

Public-Private Partnerships: Economic Theory and Public Policy

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Motivation

Three organizational forms to provide public infrastructure:

- public \equiv traditional
- privatization
- public-private partnerships \equiv PPP \equiv P3 \equiv concession

Generally private firms

Differences in:

- risk allocation, control rights, information, contracting, financing, governance, fiscal accounting, political economy

Motivation

20 years of joint work on PPPs with Ronald Fischer (Universidad de Chile) and Alexander Galetovic (Universidad de los Andes)

PPPs have been used for highways, bridges, seaports, airports, water and sewer plants, hospitals, prisons, schools, public housing, ...

25 years of practical experience with PPPs and research by many researchers

This work and experience summarized in *The Economics of Public Private Partnerships: A Basic Guide*, Cambridge University Press, 2014

The Economics of Public-Private Partnerships

A Basic Guide

**Eduardo Engel,
Ronald D. Fischer,
Alexander Galetovic**

Contracting under public provision

Government:

- directly finances the project with public debt
- hires one firm to build the project
- hires another firm for operations and management (O&M)

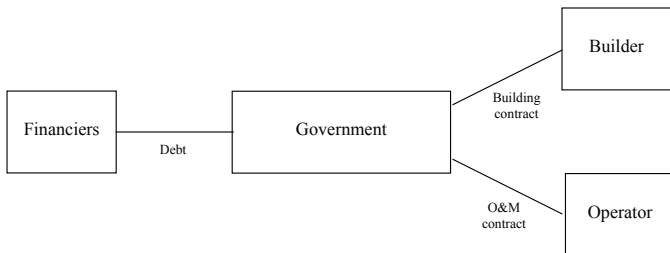
Contracting under a PPP

- **Bundling**: same firm finances, builds and operates the project
 - stand-alone private firm \equiv SPV \equiv concessionaire
- Compensation of concessionaire:
 - user fees: high demand tollroad
 - government transfers: school or hospital under availability contract
 - a combination: low demand tollroad

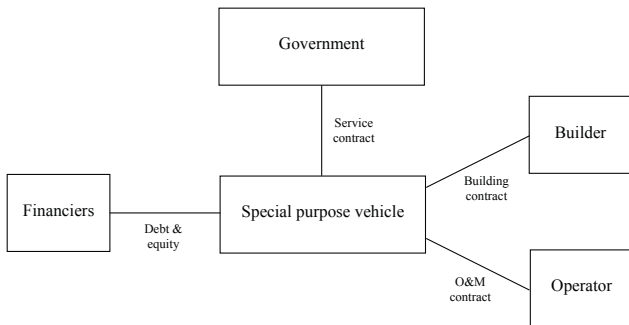
Typical PPP contract

- Fixed term, e.g. 30 years
- Concessionaire selection:
 - through a competitive auction
 - bidding variables: lowest toll, shortest concession term, highest annual payment to the State (cannon), lowest subsidy
- When concessionaire's income from user fees:
 - minimum income guarantees
- When concessionaire's income from government transfers:
 - availability contracts

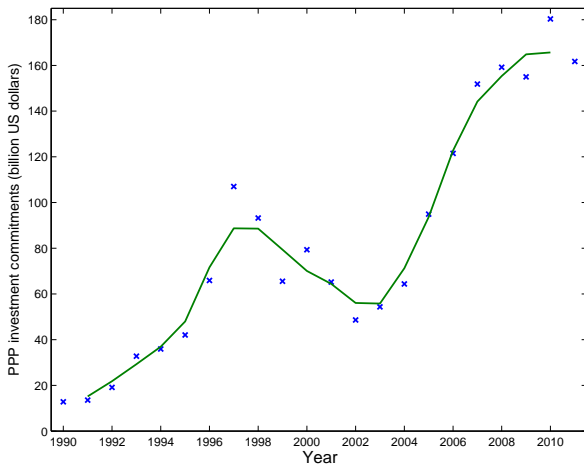
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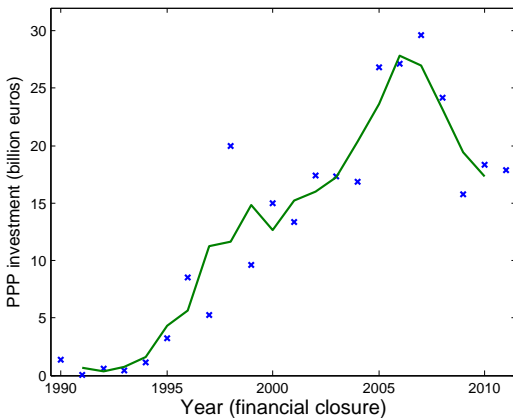
Contracting under PPP



