

Reducing Risks in Transportation Mega-Projects

by

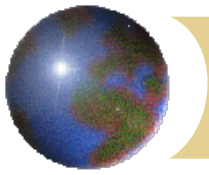
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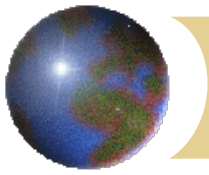
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Overview

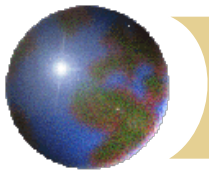
- ✚ Risk is endemic in transportation mega-projects.
- ✚ Serious incentive problems with traditional public works contracting.
- ✚ Long-term P3 (PPP) contracts create very different incentives.
- ✚ Value for Money (VfM) analysis quantifies the benefits.
- ✚ Large P3 benefits in toll roads, but can also help with major transit projects.



Major international study shows extent of risks

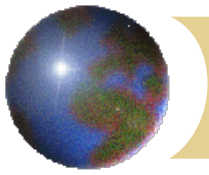
Global assessment at Aalborg University

- ✚ 258 highway & rail projects in 20 nations
 - ✚ 90% had cost overruns:
 - ✚ Rail averaged 45% over budget
 - ✚ Highways averaged 20% over budget
 - ✚ Most had inaccurate traffic forecasts:
 - ✚ Rail averaged 39% less than projected
 - ✚ Highways averaged 9% more than projected.
- (Lead researcher: Bent Flyvbjerg)



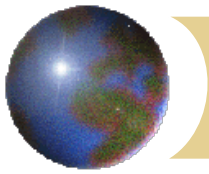
US rail projects show similar trend

Decade	Number of Projects	Budget (\$M)	Actual (\$M)	Percent
1980s	10	\$ 9,044	\$14,987	66% over
1990s	15	\$ 4,296	\$ 5,584	30% over
2000s	31	\$17,281	\$24,989	45% over
2010s	4	\$ 1,199	\$ 2,124	77% over



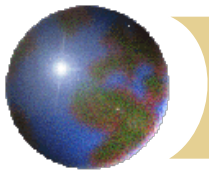
Why these consistent outcomes?

- ✚ Risk is disregarded in feasibility studies—World Bank.
- ✚ Incentives to produce rosy scenarios are very strong—MIT.
- ✚ Strategic misrepresentation by project proponents—Flyvbjerg, *Megaprojects and Risk*.
- ✚ Conventional contracting puts major risks on public sector (taxpayers).



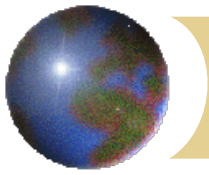
Flyvbjerg and World Bank recommend:

- ✚ Use P3 that allocates risks to the party best able to control them.
- ✚ Private partners must put their own capital at risk (skin in the game).
- ✚ Use long-term agreement that makes private partner responsible for DBFOM:
 - ✚ Design
 - ✚ Finance
 - ✚ Build
 - ✚ Operate and maintain



Problems with Design-Bid-Build

- ✚ State requests proposals to design.
- ✚ Contractors asked to bid on design, lowest bidder wins.
- ✚ State operates & maintains, forever.
- ✚ But:
 - ✚ Design often difficult to build = change orders
 - ✚ Low-bid design less durable = costly O&M
 - ✚ Life-cycle costs end up far higher than is optimal

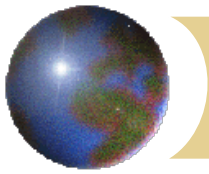


Long-term P3 concession

Competition for team to design, finance, build, operate, and maintain.

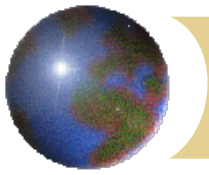
Very different incentives:

1. Designers and builder work together on design, with fixed price (few or no change orders, at company's expense);
2. Design innovations reduce cost, improve business case;
3. Build it more durable, to minimize life-cycle costs, not initial cost.



