ANNUAL PRIVATIZATION REPORT: TRANSPORTATION FINANCE

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May 2020

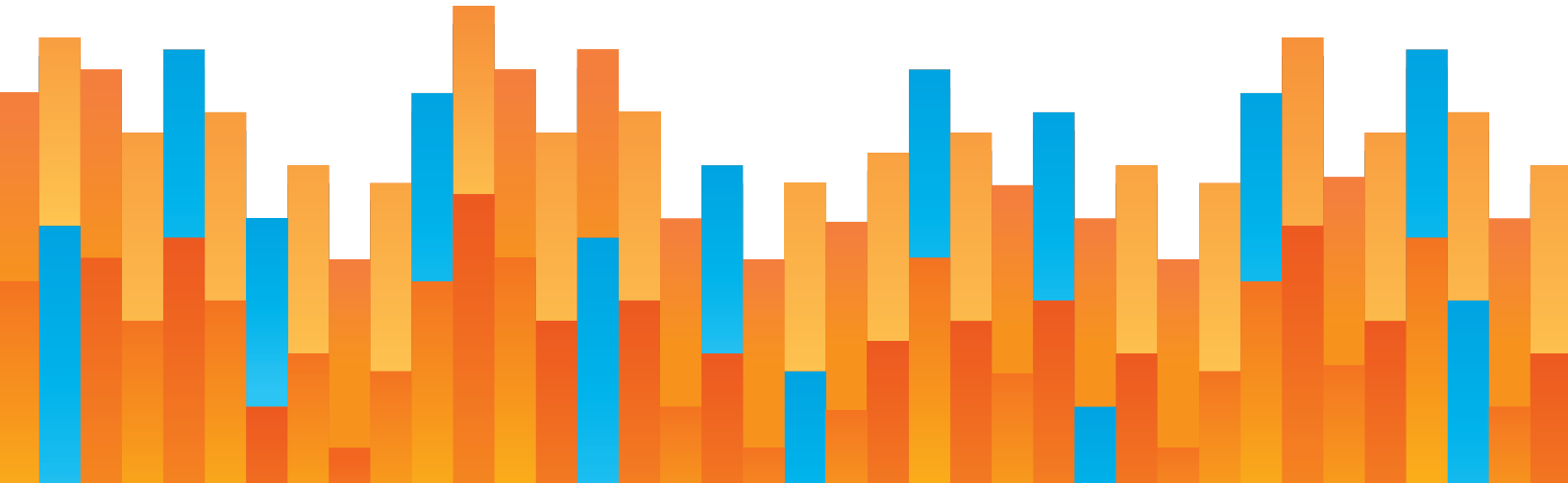

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TABLE OF CONTENTS

PART 1

INTRODUCTION

Beginning in the late 1980s and on into the 1990s, governments in many developed countries privatized many state-owned enterprises, including infrastructure such as airports, electricity, gas, railroads, seaports, telecoms, and toll roads. Some of these facilities were sold to investors, in whole or in part. In many other countries, enterprises of this kind were instead leased to investors under long-term public-private partnerships (P3s). Thereafter, a growing number of governments used such P3s to finance, build, and operate new airports or airport terminals, electricity facilities, seaports, and toll roads. The sale or lease of an existing facility is called a "brownfield" transaction (in part because significant refurbishment may be needed). By contrast, P3s for brand new facilities are referred to as "greenfield" transactions.

Additionally, a substantial amount of U.S. infrastructure is owned and operated by the private sector, including most of the U.S. energy production and electric and gas utility infrastructure. These assets may be held through publicly traded corporations or (in the case of energy) master limited partnerships, or they may be owned directly by private investors.

Infrastructure projects of both brownfield and greenfield types require long-term financing. In the public sector, such facilities are often financed 100% by government bonds, which in the United States are tax-exempt. When the private sector invests in infrastructure, it typically invests equity to cover part of the cost, and finances the rest via either bank loans or long-term borrowing, such as via revenue bonds. These large financing needs led to the

development and growth of infrastructure investment funds, most of which raise equity to invest in privately owned or P3 infrastructure (though a more recent development is infrastructure debt funds, as well). Public pension funds, seeking to increase their overall return on investments, have begun investing equity in such infrastructure as well.

During 2019, *Infrastructure Investor* reported that investors put a near-record $97.3 billion in new money into infrastructure investment funds of this kind.[1] Pension funds continued to increase their investment in such infrastructure, in most cases by placing a specific allocation with one or more of the infrastructure funds, but a handful of large pension funds have built professional staffs that enable them to make direct investments in individual facilities.

This report reviews 2019 developments in the infrastructure investment fund world, focusing on transportation infrastructure. While the scope of the report is global, it pays particular attention to U.S. developments in P3 infrastructure and the growth of U.S. pension fund investing in this field.

[1] PEI Staff. "2019 Is Infra's Second-Best Fund-Raising Year." *Infrastructure Investor.com*. January 21, 2020.

PART 2

MAJOR INFRASTRUCTURE INVESTMENT FUNDS AND TRENDS

2.1 OVERVIEW

Each year, *Infrastructure Investor* publishes a table of the amounts raised by the 50 largest infrastructure investment funds over the latest five-year period. Table 1 lists those funds and the five-year total each has raised by 2019. The five-year total reached by all 50 funds is $496 billion.

TABLE 1: 50 LARGEST INFRASTRUCTURE INVESTMENT FUNDS: "INFRASTRUCTURE INVESTOR 50, 2019"

2019 Rank	2018 Rank	Fund	Headquarters	Total as of 2019 ($B)	Total as of 2018 ($B)
1	1	Macquarie Infrastructure & Real Assets	London	$60.770	$55.530
2	3	Global Infrastructure Partners	New York	$57.415	$26.000
3	2	Brookfield Asset Management	Toronto	$38.686	$27.698
4	4	KKR	New York	$20.188	$18.653

2019 Rank	2018 Rank	Fund	Headquarters	Total as of 2019 ($B)	Total as of 2018 ($B)
5	11	AMP Capital	Sydney	$18.254	$10.533
6	15	EQT Partners	Stockholm	$17.851	$7.275
7	5	IFM Investors	Melbourne	$16.006	$17.702
8	6	Stonepeak Infrastructure Partners	New York	$15.027	$14.946
9	24	Blackstone	New York	$14.000	$5.000
10	12	BlackRock	New York	$13.896	$10.495
11	7	I Squared Capital	Miami	$13.400	$12.000
12	8	First Sentier Investors	Sydney	$12.986	$11.128
13	9	Ardian	Paris	$12.919	$10.652
14	10	Energy Capital Partners	Summit, NJ	$11.275	$10.556
15	39	Colony Capital	Los Angeles	$10.309	$3.300
16	16	ArcLight Capital Partners	Boston	$10.022	$7.247
17	28	Dalmore Capital	London	$8.551	$4.208
18	14	Antin Infrastructure Partners	Paris	$8.173	$8.173
19	22	Carlyle Group	Washington	$7.800	$5.321
20	18	Copenhagen Infrastructure Partners	Copenhagen	$6.784	$6.095
21	19	Infracapital	London	$6.516	$5.988
22	31	Greencoat Capital	London	$6.112	$3.846
23	26	Actis	London	$5.994	$4.364
24	20	Partners Group	Baar-Zug	$5.714	$5.975
25	23	F2i Sgr	Milan	$5.565	$5.050
26	30	Queensland Investment Corp. (QIC)	Brisbane	$5.509	$3.890
27	17	DIF Capital Partners	Schiphol	$5.297	$6.361
28	27	LS Power Group	New York	$4.604	$4.330
29	34	Equitix	London	$4.565	$3.542

