

RISK TREATMENT PREFERENCES FOR PPP/PFI CONSTRUCTION PROJECTS IN THE UK.

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Public private partnerships (PPP) and the Private Finance Initiative (PFI) in the United Kingdom purport to transfer project risk to the private sector. This raises the question as to what treatment options are available and preferred for these risks. A questionnaire survey, using a catalogue of 46 risks categorised under three risk meta-levels, explored the perceptions of people involved in PPP/PFI construction projects in the UK. The findings indicate that risk avoidance and risk reduction are the two least preferred treatment options, compared with risk retention and risk transfer. Retention of the risks allocated to either the public or the private sectors is preferred for dealing with political and social risk at the macro-risk level; for the demand and residual risks at the meso-risk level, and for all of the micro-level risks.

Keywords: Project procurement; public/private partnerships; PPP; Private Finance Initiative; PFI; risk management; risk treatment.

INTRODUCTION

PPP/PFI projects and risk

The involvement of the private sector in the development and financing of public facilities, through the mechanisms of public/private partnerships (PPP), has developed at an increasing rate in the United Kingdom mainly through the procurement mechanism of the Private Finance Initiative (PFI).

PPP/PFI projects, like other construction projects under more traditional procurement systems, are exposed to a variety of risks over the project life cycle. The construction process itself is lengthy, complex and characterised by many uncertainties. The operational phase of public service delivery projects is unfamiliar to most private sector organisations, and thus poses further risks. Even the eventual cessation of a service or disposal of an asset is not free of risk.

The process of risk management involves identifying and analysing risks and then deciding upon a response to each risk. While each risk has to be dealt with individually at some stage, initially it may be beneficial to consider groupings, or meta-levels of project risks in the interests of making the risk management process more efficient. The objectives of this paper are first, to describe a meta-level typology

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of risks for PPP/PFI projects, and second, to present the findings of survey research which explored respondents' treatment preferences for these risks.

Risk categorisation in PPP/PFI

Li (2003) has established a risk checklist for PPP/PFI projects with a meta-level classification approach that essentially looks at the nature of the risks and their relationship and proximity to the project. Under this proposal, risks associated with PPP/PFI projects would be classified on the basis of three levels of risk factors:

- *macro* level
- *meso* level and
- *micro* level.

Macro level PPP/PFI risks are sourced *exogenously*, i.e. they are external to the project itself, or beyond the system boundaries of the project. This category comprises risks at a national or industry level status, and natural risks. The risks at this level are most often associated with political and legal conditions, economic conditions, social conditions and weather.

Meso level PPP/PFI risks arise *endogenously*, i.e. internally at the project level through the processes of the project itself. These represent the PPP/PFI project implementation problem, and involve issues such as project demand/usage, location, design and construction, operational requirements and technology.

The *micro* level of PPP/PFI risks is more difficult to define, but represents the risks present in the stakeholder relationships formed in the project procurement process, and which arise mainly through the inherent differences between the public and private sectors in ethos and contract management approach. The public sector has social responsibility, while the private sector is mostly profit driven.

Table 1 provides a catalogue of potential PPP/PFI project risks. These are developed from Al-Bahar and Crandall (1990). The risks are categorised in terms of the macro, meso and micro three level approach. Each major category is classified into its important sub-groups.

Risk treatment options

Although the risk management objectives of the public sector are different from those of the private sector (Lewis and Mody 1997), most governments, such as the UK Government, realise that many areas of the private sector's experiences in risk management are applicable in practice to government departments (NAO 2000). Business risk management models are strongly recommended by governments and industry professionals (Lewis and Mody 1997; NAO 2000). In business management, the risk treatment options applicable to PPP/PFI projects comprise risk retention, risk avoidance, risk reduction and risk transfer.

For some risks it may be possible to apply combinations of options (excluding risk avoidance, which cannot be combined with any other option). However, the nuances of combination responses to risk can only be addressed effectively by considering specific treatments for specific risks on specific projects, and in any treatment combination it is likely that one option in the combination will dominate any others. It is therefore valid to explore the perceptions of people involved in PPP/PFI projects, concerning their preferred basic risk treatment options for such projects. Questionnaire survey research was carried out to explore these perceptions.