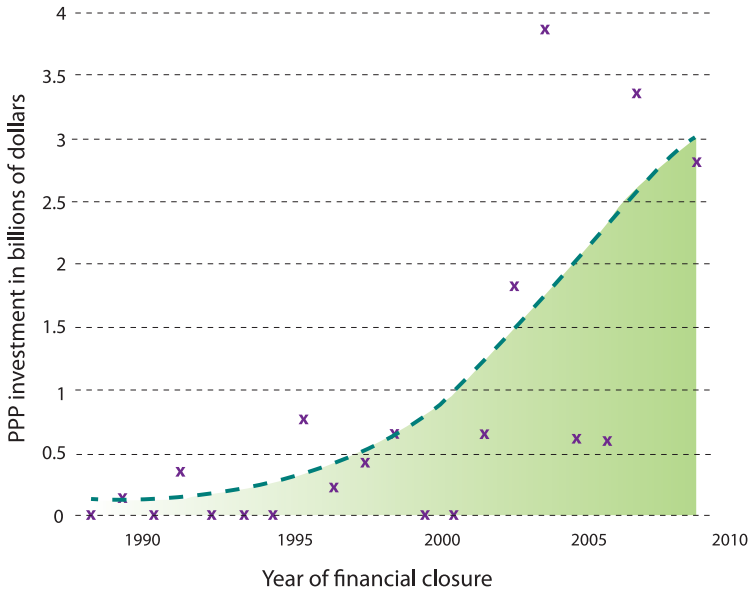
Inv. in PPPs: low-middle inc. cties. 1990–2011



Investment in PPPs: Europe 1990–2011



Investment in P3s: United States 1990–2011



25 Years of PPPs

- Mixed reviews
- Arguments in favor (and against) PPPs:
 - suspect
 - valid
- Magnitudes?
- When?
- How?

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Efficiency

Fiscal shenanigans

Renegotiations

Flexible term contracts

PPP Premium?

Conclusion

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Problems with Public Provision

Poor choice of projects

Poor service quality

- insufficient and untimely maintenance
- US annual cost of poor road maintenance \$54bn (40 cents per gallon gasoline)

Excessive cost of projects chosen:

- cost overruns
- delays

Pork barrel, white elephants

Efficiency gains?

PPPs more efficient because of private firm involvement:

- wrong argument: under public provision it's also private firms

Bundling leads to lower life-cycle costs:

- bundling \Rightarrow minimize life-cycle costs (construction + maintenance)
- quality of service contractible \Rightarrow above effect socially beneficial
- otherwise could reduce service quality (Oliver Hart's, 2003)

Fewer delays in construction:

- include the construction period in the contract length and do not allow user fee collection until the project is complete

Efficiency gains: maintenance

Better incentives under PPPs:

- The case of highways
- Assumption: state of infrastructure at the end of the concession is contracted upon and contract is enforced
- Then the best strategy for the PPP is to maintain the facility continuously: minimizes maintenance costs and (unintended) maximizes service quality
- Quantitatively important savings in maintenance costs: one third

Filter white elephants?

- Market test ... if concessionaire's income is user fees and no government guarantees
- Examples of white elephants: bridge to nowhere, ...
- Using PPPs to filter white elephants comes at a cost: tolls above marginal cost to finance initial investment

Lonquimay Tunnel, Chile



Adam Smith and White Elephants

“When high roads are made and supported by the commerce that is carried on by means of them, they can be made only where that commerce requires them. [...] A magnificent road cannot be made merely because it happens to lead to the country villa of the intendant of the province [...]”