Risk assignment in P3 concessions

Environmental clearance	State
Right of way	State
Construction cost overruns	Private
Late completion	Private
Operations & maintenance	Private
Traffic & revenue	State or private

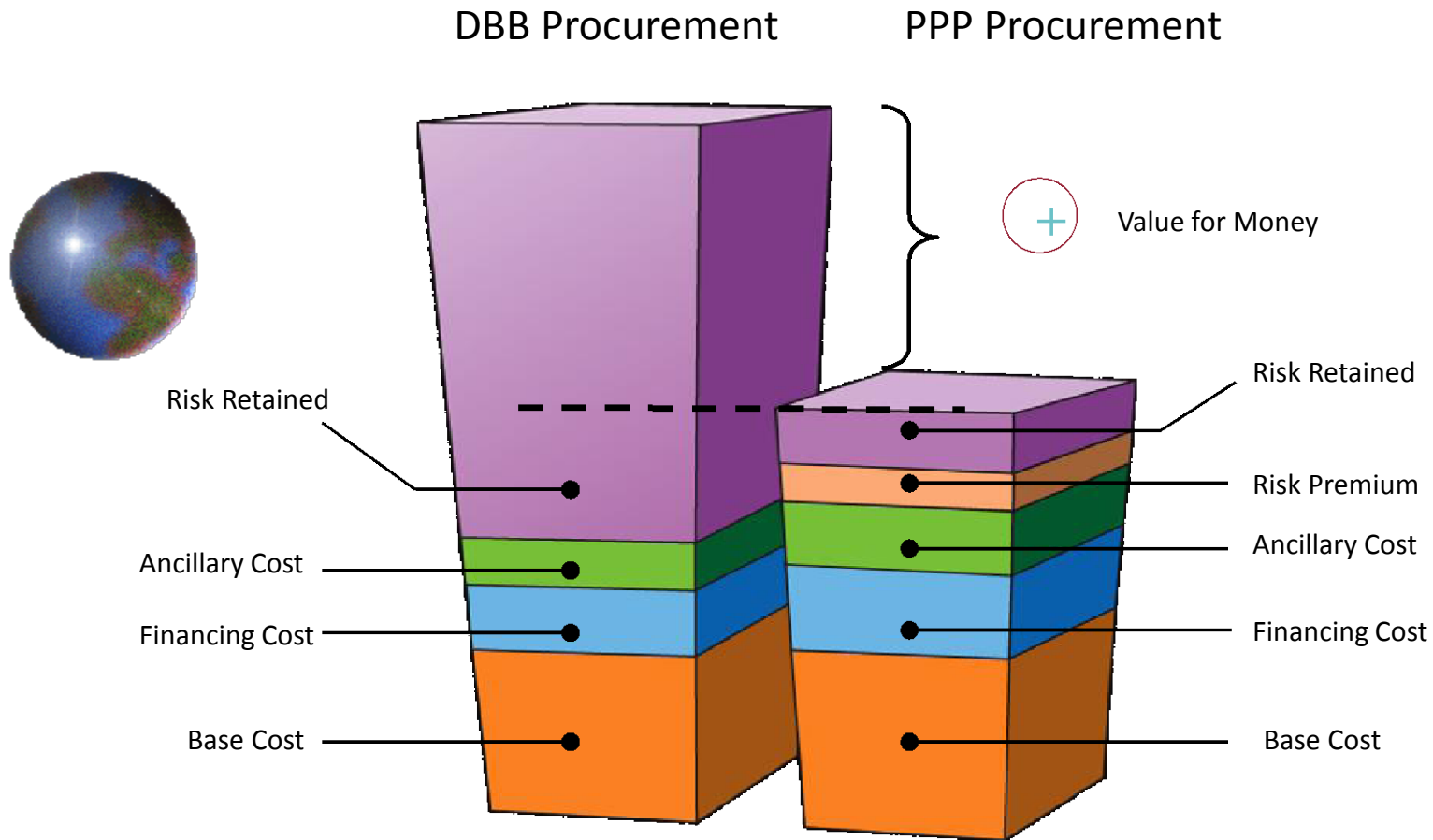


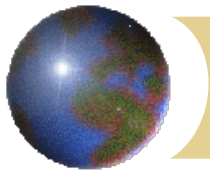
Expert's explanation of why P3 concessions work better