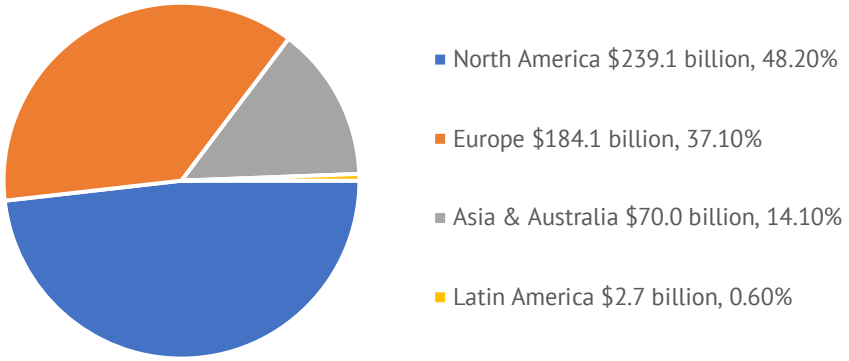
2019 Rank	2018 Rank	Fund	Headquarters	Total as of 2019 ($B)	Total as of 2018 ($B)
30	52	Infravia Capital Partners*	Paris	$4.546	n.a.
31	32	Ping An Asset Management	Shanghai	$4.496	$3.810
32	38	Capital Dynamics	Zug	$4.227	$3.309
33	36	Axium Infrastructure	Montreal	$4.199	$3.380
34	33	Morgan Stanley Infrastructure Partners	New York	$4.089	$3.600
35	29	Sunvision Holdings	Shanghai	$4.087	$4.148
36	25	InfraRed Capital Partners	London	$3.991	$4.647
37	37	Meridiam Infrastructure	Paris	$3.785	$3.327
38	35	DWS	Frankfurt	$3.670	$3.490
39	42	Goldman Sachs Infrastructure Partners	New York	$3.267	$2.969
40	67	National Investment & Infrastructure Fund*	Mumbai	$3.247	n.a.
41	73	Alinda Capital Partners*	Greenwich, CT	$3.204	n.a.
42	21	Hermes Infrastructure	London	$3.121	$5.380
43	n.a.	Swiss Life Asset Managers	Zurich	$3.057	n.a.
44	47	Oaktree Capital Management	Los Angeles	$2.996	$2.240
45	n.a.	Vauban Infrastructure Partners*	Paris	$2.979	n.a
46	13	KDB Infrastructure Investments	Seoul	$2.767	$9.551
47	56	Patria Investments*	Sao Paulo	$2.699	n.a.
48	n.a.	CICC Capital*	Beijing	$2.627	n.a.
49	96	Instar AGF Asset Management*	Toronto	$2.493	n.a.
50	103	Argo Infrastructure Partners*	New York	$2.450	n.a.

***indicates not in top 50 in prior year**
Source: *Infrastructure Investor*, November 2019.

As can be seen by the various headquarters locations, these funds are being raised world-wide, but North America and Europe account for the lion's share of where funds are being raised, as has been true for many years. The geographical breakdown is in Figure 1 below.

FIGURE 1: GEOGRAPHICAL BREAKDOWN OF INFRASTRUCTURE INVESTMENT

TOTAL INVESTED: $495.9 BILLION



The purpose of raising these funds is to invest the money in infrastructure projects. (Different media track and report infrastructure investment in different categories, which should be kept in mind in what follows.) *Inspiratia* reported in January 2020 that $234 billion was invested in infrastructure and renewable energy projects worldwide in 2019; $132 billion of that total was infrastructure, by their estimates.[2] North America accounted for $32 billion of this infrastructure, and the three largest transportation deals were the acquisition of 10.1% of Canadian toll road 407 ETR ($2.4 billion), the sale of the Long Beach (CA) Container Terminal ($1.8 billion), and the $1.2 billion extension of the Trillium rail line in Canada.

Inframation, using somewhat different definitions, counted 57 North American transportation deals in 2019, of which 10 were greenfield P3s with a total value of $6.2 billion.[3] Brownfield deals included the sale of the Genesee & Wyoming Railroad ($8.68 billion), sale of 80% of Direct Chassis Link ($2.5 billion), and the above-noted 407 ETR transaction. Greenfield deals included two issues of tax-exempt Private Activity Bonds for Florida's Brightline intercity rail project ($2.7 billion) and the NTE Segment 3C highway project in Texas ($0.91 billion).

2 Coker, Omolola. "Where the Money Went in 2019." *Inspiratia.com*. January 22, 2020.

3 Inframation. "Transport North America." Downloaded January 17, 2020.

Every year Probitas Partners conducts a survey of institutional investors in infrastructure. In the 2019 edition, respondents expressed some concern that so much money is being raised that this might reduce future returns. Despite this, funds' "appetite for infrastructure remains strong—but primarily in developed countries."[4] Respondents reflected the geographical distribution of the funds in Table 1, with 60% from North America, 22% from Europe, 16% from Australia, and 2% other. Given a choice between public-private partnerships (P3s) and projects that do not involve contracting with a government entity, 36% preferred independent projects, 31% preferred a mix of P3s and independent projects, another 31% considered such a mix irrelevant, and only 2% preferred exclusively P3 projects.

While transportation was the third-most popular category of infrastructure in 2018, it moved into a tie with renewable energy in first place in the 2019 survey, as shown in Table 2.

TABLE 2: INFRASTRUCTURE INVESTMENT SECTORS OF INTEREST

Sector	2018	2019
Transportation	60%	74%
Renewable Energy	66%	74%
Energy and Power	54%	71%
Water and Waste Management	66%	69%
Telecom	57%	69%
Diversified Only	43%	52%
Social Services	37%	43%
Opportunistic/No Sector Focus	49%	16%

Source: Probitas Partners. "Infrastructure Institutional Investor Trends: 2019 Survey Results." 2019.

[4] Probitas Partners. "Infrastructure Institutional Investor Trends: 2019 Survey Results." 2019.

As for which geographical areas the surveyed investors choose to focus on, Table 3 provides a breakdown.

TABLE 3: INSTITUTIONAL INVESTOR GEOGRAPHICAL FOCUS

North America	**81%**
Western Europe	76%
Global	74%
Developed Markets	45%
Australia	26%
Asia	19%
Emerging Markets	10%
Latin America	10%
Eastern Europe	7%
Sub-Saharan Africa	2%
Middle East/N. Africa	2%
Other	5%

Source: Probitas Partners. "Infrastructure Institutional Investor Trends: 2019 Survey Results." 2019.