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Fiscal accounting and infrastructure projects

- Governments want to spend on infrastructure:
 - many good reasons
 - also increases chances of winning elections
- Spending is limited by:
 - budgetary process and Congress
 - limits to public debt and deficit (fiscal rules, Maastricht agreement)
- Public provision: counts as debt, adds to the deficit and requires Congressional approval
- PPPs: (mostly) do not count as debt, do not contribute to the deficit and do not require Congressional approval
- What is the fiscal impact of PPPs?

Do PPPs relieve strained government budgets?

Main argument used in favor of PPPs

Evidently not true when the concessionaire's income comes from government transfers:

- government savings from not paying investment are equal, in present value, to capital costs included in government transfers during the concession

Do PPPs relieve strained government budgets?

Also incorrect when the concessionaire's income source is user fees:

- government could have collected user fees ...
- ... to pay for the debt needed to finance the initial investment

Equivalence Result

The (discounted) fiscal impact of an infrastructure project provided under public provision and under PPP is the same.

(Assumes same costs under both organizational forms.)

Fiscal Accounting of PPPs

“Cynics suspect that the government remains keen on PFI not because of the efficiency it allegedly offers, but because it allows ministers to perform a useful accounting trick.”

The Economist, July 2nd, 2009.

Without proper accounting, PPPs are off-balance-sheet vehicles

Since the discounted impact on the public budget is the same under public provision and PPPs (the Equivalence Result), both should be treated equally in fiscal accounts (debt, deficits)

Treating PPPs and public provision the same avoids choosing a PPP when public provision is the best option:

- Ex.: Line 7 for Santiago's Metro

Fiscal Accounting of PPPs: Moving in the right direction

OECD Meeting in 2007

UK: From the Ryrie Rules to PFI and on the way back, but not quite

France: 2011 law reduces local government's ability to use PPPs for debt-hiding

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Renegotiations

- Renegotiation of a PPP contract:
 - important change in the original contract
- Renegotiations take place in many ways:
 - extension of concession term
 - increase in user fees or government transfers
 - adding new public works to be done by concessionaire
- Guasch (2004) provides extensive evidence of pervasive renegotiations based on analysis of 1000+ PPPs in Latin America

Efficiency Costs of Renegotiations

First intuition — no cost:

- more aggressive bids if expect to make money renegotiating

Second intuition — potentially high cost:

- Adverse selection of inefficient firms good at lobbying
- Moral hazard problem: government becomes careless
- Bad project selection: white elephants more likely

Post-renegotiation contracts not publicly available in most countries

Renegotiations as bailouts

Pervasive renegotiations (or the renegotiation of an emblematic project) bailing out concessionaires have led to a negative perception of PPPs in some countries.

- First wave of Mexican concessions: fiscal cost of bailouts estimated at \$12 billion
- London Underground: cost of bailout between \$250 and \$620 million

Renegotiations and spending anticipation: Motivation

- Winter of 2004: government decides to build a rainwater collection system for Santiago
- Financing options
 - Obtain extraordinary Congressional approval for additional budget
 - Hire firm that is building an urban concession in Santiago
- Problems:
 - cost overruns because of lack of competition
 - no Congressional oversight of additional expenditure
 - concession term is extended and user fees are increased
 - future administrations (and users) pay

Renegotiations and spending anticipation

PPPs frequently lead to additional works that are unrelated to the original project and that are not subject to the budgetary process

By contrast with public provision, PPPs allow government's to make deals that benefit the current administration and where the bill is paid by future administrations (and future users).