"By incentivizing private equity to organize and manage large, complex projects, P3 developers meet deadlines and budgets, or they lose money and someone gets fired. Once the project financing commitments are signed, there are no construction contract disputes, no excuses for poor performance, no scope creep, and no state senators demanding leniency for a campaign contributor who bends rebar."

--Bill Reinhardt, Editor, *Public Works Financing*

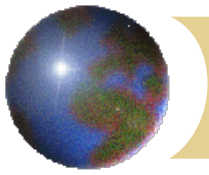
Value for Money quantifies the benefits





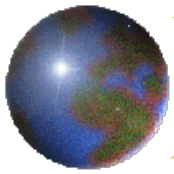
NPV comparisons of P3 versus alternatives (life cycle cost)

Project	Savings vs. public sector project	Savings vs. next bidder	Comments	
I-595 FL	14.3%	30%	Toll/AP	
I-635 TX	15%	50%	Toll	
Port Tunnel FL	12.5%	50%	AP	
Goethals Bridge NY	20%	7.2%	Toll/AP	



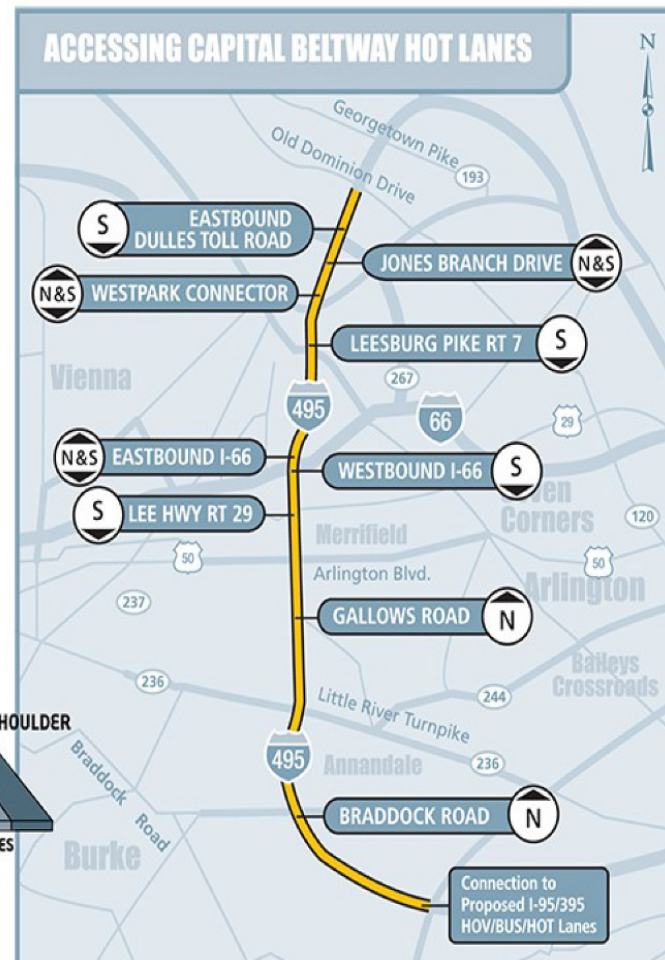
Project example: Capital Beltway, northern Virginia

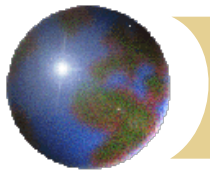
- ✚ I-495 Beltway massively congested for decades.
- ✚ Virginia DOT solution: add 2 HOV lanes each way; \$3 billion. Only two problems:
 - ▣ They didn't have \$3 billion for a project in one single district.
 - ▣ It faced fierce opposition; over 300 homes and businesses to be taken.