2.2 EXAMPLES OF DIVESTITURES AND ACQUISITIONS

Most current infrastructure investment funds are "closed end," which means they raise money to invest for a pre-set period of time, typically 10 years. The funds are not "buy and hold" investors; rather, they seek to develop a portfolio that will be adjusted during its life to maximize the overall return to those who have placed funds with it. Hence, at various points in time during a fund's life, it will acquire investments, work to improve their operations, and then sell some holdings to realize value appreciation. This is not short-term "asset flipping" as is sometimes see in housing markets. Rather, it is an ongoing process that seeks to optimize the performance of the investments in the fund. Here are some examples from 2019.

- **Goldman Sachs Infrastructure Partners II** in October was pursuing the sale of its 49% stake in the concession company for the PR-5 and PR-22 toll roads in Puerto Rico.[5] That fund was also in the process of selling its stake in a set of 11 Mexican toll road concessions.[6] Among the interested bidders were a consortium of Abertis and Atlantia and China Communications Construction Company.[7]
- **Macquarie Infrastructure and Real Assets** in December was reported to be considering the sale of its equity in the concession for the Elizabeth River Tunnels in Virginia.[8] It also sold its stake in privately owned Brussels Airport.[9] On the other hand, Macquarie also reached financial close on two highway projects: the $375 million A9 motorway P3 in the Netherlands[10] and the $1.3 billion Silvertown Tunnel P3 in London.[11] It was also considering acquisition of a portfolio of toll roads in Colombia.[12]
- **Brookfield Asset Management** sold 33% of its equity in two Chilean toll road concessions to French investment fund Ardian.[13]
- France's **Meridiam** bought controlling stakes in two Spanish toll roads from developer Cintra for $504 million.[14]

5 "Goldman Infra Retains Bankers to Sell PR Highway Concession Stake." *Inframation News*. Oct. 24, 2019.

6 Tan, Gillian, Rodrigo Orihuela, and Michael O'Boyle. "Goldman Is in Talks to Sell Mexico Tollroad Operator." *Bloomberg News*. Oct. 9, 2019.

7 "International Consortia Vie for Goldman's Mexican Highway Portfolio." *Inframation News*. Oct. 9, 2019.

8 Tan, Gillian. "Macquarie Weighs $2 Billion Sale of Virginia Toll Tunnels." *Bloomberg News*. Dec. 9, 2019.

9 Carr, Rose. "FC for Brussels Airport." *Inspiratia.com*. Dec. 12, 2019.

10 Rivera, Fernando Moncada. "Macquarie Team Closes Financing on A9." *Inspiratia.com*. Dec. 4, 2019

11 Bentley, Zak. "Macquarie Consortium Closes on One of the Last UK PPPs." *Infrastructure Investor*. Nov. 28, 2019.

12 Tomaselli, Wesley. "Macquarie Sets Sights on Colombia Portfolio Buyout." *Inframation News*. May 20, 2019.

13 Rivera, Fernando Moncada. "Ardian Buys Into Chilean Road Concessions." *Inspiratia.com*. Sept. 9, 2019.

14 Rivera, Fernando Moncada. "Meridiam Buys Majority of Two Spanish Toll Roads." *Inspiratia.com*. June 17, 2019.

- **BBGI** acquired 33.3% of the equity in the Ohio River Bridges East End Crossing P3 concession, increasing its stake to 66.6%, with the remainder held by original investors Vinci and Walsh.[15]
- **Acciona** sold 80% of the equity in the Spanish toll road Gerediaga-Elorrio to infrastructure fund 3i Group for $77 million.[16]
- **3i Group** and **TIIC** acquired 50% of the equity of a tunnel under the River Shannon in Ireland and 75% of the equity in the same developer's concession for a 175-km toll road on the Cork-Dublin Route. The seller was the consortium of companies that was awarded the original concessions for these projects.[17]

In a number of these transactions, we can see infrastructure funds buying some or all of the equity invested by the original construction-oriented companies that won the concessions and took on initial risks such as environmental permitting, late completion, and construction cost overruns. Once those risks are in the past, the operational project has lower overall risk, and better fits the criteria of many infrastructure investment funds. Other funds are willing to be greenfield investors, taking the early-stage development and construction risks in hopes of a higher return on their equity investment.

15 Tammik, Ott. "BBGI Ups Stake in US Bridge PPP." *Inspiratia*. May 17, 2019.

16 Rivera, Fernando Moncada. "3I Buys Spanish Road." *Inspiratia*. Oct. 29, 2019.

17 Carr, Rose. "Infra Investors Acquire Major Stakes in Irish Road PPPs." *Inspiratia*. June 14, 2019.

PART 3

P3 COMPANIES AND PROJECTS

Previous issues of this chapter of Reason's *Annual Privatization Report* have relied on a database created and maintained by *Public Works Financing*, the U.S.-based newsletter that chronicled the growth of P3 infrastructure since the 1990s. That newsletter ceased publishing at the end of 2018. The comparable data tables for this year's chapter were developed by Inframation, a company that likewise maintains a detailed database on P3 infrastructure. Since the databases were compiled separately, direct comparisons between this year's tables and last year's may not be reliable.

Table 4 below lists the 19 largest transportation infrastructure P3 projects that were financed in 2019. As can be seen, none of these are located in the United States. By sector, rail projects were the largest category, representing 41.5% of the $28.6 billion value of the 19 projects. Roadway (including bridges and tunnels) projects were in second place, at 33.1% totaling $9.48 billion. Light rail transit projects accounted for another 16%, with one airport and one rail rolling stock project accounting for the remainder. Geographically, these projects are located in seven developed countries (members of the Organization for Economic Cooperation and Development—OECD) and five developing countries, each group with about half of the total investment value of the 19 projects.

TABLE 4: MAJOR GREENFIELD TRANSPORTATION P3S FINANCED IN 2019

Country	Project	Sector	Value $B	Lead Developers
China	Hangzhou-Shaoxing-Taizhou HSR	Rail	$6.670	China Railway/Hongrun Construction
Australia	Sydney Metro Stage 2	Rail	$2.534	MTR Corporation/Plenary
India	Bangalore International Airport	Airport	$1.914	Siemens/Airports Authority of India
Canada	Ottawa LRT Stage 2, Confederation	Light Rail	$1.907	Vinci/Kiewit
Cambodia	Phnom Penh-Sihanoukville Expressway	Roads	$1.800	China Road & Bridge Corporation
Australia	Cross River Rail, Brisbane	Rail	$1.562	BAM PPP PGGM/CIMIC Group
U.K.	Silvertown Tunnel	Roads	$1.551	Ferrovial/Macquarie
Canada	Hurontario LRT	Light Rail	$1.465	John Laing/ Transdev/Astaldi
Chile	Americo Vespucio Oriente Highway	Roads	$1.200	Sacyr/OHL Concessions
Uruguay	Ferrocarril Central	Rail	$1.100	Sacyr/Grupo Saceem
Netherlands	A9 Amstelveen-Ouderkerk Amstel	Roads	$1.043	FCC Construcción/ Macquarie
Colombia	Autopista al Mar 1	Roads	$1.000	Strabag, Sacyr
Colombia	Rumichaca-Pasto Highway	Roads	$0.785	Sacyr/HCC
Australia	NSW Regional Rail Fleet	Rolling Stock	$0.784	CAF/CIMIC Group
Colombia	Autopista al Mar 2	Roads	$0.750	China Harbour Engineering
France	Route Centre-Europe Atlantique	Roads	$0.676	Eiffage/APRR
South Korea	Mandeok-Centum Naedbu Expressway	Roads	$0.672	Shinwa Construction/ DSME/LOTTE
South Korea	Dongbukseon LRT	Light Rail	$0.669	Macquarie/Hyundai
Canada	Ottawa LRT State 2, Trillium	Light Rail	$0.598	SNC-Lavalin

