 14, 2018). Article 17 of Law 102/2009 establishes price cap regulation of Italian airports with over 8 million annual passengers. Agreements for each airport may be found at https://www.enac.gov.it/La_Regolazione_Economica/Aeroporti/Contratti_di_Programma/Stipulati/index.html.

48. "Review of the Comprehensive Agreement for the I-77 Express Lane Project," Mercator Advisors, LLC, accessed January 4, 2018, https://www.ncdot.gov/projects/I-77ExpressLanes/download/mercator-final-report.pdf.

49. Determining under what circumstances the project sponsor can build competing capacity is a very complex issue. See discussion of competition clauses and sharing models in, U.S. Department of the Treasury, Office of Economic Policy, "Expanding the Market for Infrastructure Public-Private Partnerships: Alternative Risk and Profit Sharing Approaches to Align Sponsor and Investor Interests," (April 2015) at https://www.treasury.gov/resource-center/economic-policy/Documents/2_Treasury%20Infrastructure%20White%20Paper%20042215.pdf (downloaded November 21, 2017).

50. U.S. Department of the Treasury, Office of Economic Policy, "Expanding the Market for Infrastructure Public-Private Partnerships: Alternative Risk and Profit Sharing Approaches to Align Sponsor and Investor Interest," April 2015.

51. http://ftp.dot.state.tx.us/pub/txdot-info/hou/sh288_toll_lanes/executed/da.pdf.

52. Importantly, the mere potential for attractiveness to private investors, taken in isolation, could defeat the purpose of P3s in achieving public goals.

53. Canada's *Economic Action Plan 2013* mandated that all projects with capital costs of more than $100 million submitted to the Building Canada Fund would be subject to a screen for P3 viability.

54. http://www.penndot.gov/ProjectAndPrograms/p3forpa/Documents/P3BridgeTeamSelect102414.pdf.

55. However, in a large metropolitan area with multiple airports, which are often run by a single public agency, any transfer of control to private contractors should ensure competition.

56. Just as best practice calls for a value-for-money analysis comparing conventional and P3 procurement before government decides which approach to undertake, project sponsors should also use value-for-money analysis to compare bids.

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