Renegotiations: Evidence from Chile

- 50 concessions (28 highways), 1995–2007
- 147 renegotiations (one every 2.5 project-years)
- Original investment: US\$ 8400 million
- Additional investment via renegotiations: 33% — Colombia: 84%
- **When:** 78% during construction – points against the “incomplete contracts” explanation
- **What:** 84% of renegotiations contemplate additional investments
- **Who pays:** 65% paid by future governments

Avoiding opportunistic renegotiations

Independent specialized agency:

- reviews and approves projects
- ensures that contract value **does not change** after renegotiation:

The above institutional reform:

- filters “bad faith” renegotiations
- avoids adverse selection problem
- does not avoid soft budget problem

Many countries have reformed their PPP laws in line with the above

Chadwick-Demsetz vs. Williamson

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Flexible term contracts

- These contracts have various advantages over fixed term contracts
- Will motivate their advantages by looking at the two major highway concessions in the US during the 90s

Dulles Greenway (Washington, DC)

- Virginia Route 267
- 14 miles joining Leesburg VA, with west end of the Dulles toll road
- Concession term: 40 years
- Toll of \$1.75:
 - estimated daily traffic: 35,000

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 - actual traffic: 8,500

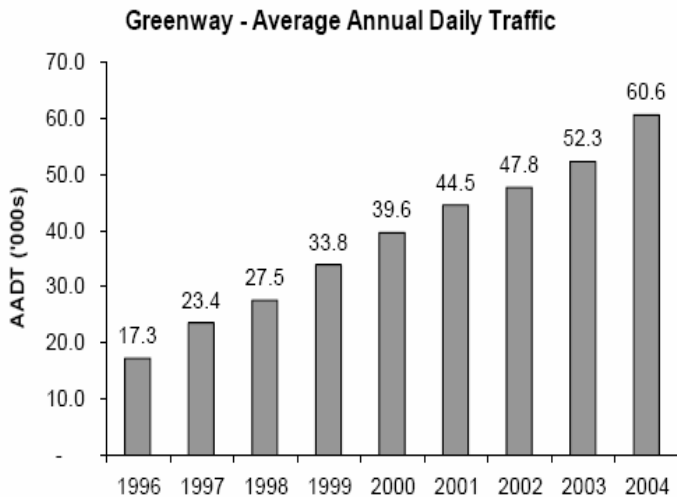
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- Toll of \$1.75:
 - estimated daily traffic: 35,000
 - actual traffic: 8,500
- State of Virginia widened untolled Route 7

Dulles Greenway (Washington, DC)

- Operational: 1996
- Concessionaire faces financial trouble in 1999
- Contract is renegotiated
- Concession term: extended by 20 years
- Even though there eventually was enough traffic to make the project profitable
- Does it make sense to have the concessionaire bear all the demand risk?

Dulles Greenway: Annual Traffic



SR 91 Orange County, California

- 35 year concession contract
- Concessioned 16 km lane, adjacent to untolled lanes
- Concessionaire can charge congestion tolls
- Investment: \$130 million
- Inaugurated: December 1995
- Non-compete clause: government cannot build additional lanes

SR 91 Orange County, California

- Traffic grew faster than expected
- 1999:
 - untolled lanes: collapsed
 - concessioned lane: congestion pricing leads to very high toll and slow (yet faster than in untolled lanes) traffic
- Urgent need to build an additional lane
- Concessionaire goes to court to enforce non compete clause
- Four years of negotiations before OCTA buys the concession for \$207 million (initially \$274 million mentioned)
- Non-compete clause was pretty inefficient, is there a better alternative?

Demand risk and Highway PPPs

- High demand risk
- Large component of risk that does not depend on the concessionaire (exogenous)
- Risk that depends on the concessionaire relates mainly to service quality and is contractible
- Bad idea to assign exogenous risk to the concessionaire
 - can't manage it, charges a risk premium for having to bear it, blunts white elephant filter, increases undesirable renegotiations
- Despite high exogenous risk it is often the case that we know in advance that if the concession lasts long enough it will be profitable
- How about a contract with better risk allocation?

PVR concession

- Government: sets discount rate
- Firms: bid on present-value-of-revenue from tolls during the concession (PVR)
- Winner: lowest PVR
- Concession lasts until the winner collects tolls equal, in present value, to the winning bid

Example

- Two firms
- Firm A:
 - **Cost:** 100, **Bid:** 120.
- Firm B:
 - **Cost:** 120, **Bid:** 132.
- Firm A wins, builds and operates until it collects 120.