Source: Inframation

Table 5 lists the 40 largest (by numbers of projects) investors in P3 transportation projects through the end of 2019. The top 10 investors are all from Europe, with Spain representing six of the 10. In the second 10, the United Kingdom has four representatives, with two from Australia, another each from France and Spain, and one each from Brazil and Mexico. Across the entire top 40, Spain is the headquarters of eight, with France close behind at seven and the U.K. with five. The United States does not appear until the last 10, with Plenary North America and Fluor Corporation.

TABLE 5: WORLD'S LARGEST TRANSPORTATION P3 INVESTORS, BY NUMBER OF PROJECTS

Name	Headquarters	Operating/ Under Construction	Pursuits
Vinci	France	45	38
Grupo ACS/Hochtief	Spain	47	17
Meridiam Infrastructure	France	34	12
DIF Capital Partners	Netherlands	32	3
Abertis*	Spain	31	3
Ferrovial/Cintra	Spain	27	9
Sacyr	Spain	26	9
Globalvia	Spain	25	4
3i Group	United Kingdom	22	0
FCC Construcción	Spain	21	2
InfraRed Capital Partners	United Kingdom	20	2
John Laing	United Kingdom	19	12
Macquarie	Australia	19	11
PINFRA	Mexico	17	1
Dalmore Capital	United Kingdom	17	0
Bouygues	France	16	0
Transurban Group	Australia	14	2
Companhia de Concessoes Rodoviarias (CCR)	Brazil	14	1

Name	Headquarters	Operating/ Under Construction	Pursuits
Aberdeen Standard Investors	United Kingdom	14	1
Acciona	Spain	13	12
Impulsora del Desarrollo y el Empleo en America Latina	Mexico	12	2
Avax	Greece	12	2
BBGI Management	Luxembourg	12	2
BAM PPP PGGM Infrastructure	Netherlands	12	1
GMR Infrastructure	India	12	6
Eiffage	France	12	2
TAV Airports Holding	Turkey	11	2
IRB Infrastructure Developers	India	11	0
Group Odinsa	Colombia	10	2
Strabag	Austria	10	7
Colas	France	10	5
EGIS Group	France	10	9
Mirova Asset Management	France	10	1
Abu Dhabi Investment Authority	UAE	10	1
Astaldi Group	Italy	10	1
Plenary North America	USA	9	7
SNC-Lavalin	Canada	9	3
Fluor Corporation	USA	9	2
Comsa Corporación	Spain	9	1
Arteris	Brazil	9	n/a

Source: Inframation
***now owned by ACS/Hochtief**

Table 6 focuses on transportation P3 *developers*, as opposed to investors. Here companies from France and Spain represent half of the top 10, with two from Australia and one each from the United Kingdom and the United States. The leading positions of developers from Australia, France, and Spain reflect the extensive use of the public-private partnership approach to major transportation projects in those countries, which has led to considerable experience by major companies that now compete worldwide for P3 projects.

TABLE 6: TOP 10 P3 GLOBAL TRANSPORTATION DEVELOPERS BY PROJECT VALUE

Name	Headquarters	Total Value ($B)	Number of Projects
Grupo ACS/Hochtief*	Spain	$61.27	55
Vinci	France	$37.60	45
Ferrovial/Cintra	Spain	$34.49	39
FCC Construcción	Spain	$16.69	38
Meridiam Infrastructure Managers	France	$42.66	30
John Laing	United Kingdom	$29.53	27
Bouygues	France	$19.05	27
Macquarie	Australia	$26.96	25
Transurban Group	Australia	$17.32	17
Fluor Corporation	USA	$16.51	14

Source: Inframation
***not including Abertis**

Whereas Table 6 presents worldwide figures on P3 transportation projects, Table 7 zeroes in on the United States. P3 projects are still a very small fraction of large-scale highway, transit, and airport projects in this country, but several dozen projects have been financed in the past 20 years. This table shows that, while French and Spanish developers have again played a large role, three U.S. developers have been successful in a number of cases, as has Australia's Transurban, the U.K.'s John Laing, the Netherlands' APG, and Sweden's Skanska.

TABLE 7: TOP 10 U.S. P3 TRANSPORTATION DEVELOPERS, BY NUMBER OF PROJECTS

Name	Headquarters	Project Value ($B)	Number of Projects
Meridiam Infrastructure Managers	France	$17.08	10
Ferrovial/Cintra	Spain	$10.01	7
John Laing	United Kingdom	$ 7.80	6
ACS/Hochtief	Spain	$ 6.81	6
APG Group	Netherlands	$ 8.70	5
Skanska	Sweden	$ 8.31	3
Fluor Corporation	USA	$ 5.59	3
Star America	USA	$ 3.57	3
Transurban	Australia	$ 1.96	3
Plenary North America	USA	$ 1.27	3

Source: Inframation

Finally, Table 8 provides an overview of U.S. greenfield transportation DBFOM P3 projects since the very first such projects were financed 1993. Prior to the advent of the federal TIFIA loan program and tax-exempt Private Activity Bonds (PABs), the earliest projects were financed by taxable bank debt. Since the advent of the two federal financing tools, most such projects in surface transportation have used TIFIA or PABs or both, to be competitive with the tax-exempt bonds available to state transportation agencies. These projects are separated into two groups. Those in the top half are financed based on project-derived revenues, denoted as Revenue-Risk (RR). In the lower half of the table are projects financed based on annual availability payments from the sponsoring agency, denoted as Availability-Pay (AP).

As can be seen, there is a much higher level of equity invested in the RR projects, because the investors are taking on revenue risk in addition to risks that are common to both types of P3 (such as construction cost overruns and late completion). Because they are taking on greater risk, RR investors put in more equity because creditors demand it. The additional equity has two important benefits. First, the state contribution to the financing is much less for the RR projects. Second, the larger amount of equity as a percentage of the overall project financing provides a "cushion" in the event of a recession, when toll revenues are likely to decrease. Debt service must be paid regardless, so if the debt is a smaller fraction of the project cost, it is easier to service that debt when revenues decline.

