RISK ALLOCATION IN PPPS

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Risks

- **Definition**: Uncertain outcomes which have a direct effect on the provision of the service or its financial return (i.e. it affects benefit, cost or revenues)

- Risks in PPPs can:
- - Be retained by the PA
- - Can be transferred to , retained by, the Project Company
- Be transferred to PC, and then reallocated to third parties (i.e. subcontractors)
- Covered by insurance
- Transferred to end users, if these pay

The main types of risk

- ***Misspecification of output requirements risk***

It refers to the possibility that the output characteristics specified in the contract and which form the basis of the contractual obligations are ill or not clearly described.

Design risk and site risk

- It includes the risk of failing to complete the design process in time and within the budgeted costs, the risk of failing to deliver a solution that works satisfactorily and meets the requirements set by the public-sector party. This risk also includes the possibility of changes in technical standards during the design phase.

- **Example**: Millennium bridge in London

Construction risk and time schedule risk

- It includes the risk that factors such as changes in labour and materials costs, inadequate cost management, inefficient construction practices, adverse site and weather conditions, protester action, delays in obtaining approvals and permits, and the failure of private partners to perform may lead to construction delay and cost overruns.

- **Example**. Geology of site is not as expected and thus extra piling may be required for its foundations

Construction risk: Site risk

- Site acquisition process
- Ground conditions
- Permits for construction
- Environmental permits
- Archeology
- Right of way
- Protesters

Example: Protesters blocking the Lyon – Turin Train

Operation risk

- It includes the risk factors that may lead to an increase in operation costs and failure to meet availability and performance standards. These factors include shortage of skilled labor, labor disputes, late delivery of equipment, poor maintenance schedule, inadequate cost management, etc.

Example: national strike

Demand risk

It is the risk of making lower-than-expected revenues if the actual demand for service falls short of the demand initially forecasted.

Example. for toll bridge is the risk that users turn out to be less than expected

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Availability risk

- Includes risk that the public service is not delivered or not delivered according to the standards specified in the contract.
- This is related to:
- Risk that the infrastructure/site (or part of it) is made unavailable because of some uncertain event realizing.
- Risk of substandard services

Risk of changes in public needs

It is the risk that the output specifications set up in the initial contract become inadequate because of changes in society's preferences. The relative importance of this risk increases with contract length, as for a longer contract the chance of changes in public needs is greater.

Example: Chef Jamie Oliver and hiand the quality of catering in UK PFI schools

Legislative/Regulatory risk

It is the risk of changes in the legislative and regulatory framework, e.g. unexpected modifications in tax legislation, tariff-setting rules, and contractual obligations regarding investment and quality standards.

Example: unilateral tariff renegotiation in LAC

Political risk

It is the risk of changes in the political regime or political power that may lead to changes in attitude towards the project and the PC, leading to strong political opposition, which may result in:

- Change in law
- Change in user tariffs

- Guasch (2006): Govt lead renegotiations occurred mainly before elections

- - London Underground and the Ken Livingston-Treasury institutional disagreement

Financial risk

Operating and capital losses may result from interest and exchange rate fluctuations, capital controls restricting convertibility and transferability of profits, etc.

Example: UK Financial crisis reducing availability of funds, with lenders pulling out

Residual value risk

It is the risk of holding a facility (e.g. land, buildings, water plant) whose value at the end of the contract is lower than that anticipated at the start.

Example: Public office accommodations losing value because of housing market crash

Who should bear these risks?

- A common mistake by PA in Europe is to try to push bidders to accept too much risk
- A common mistake in Europe is not to try to push bidders to accept risk
- Lenders typically do not want to take risk: they want the PC to be an empty box with all risk allocated elsewhere
- Misallocation of risk is the key problem in PPP

The issues

- The risk allocation affects the expected returns from the project and their riskiness

- Thus risk allocation affects the project bankability, the PC's risk balance and the Lender's returns.

- Detailed specifications on how to allocate risks are necessary: a process of due diligence and risk evaluation has to be undertaken by Sponsors and Lenders through the bidding process and through the contract negotiations

The risk matrix (or Risk register)

- Appended to the contract

It derives from a consideration of:

- The nature of each risk
- The effect of the risk occurring
- The allocation of each risk
- Any risk mitigation from its passing to subcontractors or insurance

Risk allocation and public debt

- Risk allocation affects the way the project is accounted ir recorded in the public accounts
- Regulation of On- or off-balance sheet considerations, and the impact of project on Public Indebtness.