Value engineering: unsolicited P3 proposal-Beltway HOT lanes

\$1.4 Billion

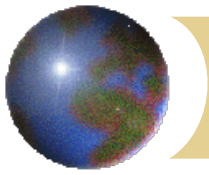




Capital Beltway project finance

Private equity	\$348.7M	18%
Toll revenue bonds	\$589.0M	29%
TIFIA loan	\$588.9M	30%
VDOT funds	\$408.9M	21%
Interest income	<u>\$ 47.6M</u>	<u>2%</u>
TOTAL	\$1,983.1M	100%

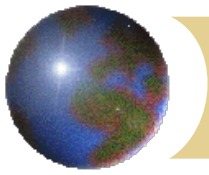
This is a pretty typical P3 finance model.



Is risk transferred if project goes bankrupt?

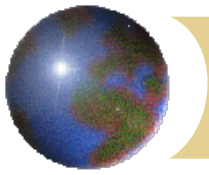
South Bay Expressway P3, San Diego

- ✚ New 9.2-mi. toll road with major bridge
- ✚ Construction cost budget \$658M
- ✚ Similar financing as Capital Beltway, except no government funding.
- ✚ Opened November 2007, filed for bankruptcy March 2010.



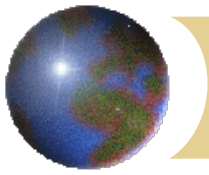
South Bay Expressway (2)

- ✚ Major problems that led to filing:
 - ▣ Large cost overrun by its D-B contractor;
 - ▣ Bridge costs ballooned due to requirement for future light rail;
 - ▣ Caltrans micromanagement slowed down progress, added costs;
 - ▣ Housing market collapse decimated traffic and revenue.



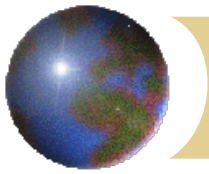
South Bay Expressway (3)

- ✚ Company's equity wiped out
- ✚ Defaulted on bonds and TIFIA loan
- ✚ Road bought from bondholders by SANDAG, for \$341.5 million (50¢/\$1)
- ✚ Lenders also gained share of future toll revenues as part of the deal.
- ✚ No taxpayer losses; no taxpayer bailout



Other P3 toll road bankruptcies

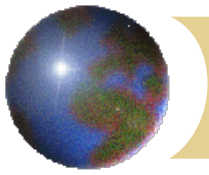
- ✚ Similar outcomes in Australia and elsewhere in United States
 - ▣ 2 toll tunnels in Sydney
 - ▣ Early, speculative Texas toll road
 - ▣ Poorly justified Pocahontas Parkway toll road in Virginia
- ✚ No taxpayer bailouts in any of these.



P3 concessions without toll revenue

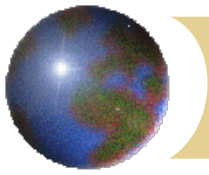
Port of Miami Tunnel

- ✚ Twin tubes, 4200' long, bored beneath Biscayne Bay (port is on an island).
- ✚ Purpose: to divert cargo trucks and buses to the expressways from downtown Miami streets.
- ✚ Charging tolls would have been counterproductive to project purpose.



Port of Miami tunnel (2)

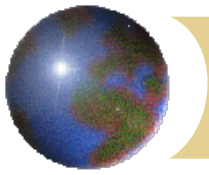
- ✚ High risk—no such tunnel ever done in Florida
- ✚ FDOT wanted benefits of P3, but tolls were not an option.
- ✚ Borrowed from Europe the “availability payment” model.
- ✚ DBFOM concession (35 years) but with annual payments to cover construction plus operations and maintenance.