TABLE 8: HISTORICAL OVERVIEW OF U.S. LONG-TERM P3 GREENFIELD PROJECTS

Project	Type	Govt. (M)	TIFIA (M)	PABs (M)	Bank Debt (M)	Equity (M)	Total (M)	% Equity	Financial Close
91 Express Lanes	RR	0	0	0	$100	$30	$130	23%	1993
Dulles Greenway	RR	0	0	0	$298	$80	$378	21%	1993
S. Bay Expressway	RR	0	$140	0	$340	$130	$610	21%	2003
I-495 Express	RR	$495	$598	$589	0	$630	$2,312	27%	2007
SH 130, Seg. 5-6	RR	0	$430	0	$686	$210	$1,326	16%	2008
N. Tarrant Express, TX	RR	$594	$650	$398	0	$426	$2,068	21%	2009
LBJ Expressway, TX	RR	$490	$850	$606	0	$682	$2,628	26%	2010
Midtown Tunnel, VA	RR	$582	$422	$675	0	$272	$1,951	14%	2012
I-95 HOT, VA	RR	$83	$300	$253	0	$280	$916	31%	2012
N. Tarrant 3A/B, TX	RR	$379	$531	$274	0	$442	$1,626	27%	2013
US 36, Ph. 2, CO	RR	$75	$60	$21	0	$41	$197	21%	2014
I-77 MLs, NC	RR	$95	$189	$100	0	$248	$632	39%	2015
SH 288, Texas	RR	$17	$357	$100	0	$375	$849	44%	2016
I-66, Virginia	RR	$0	$1,229	$737	0	$1,549	$3,515	44%	2017
I-95, ext., Virginia	RR	$0	$0	$277	0	$532	$809	66%	2019
N. Tarrant, 3C, TX	RR	$14	$0	$750	0	$160	$924	17%	2019
Newark ConRAC	RR	$110	$0	$0	$310	$60	$480	13%	2019
Belle Chasse Bridge, LA	RR	$45	$0	$110	0	$28	$183	15%	2019
Total		$2,979	$5,756	$4,890	$1,734	$6,175	$21,534		
Average		$166	$320	$272	$96	$343	$1,196		
Percent		13.8%	26.7%	22.7%	8.1%	28.7%			
I-595, FL	AP	0	$603	0	$781	$208	$1,592	13%	2009
Port Miami Tunnel	AP	$100	$341	0	$342	$80	$863	9%	2009
Denver Eagle rail	AP	$1,312	$280	$396	$0	$54	$2,042	3%	2010
Presidio Pkway Ph 2	AP	0	$150	0	$167	$45	$362	12%	2012
East End Bridge	AP	$526	$162	$508	$0	$78	$1,274	6%	2013
Goethals Bridge	AP	$125	$474	$453	$0	$107	$1,159	9%	2013
I-69, IN	AP	$80	$0	$244	$0	$41	$365	11%	2014
I-4 , FL	AP	$1,035	$950	$0	$484	$103	$2,572	4%	2014
Penn. Rapid Bridges	AP	$255	$0	$721	$0	$59	$1,035	6%	2015
Portsmouth Bypass	AP	$178	$209	$227	$0	$49	$663	7%	2015
Purple Line rail	AP	$1,599	$875	$313	$0	$139	$2,926	5%	2016
LaGuardia Terminal	AP	$1,200	$0	$2,400	$0	$200	$3,800	5%	2016
I-70, Colorado	AP	$687	$404	$141	$0	$65	$1,297	5%	2017
LAX People Mover	AP	$1,031	$0	$1,295	$269	$103	$2,698	4%	2018
LAX ConRAC	AP	$690	$0	$458	$73	$43	$1,264	3%	2019
Total		$8,818	$4,448	$7,156	$2,116	$1,374	$23,912		
Average		$588	$297	$477	$141	$92	$1,510		
Percent		36.9%	18.6%	29.9%	8.8%	5.7%			

Sources: Data from *Public Works Financing*, Inframation, and U.S. DOT.

PART 4

PENSION FUND INFRASTRUCTURE INVESTING

4.1 INTRODUCTION

The concept of public pension funds including infrastructure in their investment portfolios is not new. Pension funds generally invest in relatively safe long-term bonds for a significant portion of their portfolios, as well as relatively conservative corporate stocks such as those of railroads and investor-owned utilities. In the United States, however, a great deal of infrastructure is owned by governments: airports, seaports, toll roads, and most water and wastewater systems. Pension funds do not invest in these government-owned infrastructure assets for two reasons. First, these facilities' bonds are tax-exempt, and the tax exemption is of no value to nonprofit, tax-exempt public pension funds. Second, it is not possible to buy shares in government-owned infrastructure, since there are no tradeable shares.

This situation has changed over the past several decades, as governments in many countries have leased or sold these kinds of infrastructure. In some cases, such as the British airports, seaports, telecoms, electricity, and water systems, the government sold into listed equities markets or to private-sector investors. In a larger number of cases,

governments created long-term P3 leases for such facilities, as is typically the case in Asia, Australia, and Latin America. The shares in the special purpose vehicles (SPVs) that win the long-term concessions for such infrastructure are generally not traded on stock markets (i.e., they are unlisted), but knowledgeable investors such as infrastructure investment funds, and also public pension funds, can purchase portions of the equity of the SPVs.

The pioneer pension funds investing in privatized infrastructure were those of Australia and Canada. In 1992, the Australian government required employers to set aside 3% of nearly all employees' wages in their choice of approved pension funds. Over subsequent years, that annual percentage was gradually increased, to 9.5% today. The pension funds built diversified portfolios, including shares in Australia's newly privatized utilities, airports, seaports, toll roads, and other infrastructure. As of 2018, those pension funds had assets of $1.9 trillion and growing. Canada's public pension funds followed a similar course. Since both Australia and Canada have relatively small populations and industries, their pension funds expanded the scope of their investments worldwide, including their investments in privatized infrastructure.

Most pension funds that invest in private and P3 infrastructure minimize their risk by not making direct investments in specific facilities. Instead, they allocate a specific sum for infrastructure and place it with one or more infrastructure investment funds, such as those shown in Table 1. A handful of large Australian and Canadian pension funds have developed staffs with detailed knowledge and understanding of private and P3 infrastructure. Those funds make direct investments, rather than placing all their capital with major infrastructure funds. Also of note, the seventh-largest fund in Table 1—IFM Investors—was created by pension funds acting together to invest in infrastructure on behalf of their member beneficiaries.

4.2 RECENT PENSION FUND INFRASTRUCTURE DEVELOPMENTS

4.2.1 OVERSEAS PENSION FUND ACTIVITY

Australian and Canadian pension funds with extensive infrastructure expertise were quite active during 2019. Here is a sampling of such activities.