PVR and Risk Allocation

Important risk reduction (for concessionaire):

- contract length extends automatically in low demand scenarios
- and shortens when demand is higher than expected
- savings from lower risk premium: 30-40% of initial investment
- lowers demand government guarantees
- would have avoided Dulles Greenway bankruptcy

PVR and Early Termination

Easy to calculate fair compensation when the government decides to end the concession ahead of time:

- the difference between winning bid and sum collected so far (subtracting an estimate for savings due to lower maintenance and operational costs)

Much harder with a fixed term contract:

- what would have been the concessionaire's profits had the concession continued as is (it won't!)?

A PVR contract with an early termination clause would have avoided four years of congestion and frustration at the Orange County SR 91 while at the same time protecting the concessionaire from opportunistic behavior by government

PVR: Other properties

- Provides flexibility in tolls:
 - urban highways and adaptation to changing optimal toll schedules
- Makes opportunistic renegotiations less likely:
 - can't renegotiate on contract term
 - increasing user fees helps the concessionaire little
- Mitigates the winner's curse (Tirole, 1996): bids become cost oriented

Experience with PVR

- UK, 1989: first PVR contract, no auction
- Colombia, 1997: first flexible term auction, bids on the sum of tolls without discounting
- Chile, 1998: first PVR auction

Experience with PVR



Experience with PVR: Chile

<i>Project</i>	<i>Month/year auctioned</i>	<i>Winning bid (MM USD)</i>
Ruta 68, Santiago-Valparaíso-Viña	02/1998	513
Diego Aracena Airport	11/2007	15
Ruta 160, Coronel-Tres Pinos	04/2008	342
Access AMB airport	07/2008	56
Melipilla-Camino de la Fruta Connection	08/2008	46
Ruta 5, Vallenar-Caldera	11/2008	288
Ruta 5, Puerto Montt-Pargua	05/2010	31
Concepción-Cabrero	01/2011	318
Alternative access Iquique	01/2011	167
Ruta 5, La Serena-Vallenar	12/2011	345
Rutas El Loa	12/2012	286
Ruta 43, La Serena-Ovalle	05/2013	223

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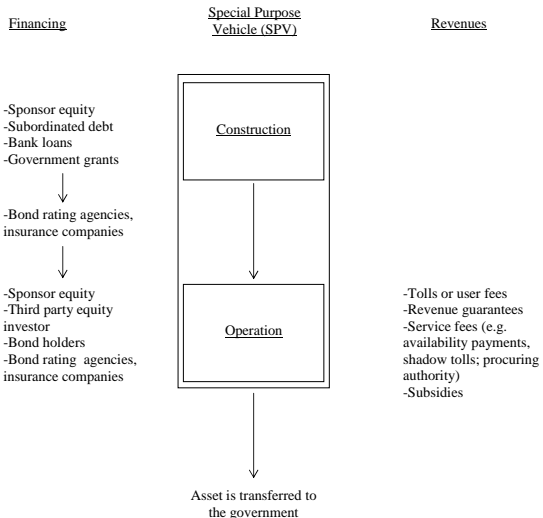
Financing and Project Finance

- What characteristics of PPPs are relevant when it comes to financing the project?
- How do financing sources vary during the life of the concession?
- Why is Project Finance so popular with PPPs?
- Is it true that the higher interest rates on private debt, as compared with public debt, is a valid argument against PPPs?

Financial Life Cycle of a PPP

- The development of PPPs happened at the same time as the development of **project finance**
- Project finance:
 - long-term financing of infrastructure projects based upon the projected cash flows of the project rather than the balance sheets of its sponsors
- Legal challenge:
 - that committing future cash flow be legally binding
 - a separate entity is created, a “**special purpose vehicle**” or **SPV**, whose only business is to build and operate the concessioned facility
- Many advantages, few disadvantages when compared with corporate finance

Life-cycle of PPP Finance



Is there a PPP premium?