Port of Miami tunnel (3)

- ✚ Competition led to major cost savings
- ✚ Huge construction risk transfer accomplished
- ✚ On-budget completion, nearly on time
- ✚ Significant traffic and emission benefits
- ✚ State, county, and city have taken on a 35-year liability.

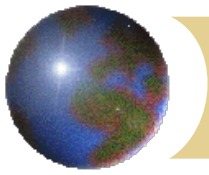




AP concessions a new trend

Two AP models are being used for highway projects:

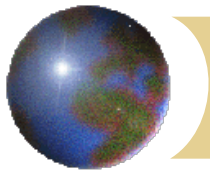
- ❖ Pure AP, for I-69 in Indiana, several others—no tolls, just dedicating state DOT revenues for long term.
- ❖ Hybrid toll/AP, for I-595 and I-4 in Florida—reconstructing entire freeway plus adding express toll lanes.



An AP concession for rail transit

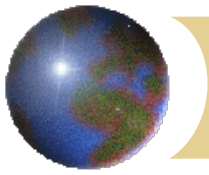
Eagle P3 in Denver

- ✚ 23 mile commuter rail, downtown to airport, + 13 miles in other corridors + maintenance facility
- ✚ \$2.1 billion capital cost, plus 34 years of operating cost (NPV \$1.12 billion)
- ✚ Competitive selection of DBFOM team



Financing Eagle P3 construction

Developer equity	\$55M	3%
Private activity bonds	398M	19%
FTA New Starts grant	1,000M	48%
TIFIA loan	280M	13%
Denver RTD	<u>367M</u>	<u>17%</u>
TOTAL	\$2,100M	100%



How does developer get paid?

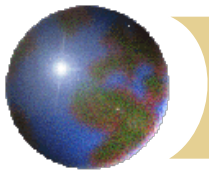
Construction payments--6 yrs \$1,140M

Substantial completion 44M

\$1,184M

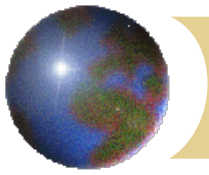
Plus, annual availability payments for 34 years totaling \$3 to 4 billion, NPV=1.12B

How is this better than usual project?



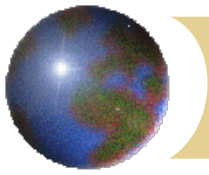
Eagle P3 potential benefits

- ✚ Initial cost saving of \$300M vs. RTD's own cost estimate;
- ✚ Transfer of construction cost and completion risk to concession company;
- ✚ Transfer of O&M risks to company;
- ✚ But, how much real VfM here is hard to tell at this point.



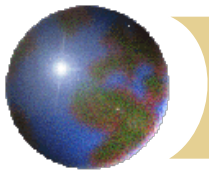
Assessment of AP concessions

- ✚ No net new transportation funding, unless project is tolled.
- ✚ AP payment stream is a liability for government, counts toward bonded indebtedness cap.
- ✚ Can provide benefits vs. traditional D-B-B or D-B procurement.
- ✚ But overall, a tool of limited value.



Conclusions

- ✚ Major risk transfers and increased accountability are being realized via DBFOM.
- ✚ A P3 concession will not convert a boondoggle into a sound project.
- ✚ An objective benefit/cost analysis comes first, to see if project is worth doing.
- ✚ If B/C is robust, than do a VfM analysis to quantify the benefits of procuring as a DBFOM concession.



Details:

"Transportation Mega-Projects and Risks," Robert Poole and Peter Samuel, Reason Foundation, 2011

"Toll Concessions FAQs," Robert Poole, Reason Foundation, 2014

Megaprojects and Risk, Bent Flyvbjerg, et al., Cambridge University Press, 2003

The Road to Renewal, Richard Geddes, AEI Press, 2010

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