Canada Pension Plan Investment Board (CPPIB) acquired majority control of the Highway 407 toll road concession in the Toronto metro area via purchase of an additional 10.1%

from SNC-Lavalin, paying $2.2 billion.[18] CPPIB and Allianz Capital Partners led a consortium of investors that purchased nine toll road concessions in India from a development company, SIPL, for $994 million.[19] Another Canadian fund, OMERS Infrastructure Managements, comprises 22.4% of the consortium. CPPIB and Astra Infra acquired 55% of Malaysia's Cipali toll road concession for a sum estimated by Bloomberg at $500 million.[20]

Ontario Teachers Pension Plan (OTPP) joined with CPPIB to launch a tender offer on the Mexican stock exchange for the majority of toll road developer IDEAL. If the effort succeeds, OTPP will own 16.3% and CPPIB 23.7%. The three are already partners in the Arco Norte and Pacifico Sur toll roads.[21] OTPP and CPPIB also are part of a joint venture called Triton Bidco that acquired satellite communications company Inmarsat for $3.4 billion.[22] OTPP sold a minority of its stake in Brussels Airport to Japan's GPIF and Australia's TCorp.[23]

Ontario Municipal Employees Retirement System (OMERS) bought a 22.4% stake in Indian toll road operator IndInfravit for $121 million.[24]

Caisse de dépôt et placement du Québec (CDPQ) reached an agreement to buy India's Highway Concessions One portfolio for $391 million, beating out CPPIB and NIIF.[25] In November it announced the purchase of a 24.9% stake in the operations and maintenance P3 contract for the Sydney Metro, Australia's first driverless rail system.[26]

Australian Super and OTPP each committed $250 million to the relatively new National Investment & Infrastructure Fund of India, which has also received investments from the

18 Rivera, Fernando Moncada. "CPPIB Buys Further Into Canadian Toll Road." *Inspiratia*. Aug. 19, 2019.

19 Balakrishnan, Reghu. "CPPIB-Led InvIT to Acquire Sadbhav Infra's 9 Road Assets for Rs 6,610 Crore." *The Economic Times*. July 2, 2019.

20 "Khazanah Divests Stake in Indonesia Toll Concession to CPPIB." *MSN.com*. Sept. 20, 2019.

21 Tedeschi, Federica. "CPPIB, OTPP to Buy Stake in Mexican Infra Developer." *Inspiratia*. Nov. 25, 2019.

22 "Inmarsat Acquired by Private Equity Consortium for $3.4 Bn." *Air Traffic Management*. March 25, 2019.

23 Kolivakis, Leo. "OTPP Sells A Minority Interest in Brussels Airport." *Pension Pulse*, Jan. 8, 2020.

24 Rivera, Fernando Moncada. "OMERS Buys Into Indian Toll Road Operator." *Inspiratia*. Feb. 25, 2019.

25 Shah, Sneha and Rajesh Mascarenhas. "CDPQ to Buy IDFC's Road Assets for Rs 2,400 Crore." *The Economic Times*. Oct. 16, 2019.

26 Kolivakis, Leo. "CDPQ, CPPIB, and OTPPP Sign Big Infrastructure Deals." *Pension Pulse*. Nov. 28, 2019.

sovereign investment funds of Singapore and Dubai. Among NIIF's investments is toll road company Roadis and GVK's airport business.

IFM Investors was part of a consortium that bought Poland's largest container terminal, in Gdansk, for an estimated $1.3–1.5 billion.[27] The facility was previously owned by Macquarie Infrastructure & Real Assets, MTAA Super, Statewide Super, and Australian Super.

4.2.2 U.S. PENSION FUND ACTIVITY

CalPERS is America's largest public employee pension fund and was one of the first to commit to investing in infrastructure. Its current allocation is 1.3% of its $370 billion portfolio; its actual investments were approaching 1.25% by the end of 2019. *Inframation* reports that the fund's latest one-year internal rate of return on its infrastructure portfolio was 11.1% and its five-year return was 12.7%.[28] Those are the kinds of returns pension funds need to increase their overall rate of return. The majority of CalPERS' infrastructure investments are made through infrastructure funds. Its largest such commitments are with GIP Strategic Alliance, Golden Reef Infrastructure Trust, and J.P. Morgan Infrastructure Investments Fund (IIF). But CalPERS is one of a handful of U.S. pension funds with knowledgeable infrastructure staff able to select a small number of direct investments. Of the seven direct investments listed as of the end of 2019, three are transportation infrastructure: Gatwick Airport (12.78% stake), Indiana Toll Road Concession Co. (10%), and Port of Melbourne (10%).

Here is a sampling of other 2019 activity by U.S. public pension funds.

- **Teacher Retirement System of Texas (TRS)** increased its allocation to energy, natural resources, and infrastructure to 6% from 5% previously, with infrastructure planned to be 45% of that total. TRS invests via infrastructure funds.[29]
- **Texas Municipal Retirement System (TMRS)** committed up to $150 million to Global Infrastructure Partners IV, which already had commitments from five other state

[27] Rivera, Fernando Moncada. "Consortium Buys Gdansk Port." *Inspiratia*. March 20, 2019.

[28] "Inframation Deals—California Public Employees' Retirement System." https://www.inframationnews.com/investors/institutional-profiles, accessed Jan. 9, 2020.

[29] Sun, Yuanqing. "Texas TRS Increases Infra and Energy Allocation." *Inframation News*, July 22, 2019.

retirement systems. TMRS' Real Return Portfolio is 11% of its total, and private infrastructure is 31% of that.[30]

- **Chicago Teachers' Pension Fund** committed $10 million to JLC Infrastructure Fund I. CTPF has a target of 2% for infrastructure, and had already made allocations to larger funds, including ones run by Brookfield, IFM, JP Morgan, and Macquarie.[31]
- **Oklahoma Firefighters Pension and Retirement System** agreed to invest $100 million in IFM Global Infrastructure Fund as its initial infrastructure commitment, in December 2019. Infrastructure is part of its "other assets" category, accounting for 8% of its total portfolio.[32]

These are just a few examples of the increasing commitments by U.S. public employee pension funds to infrastructure investment. Several other pension fund commitments are provided in Table 9.

TABLE 9: EXAMPLES OF INCREASE IN PENSION FUND INFRASTRUCTURE ALLOCATIONS, 2019 VS. 2017

Pension Fund	Allocation, 2017	Percent	Allocation, 2019	Percent
CalPERS	$3.7 billion	1.1%	$4.87 billion	1.3%
Maine PERS	$1.03 billion	9.1%	$1.77 billion	11.9%
Virginia Retirement System	$1 billion	1.64%	$1.75 billion	4.8%
Michigan Retirement System	$775 million	1.14%	$861 million	1.16%
NYC ERS	$234 million	0.4%	$655 million	0.88%
Milwaukee ERS	$159 million	9.1%	$154 million	9.1%
Fresno County ERS	$146 million	3.1%	$154 million	3.1%

Source: Inframation

30 Sun, Yuanqing. "Texas Pension Fund Allocates USD 150M to GIP IV." *Inframation News*. June 4, 2019.

31 Sun, Yuanqing. "Chicago Pension Plan Commits USD 10M to JLC Infrastructure." *Inframation News*. July 22, 2019.

32 Sun, Yuanqing. "Oklahoma Firefighters Makes Debut Infra Commitment to IFM." *Inframation News*. Jan. 8, 2020.

4.3 DRAWBACKS OF DIRECT INVESTMENT AND ASSET-IN-KIND TRANSFERS

Pension funds have a fiduciary duty to make investment decisions that are in the best interests of the retirees for whose pensions they are responsible. Direct investment by public pension funds in large individual projects can violate that duty by exposing the pension fund's portfolio to excessive risk. That is why the large majority of pension funds invest by placing their infrastructure allocations with one or more professional infrastructure investment funds. It's similar to the average individual investing in mutual funds rather than speculating in individual stocks.