- **Eurostat 2008: A project is off-balance if**

- **1. PC bears construction risk**
- **2. PC bears either demand risk of availability risk**

Criteria for efficient risk allocation

- …not to circumvent EUROSTAT
- …not to pass all risks to PC
- ….not to isolate PC from risk
- ….not to isolate banks from risks

BUT:

Trade off

risk premium considerations and incentive provisions

Understanding the risk premium

- Experiment 1. Suppose PA needs an infrastructure to be built which has risk of cost overruns. To build the infrastructure costs 3000 but with probability ½ (heads) there are overruns of 2000 (so cost is 5000).

- Run experiment in groups of 5 bidders.

Risk premium

- Experiment 2. Suppose now PA offers contract where overruns are fully reimbursed. Thus PA bears the risk of cost increasing of 2000.

  Run experiment in groups of 5 bidders.

- Experiment 3/4. Suppose now that winning contractor can exert effort at the cost of 100 to reduce the probability of cost overruns to 1/4. Suppose winning contractor bears risk of costs overruns.

  Run experiment in groups of 5 bidders with

  - Bidding takes place
  - Bidder chooses effort

	Winning bid	Expected cost for PA	Expected Profit bidder
Ex1:exogeneous risk to PC, no effort	4300	4300	4300-4000=300
Ex 2: exogenous risk to PA, no effort	3050	**3050+1000=4050 <4300**	3050-3000=50
Ex: 3: endogenous risk to PC+effort	3700	3700	3700- 3500-100 =200

- From the experiments:
- exogeneous risks: better for PA if PA bears it
- Endogeneous risk: better for PA and for C if C bears it

Criteria for efficient risk allocation

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Theory of incentives

- Principal (PA)
- Agent (Contractor, PC or subcontractors)

- Delegation to Design, build, manage, maintain and finance infrastructure for public service provision
- Interests not aligned: max welfare vx max profits

Design of award procedure and of concession contract determines the incentives of Agent

Objective PA

(i) Select best project to meet its needs

(ii) Minimize cost of realization for PA

(iii) Ensure quality standards to please users/voters

Which incentives for A to obtain (i) and (ii)?

Instruments to provide incentives

- Design tender procedure

- Design contract (payment structure risk allocation, penalties, guarantees, duration, deductions etc)

Incentive problem

- Asimmetric information on:
  - Costs and time for completion, operational costs, quality of infrastructure, service quality, forecasted demand, construction risk, demand risketc (*exogeneous*)
  - Actions/decisions which affect cost and demand and risks (*endogenous*)

- Incomplete contracts :
  - Non-forecastable events
  - Non-describable contingenties
  - Too costly to write or descrive contingencies

Putting incentives into a conceptual framework

Variable **Demand from users** is affected by:

- quality of infrastructure
- quality of service
- price
- outside uncontrollable events

Variable **cost of operating an infrastructure** is affected by :

quality of infrastructure

quality of service delivere

organizational effort (processses, procedure, input choices

outside uncontrollable events

Demand:

$$D = d_0 - bp + d_a a + d_i i + \varepsilon_D$$

Demand uncertainty σ_D

Operating costs:

$$C = c_0 - c_a a + c_i i - c_e e + \varepsilon_C$$

Cost uncertainty σ_C

Non monetary effort costs: $a^2/2 + e^2/2 + i^2/2$

a: effort in quality of infrastructure (network, facility)

i: effort on quality of service (example: punctuality)

e: effort in cost reduction (example: staff management)

Benchmark

- Effort in quality of infrastructure:

$$a = d_a + c_a$$

⇒***Optimal to Internalize effect effort on demand and cost***

- The greater the sensitivity of demand *(*d_a) to infrastructure quality, the greater the optimal effort in quality of infrastructure

- The greater the sensitiviy of operating cost to infrastucture quality, *(*c_a) the greater the optimal investment.

- Investment in quality of the service:

$$i = d_i - c_i$$

$\Rightarrow$***Optimal to Internalize effect on demand.***

- The greater the sensitivity of demand to the quality of the service *(*d_i)the greater the optimal effort.