Table 1: Categorised list of PPP/PFI project risk factors

Risk category level	Risk category sub-group	Risk Factor
Macro level risks	Political and government policy	<ul style="list-style-type: none"> • Unstable government • Expropriation or nationalisation of assets • Poor public decision-making process • Strong political opposition
	Macroeconomic	<ul style="list-style-type: none"> • Poor financial market • Inflation rate fluctuation • Interest rate fluctuation • Influential economic events
	Legal	<ul style="list-style-type: none"> • Legislation change • Change in tax regulation • Industrial regulatory change
	Social	<ul style="list-style-type: none"> • Lack of tradition of private provision of public services • Level of public opposition to project
	Natural	<ul style="list-style-type: none"> • Force majeure • Geotechnical conditions • Weather • Environment
Meso level risks	Project selection	<ul style="list-style-type: none"> • Land acquisition (site availability) • Level of demand for project
	Project finance	<ul style="list-style-type: none"> • Availability of finance • Financial attraction of project to investors • High finance cost
	Residual risk	<ul style="list-style-type: none"> • Residual
	Design	<ul style="list-style-type: none"> • Project approvals and permits delay • Design deficiency • Unproven engineering techniques
	Construction	<ul style="list-style-type: none"> • Construction cost overrun • Construction time delay • Material / labour availability • Late design changes • Poor quality workmanship • Excessive contract variation • Insolvency of sub-contractors or suppliers
	Operation	<ul style="list-style-type: none"> • Operation cost overrun • Operational revenue below expectation • Low operating productivity • Maintenance costs higher than expected • Maintenance more frequent than expected
Micro level risks	Relationship	<ul style="list-style-type: none"> • Organisation and co-ordination risk • Inadequate experience in PPP/PFI • Inadequate distribution of responsibilities and risks • Inadequate distribution of authority in partnership • Differences in working method and know-how between partners
	Third party	<ul style="list-style-type: none"> • Lack of commitment from either partner • Third Party Tort Liability • Staff Crises

QUESTIONNAIRE SURVEY

A questionnaire survey was conducted in 2001 among UK organisations with PPP/PFI experiences or interests. Of 500 questionnaires sent out, 61 completed responses were received - 16 from public sector organisations and 45 from the private sector. The effective return rate is 12%..

Survey findings

The survey responses reflected participants' opinions about preferred treatments for risks allocated through the PPP/PFI mechanisms.

Overall, risk retention (by the party to whom the risk is allocated) is considered the most popular (nearly 40%) option, followed by risk transfer and risk reduction. The least preferred method is risk avoidance. This result (as shown in Figure 1) differs from that found in earlier survey research in the construction, oil and gas industries. Baker *et al.* (1999) found that risk reduction was the most frequently utilised method, risk transfer was next, with risk retention used least.

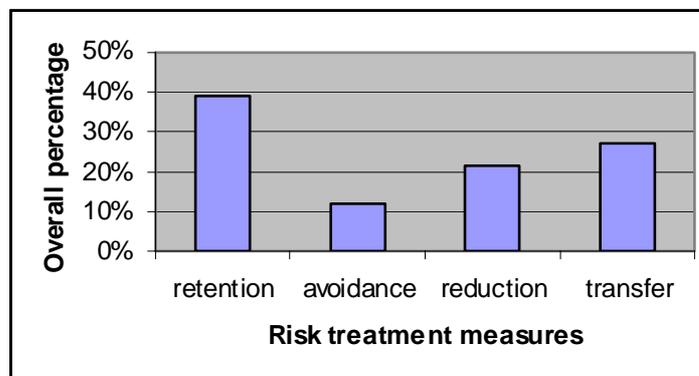


Figure 1: Overall distribution of survey respondents' preferred risk treatment measures for PPP/PFI construction projects in the UK.

In the survey data analysis, where two treatment options scored the same frequency, both methods shared the same ranking, and caused the next ranking number to become void. Table 2 shows the responses for all survey respondents and for the 46 catalogued risk factors.

For the *Risk Retention* option 26 risk factors received the highest percentage, 16 in the second, 3 in third and only 1 in fourth.

A similar preference scoring method was applied to *Risk Avoidance*, where none of the risk factors received the highest score, while 27 got the lowest percentage (in fourth place). Further analysis shows that, in terms of the most preferred risk treatment measure, the public sector prefers to transfer risk factors, while the private sector prefers to retain the risk factors allocated to it.

Table 2: Survey respondents' risk treatment preferences for 46 catalogued risks for PPP/PFI construction projects in the UK.

Risk Treatment Methods	Public Sector preferences				Private Sector preferences				Overall preferences			
	1 st	2 nd	3 rd	4 th	1 st	2 nd	3 rd	4 th	1 st	2 nd	3 rd	4 th
Retention	16	11	13	6	28	15	3	0	26	16	3	1
Avoidance	1	11	17	17	2	9	12	23	0	6	13	27
Reduction	8	27	9	2	9	14	17	6	6	16	20	4
Transfer	26	13	5	2	16	11	9	10	18	10	11	7

The risk treatments are then considered according to their macro, meso and micro level risk factor categories. The responses to the four principal methods – retention, avoidance, reduction and transfer - are summarised in Tables 3, 4, and 5, based on the main categories and principal risk groups within each category. The last four columns in the tables show the percentage of respondents agreeing to this type of risk treatment method. The values in brackets show how each treatment is ranked among four options (based on the associated percentages).