The Wall Street Journal offered a cautionary tale in 2019. A front-page story related how the Retirement System of Alabama made a high-risk direct investment: $221 million into a 16-location boutique theater-and-restaurant chain. The chain subsequently filed for bankruptcy, so the pension fund is now the proud owner of a bankrupt company whose business model failed.[33] Of course, occasionally investing in an individual project may turn out well. That is the case of the Dallas Police & Fire Pension System, which made a direct investment in a greenfield toll road project, the North Tarrant Express in Fort Worth. While a high-risk project, it has attracted traffic and revenue that exceeds original forecasts[34] and recently paid its first dividend, five years after opening.[35] An unusual case such as this does not alter the general wisdom of pension funds avoiding individual greenfield infrastructure P3 projects. Those seeking somewhat higher returns than from an all-brownfield portfolio can invest in a more-balanced portfolio via one or more infrastructure investment funds.

Some proponents advocate a different approach, contending that P3 infrastructure is politically unpopular, in part due to fears of "foreign control" and an allegedly higher cost of capital than via municipal bond financing.[36] Their proposed alternative is called "Asset-in-Kind (AIK) transfer." A government with an aging infrastructure facility needing to be refurbished would *give* the facility to the jurisdiction's pension fund as an additional asset on the fund's balance sheet. The pension fund would hire a private-sector manager to

33 Dezember, Ryan and Heather Gillers. "Alabama Pensions Bet on Lobster Rolls and Star Wars." *The Wall Street Journal*. December 26, 2019.

34 Monroe, Scott and William Schmid, Chad Lewis, and Anne Tricerri. "Managed Lanes Driven to Strong Performance." Fitch Ratings. December 3, 2019.

35 "US Toll Road Pays Out USD 292M in First Dividend." *Inframation News*. January 17, 2020.

36 Klagic, Ray, et al. "Transforming Public Infrastructure Assets Under Public Pension Stewardship for Public Benefit." (PowerPoint presentation) American Public Infrastructure. November 2019.

"transform the asset into a performance-driven enterprise." Once it has been transformed, the pension fund might then sell 5% to 10% to an independent third party, which would permit a market-based estimate of its value on the pension fund's balance sheet. Proponents acknowledges that several federal tax-code changes would be needed to make this model viable.

Several key, but questionable, assumptions are built into this model.

- First, it assumes that the asset would be valued by the pension fund at "fair market value." As anyone knows who has observed large-scale real estate transactions or mergers and acquisitions, the only way to ascertain true market value is through a competitive process. Would-be private-sector purchasers or lessees (under long-term P3s) would value the asset based on its potential after transformation, not on any kind of static assessment.
- Second, the model assumes that private contract management—without an ownership interest—would be capable of truly transforming the asset into a performance-driven enterprise. The absence of meaningful incentives for a contract manager to make such sweeping changes is one reason why long-term P3s have emerged, after decades of only minor efficiency improvements under contract management.
- Third, this model assumes that the potentially higher capital costs of a P3 (meaning the potential return on the equity invested) do not add value. But there are significant risk transfers in long-term, revenue-based P3s.[37] In exchange for the opportunity to seek, say, a 12% return on the equity invested in the asset, the private partner takes on the risk of cost overruns on new/rebuilt facilities, insufficient revenue to fully cover capital and operating costs, and insurance, among other things. Those risks would all be borne by the pension fund and its retirees under the AIK model.

Proponents cite as evidence of the viability of this approach the transfer of the Queensland Motorways to a major pension fund in Australia. This case proves the opposite of what is argued by Asset-in-Kind proponents, so it is worth reviewing in some detail.

[37] Poole, Robert. "Availability Payment or Revenue-Risk P3 Concessions? Pros and Cons for Highway Infrastructure." Reason Foundation. November 2017.

The Global Projects Center at Stanford University did a detailed case study of this asset transfer.[38] The case concerns the 2011 transfer from the state government (Queensland) of several bankrupt highway/tunnel projects, which the state had acquired post-bankruptcy, to the pension fund called Queensland Investment Corporation (QIC). Over several subsequent years, QIC acquired several additional highway assets in the Brisbane metro area and put them all under a single management as Queensland Motorways Ltd. (QML). QML made a number of upgrades to convert the highways into a network, financed by increases in toll rates. In late 2013 QIC's board decided that the value of QML had increased to the point where it was inconsistent with QIC's commitment to a diversified investment portfolio. It then organized a competitive process for a long-term P3 lease of QML, which was won in July 2014 by a consortium of a leading toll road company, a major Australian pension fund, and a sovereign wealth fund. They paid QIC $6.6 billion for the P3 lease.

On the surface, this shows benefits to a pension fund from an Asset-in-Kind transfer. However, the authors of the case study are at pains to point out how unique QIC is, especially compared with U.S. public pension funds. QIC is one of the largest pension funds in Australia, with over A$79 billion of assets in its portfolio, including A$9.5 billion of infrastructure investments. Like IFM Investors, CPPIB, and OMERS, QIC has "built a team of investment professionals and developed the in-house capability to assess and manage infrastructure assets directly." Among its other infrastructure assets are the privatized Brisbane Airport and the Port of Brisbane. The case study authors add that, "The operational improvements at QML were possible only due to the rare capability at QIC as a state-level pension fund manager to directly invest in and manage infrastructure assets. This internal capability is rare in public pensions. …Without QIC's dedicated infrastructure team, QML would also likely have not realized the same level of operational turnaround." Referring directly to advocates of AIK transfers to ordinary pension funds, the authors write that "It is unclear whether a similar transaction could be replicated in which the public pension uses some kind of external management contract with a service provider to assess and operate the in-kind asset without losing the competitive advantages that QIC's internal team enjoyed."

The alternative to AIK transfers is for the state or local government owner of the troubled asset to contract with professional legal and financial advisors to structure a competitive bidding process for the sale or (usually in the U.S. context) a long-term P3 lease of the

[38] Bennon, Michael, Ashby H.B. Monk, and Young-Joon Cho. "In-Kind Infrastructure Investments by Public Pensions: the Queensland Motorways Case Study." Stanford Global Projects Center. June 5, 2017.

revenue-producing asset. Such a proposal was made by Jeff Schoenberg, former assistant majority leader in the Illinois Senate, in March 2019: a long-term P3 lease of the Illinois Tollway system with the net proceeds used to shore up that state's grossly underfunded public pension systems.[39] Schoenberg cited the large asset values received by the city of Chicago for the P3 lease of the Chicago Skyway and by Indiana for the P3 lease of the Indiana Toll Road. And he cited a study from last decade that he co-chaired under which Credit Suisse estimated that a 75-year lease of the Illinois Tollway system could generate as much as $23.8 billion. This would be far more effective than simply giving the Tollway to the state's beleaguered pension funds.

[39] Schoenberg, Jeff. "The Road to Solvent Illinois Pensions Requires a Tollway Lease." *Crain's Chicago Business*. March 5, 2019.

PART 5

SUPPORTING INFRASTRUCTURE AND FINANCE INFORMATION

Over the past several years, infrastructure finance researchers have produced findings directly relevant to the topics discussed in this report. Below is a brief summary of several of these products. In addition, several new infrastructure databases have been developed and are now available.