- Can argue that project finance is the best option to finance PPPs
- Yet the cost of debt to finance a PP is much higher than the cost of sovereign debt:
 - differences of 200 - 300 basis points
- It is often argued that PPPs should be preferred to public provision only if productivity gains are large enough to offset the higher cost of funds under PPP.
- Is this argument correct?

Three (potential) explanations for the PPP premium

1. The interest rate on sovereign debt underestimates the social cost of this debt: if a country runs into financial trouble, it can resort to higher taxes ...
2. Risk borne by the concessionaire is the flip side of efficiency gains, thus per-dollar risk is larger, yet overall expected cost is lower
3. Inefficient contract design:
 - fixed term contracts lead to more risk (per dollar) than a PVR contract, this leads to higher cost of debt as well
 - next we present a case study suggesting that this explanation may be quantitatively relevant

First PVR Auction

- Ruta 68: Santiago to Valparaíso – Viña del Mar
- Improvements and extensions of a 130 km highway
- Construction of three new tunnels
- Annual discount rate: fixed (real) 6.5% plus 4% (correction for risk)
- Auction: February 1998
- Five bidders, one disqualified on technical grounds
- Minimum income guarantees: optional, at a price
- Winner: did not demand a minimum income guarantee

First PVR Auction

- Winning bid: US\$374 millions
- Government estimate of construction costs: US\$379 millions
- Normal return on capital if correction for risk reduced to 1 – 2% range
- An example suggesting that using the best contract reduces risk premium by 200-300 basis points

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In favor of PPPs

Suspect:

- Relieve strained public budgets

Valid:

- Better maintenance at a lower cost
- Filter white elephants
- Avoid winner's curse
- Avoid cost of bureaucracies

Gains can be substantial: 20 - 50% of initial investment

Against PPPs

Suspect:

- Higher financing costs

Valid:

- Higher expropriation risk
- Can be used to avoid budgetary controls and anticipate spending
- More opportunities to renegotiate

We now know what to do about the pitfalls of PPPs.

Conclusion

- Potentially large gains from PPPs for transport infrastructure
- Important: service quality and state of assets at the end of the concession are contractible
- If not, face Hart's tradeoff and the case for PPPs becomes far from obvious: hospitals, schools, ...
- Some of the advantages of PPPs rely on user fees being the concessionaire's main income source
- PPPs as a third way?
 - efficiency: close to privatization
 - fiscal accounting: close to public provision

Conclusion

- Now we know how to deal with the problems of PPPs:
 - avoid bad faith renegotiations
 - symmetric fiscal accounting
 - flexible term contracts
- And can therefore reap the advantages

PPPs and World Infrastructure Spending (2008-10 in US\$bn)

	Total	Private		
	Public + Private	PPP (project finance)	Non-PPP (project finance)	Corporate finance
Transport	1040	[45 — 75]	—	n.a.
<i>Airports</i>	80			
<i>Ports</i>	110			
<i>Railroads</i>	400			
<i>Roads</i>	450			
Social infrastructure	490	[12 — 20]	—	n.a.
Water and waste	160		—	n.a.
Oil, gas (transmission)	200		n.a.	n.a.
Electricity	810	[3 — 5]	[140 — 160]	n.a.
Telecoms	300		[42 — 48]	n.a.
Total	3000			
Total private	1000	[60 — 100]	[180 — 220]	[680 — 760]
World GDP 2010	63000			

The road ahead: a taxonomy of organizational form for efficient infrastructure provision

(1) Is exclusion feasible (i.e. can users be charged)?	(2) Are there increasing returns?	(3) Is the scope of planning larger than the scope of the project?	(4) Is quality contractible?	(5) Organizational form	(6) Type of infrastructure
yes	no	no	yes/no	Privatization and liberalization	Power generation , oil/gas transmission, mobile telephony
yes	yes	no	yes	Regulated privatization	Utilities: water, electricity or gas distribution, high-voltage transmission
Yes/no	yes/no	yes	yes	PPPs	Ports, highways, roads, streets, tunnels, bridges, rail lines, airports
yes/no	yes/no	yes	no	PPPs or public provision (negative externality)	Schools, jails, hospitals, health care facilities, & services, buildings, IT services

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