- Investment in cost reduction:

$$e = c_e$$

$\Rightarrow$***Optimal to Internalize effecte effort on costs***

- The greater the potential for cost reduction *(*c_e) , the greater the investment

Risk allocation and incentives

Three possible alternatives:

- Revenue sharing: A keeps fraction β of revenues
- Cost sharing: A bears share β of costs
- **Profit sharing: A** keeps fraction β of profits

(share β can be zero)

The incentives of the firm under profit sharing

With a share β, contractor's profit are:

$$\beta(pD-C) - a^2/2-e^2/2- i^2/2$$

That is:

$\beta(Dd_0 - bp + d_a a + d_i i + \varepsilon_D)$ *Revenues*

$- c_0 - + c_a a + c_e e - \varepsilon$ *Monetary Costs*

$-a^2/2-e^2/2- i^2/2$ *Nonmonetary costs*

Risk transfer and incentives

Impact on efforts of profit sharing rule

- Profit sharing :

$$a = \beta (d_a + c_a)$$

$$i = \beta d$$

$$e = c_a$$

The more demand risk and cost risk are transferred to the agent (higher profit share β) the greater the incentives of the agent to exert effort to improve quality of the infrastructure, quality of service and cost reduction.

Risk transfer and risk premium

- But transferring risk is costly: P needs to reward A for bearing risk premium

- Risk premium is greater the greater:

  - demand uncertainty σ_D
  - cost uncertainty σ_C
  - level of risk transfer β.

Risk allocation principles

- Transfer more risk to contractor (higher β) if:

- - PC can better control that risk than PA
- Risk is not too high
- Stable environments
- Standard project with lots of past experience
- Predictable risks
- service quality highly affected by PC effort
- Infrastructure quality highly affected by PC effort
- PA not privately informed
- PA cannot control that risk
- PC able to diversify risk better than PA

Application of principles to the main types of risk

Misspecification of output requirements risk

PA can control this risk by careful planning

➔Risk should be borne by PA

Design risk

PC can control this risk by careful planning

➔Risk should be borne by PC

Site risk

PC can control this risk by site surveys

However, site surveys cannot provide fully accurate information, especially for roads or brownfield projects

➔high uncontrollable risk makes case sometimes for PA to take responsibility for ground conditions.

For infrastructure where PA has superior information, risk taking by PA is also necessary to avoid opportunistic use of information, which anticipated would result in high risk premium to be paid to PC in order to induce participation

Construction risk and time schedule risk

- With design construction in the hands of the PC, all controllable construction risk should be born by PC

- Archeology:
- If low risk (Lapland), risk should be born by PC
- if high risk (Rome), risk should be borne by

Operation risk

- With design and building in the hands of PC, operational risk greatly depends on quality of project design, planning and implementation. Thus operational risk should be in the hands of the PC.

Demand risk

Prisons: demand cannot be affected by PC's effort➔demand risk must be kept in PA

Nursing homes: demand greatly affected by PC's effort➔demand risk must be transferred to PC

Transport projects: demand affected by PC's effort and by external events ➔ demand risk must be shared to PC

Legislative/Regulatory risk

National legislation: Changes in national legislation typically not controllable by (local or sector) PA or PC.

However, PC can control impact of changes on project costs➔ risk to be borne by PA

Specific legislation: Changes controlled to some exptent by PAs➔ risk to be borne by PA

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Financial risk

Capital gains may result from interest rates reductions that create good opportunity for refinancing

But they may also result from PC gaining better reputation with lenders.

Refinancing conditions: if other major risks are shared then benefit of refinancing to be shared

Residual value risk

It is the risk of holding a facility (e.g. land, buildings, water plant) whose value at the end of the contract is lower than that anticipated at the start.

Conditional end payments may be included to retrun facility to PA?

How to reconcile need to incentivize maintenance of infrastructure and residual value risk?

How to ensure end payments?

Clauses on risk allocation

- **Compensation Events**: risks for which the PA compensates the PC for the effect of the risk occurring (risk kept by PA)

- **Relief Events**: risks for which the PC is not penalized by PA for not delivering but it is not paid either (risk shared)

- **Force Major events**: neither party is at fault, but consequences of event occurring lead to termination (risk shared)

- See HM Treasury: standardized PFI contract (2007)