5.1 RESEARCH REPORTS

"Leveraging Private Capital for Infrastructure Renewal" is a recent product of the National Cooperative Highway Research Program, and available at no charge from the Transportation Research Board website.[40] It was produced by seven co-authors, five from Sperry Capital and two from the Global Projects Center at Stanford University. It's a sophisticated piece of work and would be an ideal primer for P3 units of state DOTs, transportation staff members of legislative bodies, and planners at metropolitan planning organizations (MPOs)/transportation planning organizations (TPOs).

[40] Jenkins, Bryant et al. "Leveraging Private Capital for Infrastructure Renewal: A Synthesis of Highway Practice." NCHRP Synthesis 540, Transportation Research Board. 2019.

After explaining the differences between traditional design-bid-build procurement and newer processes such as design-build and DBFOM, it devotes the bulk of its attention to DBFOM as the most promising for major highway projects, as well as the newest and least-understood procurement method. Its most valuable section is Chapter 3, "The Role of Private Equity in Public-Private Partnerships." While critics are wrong in claiming that the cost of debt is much higher in a P3 than in state-run bond financing, they are correct that the cost of equity (absent in 100% debt-financed state projects) in a DBFOM is real, and leads to a blended cost of capital (equity + debt) that is higher than in a state project. But this chapter goes on to explain in detail *what the state gets in return* for having that equity investment.

The primary benefit is *risk transfer*. In traditional projects, as the report explains, "the equity owners for that project are effectively the taxpayers." Specifically, it is taxpayers who provide the de-facto insurance, who bear the cost overruns (which are common in mega-projects), and who in one way or another make up the revenue shortfalls if toll revenue is less than projected. In contrast, a typical DBFOM transfers all those risks (and often others) to the private equity providers. And as the report points out, "lenders and equity investors [in a revenue-risk DBFOM P3] generally have no guarantee or only a limited guarantee of some form from the government to make them whole." Actually, while "minimum revenue guarantees" are fairly common in Europe and Latin America, there is only one modest provision of this kind out of all the revenue-risk P3s listed in Table 8. The report provides a lot more useful information, acknowledging that most of the public does not understand how DBFOM P3s work and can be easy prey for false and misleading claims.

Bridging the Gaps: Public Pension Funds and Infrastructure Finance, a book from New York University's Stern Infrastructure Finance Initiative, provides empirical support for pension fund investment in infrastructure. While noting that "investing in this asset class remains at a nascent stage in the United States," the authors find that those funds that have invested in infrastructure have achieved returns from capital appreciation in those funds. But they also suggest that pension funds would better match their long-term liabilities by "investing through open-end funds…alongside closed-end funds that provide upside from capital appreciation."[41]

[41] Lipshitz, Clive and Ingo Walter. *Bridging the Gap: Public Pension Funds and Infrastructure Finance*. Global Institute for Advanced Study, NYU Stern. 2019. 120.

"Rated Global Infrastructure Displays Strong Credit Quality and Low Risk" is a 2018 report from S&P Global Ratings. The authors conclude that infrastructure whose bonds have investment-grade ratings has a lower risk profile than the overall nonfinancial corporate sector. While noting that the project finance subsector (which include P3s) is riskier than the corporate sector (railroads, pipelines, utilities, etc.) "over the long term, infrastructure credits show a lower likelihood of default and higher ratings stability than the broader nonfinancial segment."[42]

"Evaluation of the Transportation P3 Market in the U.S.," a paper presented at the 2020 annual meeting of the Transportation Research Board, explains the authors' development of an index of P3 transportation project revenue bonds. The authors showed that "on the average, P3 bonds have a higher return than most bonds in the municipal bond market."[43]

5.2 INFRASTRUCTURE DATABASE RESOURCES

Data provider Inframation maintains a global P3 infrastructure project database that is available by subscription for various geographical regions. That database was relied on for a number of the tables in Part 3 of this report.

The U.S Department of Transportation has funded the creation of a database of major U.S. transportation infrastructure projects. It was developed by a team at the University of Maryland and was turned over to US DOT at the end of 2019. It is available at https://www.transportationprojects.org. Its set of procurement types includes design-bid-build, design-build, and public-private partnership (P3).

Finally, a relatively new organization, Global Infrastructure Investor Association (GIIA), whose 2019 membership was 52 infrastructure investors, has created the GIIA Global Asset Database. These are projects financed by member companies. As of 2019 the database included 1,300 infrastructure assets in 49 countries, totaling $660 billion of asset value. (http://giaa.net)

42 "Rated Global Infrastructure Displays Strong Credit Quality and Low Risk." S&P Global Ratings. April 17, 2018.

43 Wang, Yuand, Kunqi Zhang, Qinbin Cui, and Felix Delgado. "Evaluation of Transportation P3 Model in the U.S.: A Bond Index Approach." Transportation Research Board Annual Meeting. January 2020.

ABOUT THE AUTHOR

Robert W. Poole, Jr. is director of transportation policy and the Searle Freedom Trust Transportation Fellow at Reason Foundation, a national public policy think tank based in Los Angeles.

His 1988 policy paper proposing supplemental privately financed toll lanes as congestion relievers directly inspired California's landmark private tollway law (AB 680), which authorized four pilot projects including the highly successful 91 Express Lanes in Orange County. Over two dozen other states have enacted similar public-private partnership legislation. In 1993 Poole oversaw a study that introduced the term HOT (high-occupancy/toll) Lane, a concept which has become widely accepted since then.

Poole has advised the Federal Highway Administration, the Federal Transit Administration, the White House Office of Policy Development and National Economic Council, the Government Accountability Office (GAO), and the California, Florida, Georgia, Indiana, Texas, Utah, Virginia, and Washington State Departments of Transportation. He served 18 months on the Caltrans Privatization Advisory Steering Committee, helping oversee the implementation of AB 680. He was appointed by Gov. Pete Wilson as a member of California's Commission on Transportation Investment in 1995-96.

Poole is a member of the board of the Public-Private Partnerships (P3) division of ARTBA and a member of the Transportation Research Board's Managed Lanes Committee. From 2003 to 2005, he was a member of the TRB's special committee on the long-term viability

of the fuel tax for highway funding. In 2008 he was a member of the Study Committee on Private Participation in Toll Roads, appointed by Texas Gov. Rick Perry. In 2010 he was a member of the Washington State DOT's Expert Review Panel on the proposed Eastside Managed Lanes Corridor. Also in 2010, he served as a transportation policy advisor on the transition team of Florida Gov. Rick Scott.

Poole is the author of dozens of policy studies and journal articles on transportation issues. His book, *Rethinking America's Highways*, was published by the University of Chicago Press in 2018. Poole's popular writings have appeared in national newspapers, including *The New York Times* and *The Wall Street Journal*; he has also been a guest on such programs as "Crossfire," "Good Morning America," and "Huffington Post," as well as ABC, CBS and NBC News, NPR and PBS. He produces the monthly e-newsletter, *Surface Transportation Innovations*. *The New York Times* has called him "the chief theorist for private solutions to gridlock."

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