Table 3: Survey respondents' preferred treatment of macro level risks in UK PPP/PFI construction projects.

Sub-group	Risk Factor	Total		Preferred Risk Allocation	Preferred Treatment Option (% , rank)			
		Mean	Rank		Retention	Avoidance	Reduction	Transfer
Economic	Interest rate fluctuations	3.18	1	Solely to private	26% (2)	6% (4)	26% (2)	42% (1)
Economic	Availability of finance	2.97	3	Solely to private	44% (1)	7% (4)	15% (3)	34% (2)
Economic	Poor financial market	2.95	5	Solely to private	22% (3)	16% (4)	34% (1)	28% (2)
Economic	High financing cost	2.43	8	Solely to private	27% (3)	12% (4)	31% (1)	30% (1)
Economic	Inflation rate fluctuation	2.41	10	Primarily to private	31% (1)	9% (4)	31% (1)	29% (3)
Economic	Influential economic events	2.39	11	Primarily to private	36% (1)	14% (4)	29% (2)	21% (3)
Legal	Legislation change	3.02	2	Shared	35% (1)	9% (4)	32% (2)	24% (3)
Legal	Industrial regulation change	2.43	9	Solely to private	25% (3)	3% (4)	34% (2)	38% (1)
Legal	Tax regulation change	2.28	12	Primarily to private	47% (1)	13% (4)	20% (2)	20% (2)
Natural	Environment	2.95	4	Solely to private	31% (2)	3% (4)	28% (3)	38% (1)
Natural	Force majeure	2.85	6	Shared	33% (2)	5% (4)	48% (1)	14% (3)
Natural	Geotechnical conditions	2.68	7	Solely to private	21% (3)	15% (4)	24% (2)	40% (1)
Natural	Weather	2.03	13	Solely to private	33% (1)	6% (4)	27% (3)	34% (1)
Political	Unstable government	1.92	14	Primarily to public	71% (1)	18% (2)	7% (3)	4% (4)
Political	Nationalisation / expropriation	1.36	16	Primarily to public	60% (1)	24% (2)	12% (3)	4% (4)
Political	Political opposition	1.31	17	Primarily to public	76% (1)	16% (2)	8% (3)	0% (4)
Political	Poor public decision-making process	1.05	18	Primarily to public	54% (1)	25% (2)	13% (3)	8% (4)
Social	Traditional public opposition	1.44	15	Strongly depending	61% (1)	22% (2)	9% (3)	8% (3)
Social	Lack of tradition of private provision of public service	0.79	19	Primarily to private	40% (1)	10% (4)	25% (2)	25% (2)

Table 4: Survey respondents' preferred treatment of *meso* level risks in UK PPP/PFI construction projects.

Sub-group	Risk Factor	Total		Preferred Risk Allocation	Preferred Treatment Option (% , rank)			
		Mean	Rank		Retention	Avoidance	Reduction	Transfer
Construction	Construction cost overrun	3.56	1	Solely to private	23% (2)	11% (3)	12% (3)	54% (1)
Construction	Construction time delay	3.51	2	Solely to private	25% (2)	17% (3)	11% (4)	47% (1)
Construction	Poor quality of workmanship	3.17	9	Solely to private	25% (2)	11% (3)	11% (3)	53% (1)
Design	Design deficiency	3.5	3	Solely to private	26% (2)	3% (4)	18% (3)	53% (1)
Design	Late design changes	2.56	15	Primarily to private	50% (1)	11% (4)	18% (3)	21% (2)
Operation	Frequency of maintenance	3.45	4	Solely to private	31% (2)	9% (4)	19% (3)	41% (1)
Operation	Higher maintenance cost	3.27	5	Solely to private	35% (2)	15% (3)	9% (4)	41% (1)
Operation	Low operating productivity	3.23	6	Solely to private	33% (2)	12% (3)	9% (4)	46% (1)
Operation	Operation cost overrun	3.23	7	Solely to private	31% (2)	11% (3)	9% (4)	49% (1)
Operation	Operational revenue below expectation	3.18	8	Solely to private	43% (1)	7% (4)	18% (3)	32% (2)
Others	Availability of labour / material	2.95	10	Solely to private	37% (2)	10% (3)	13% (3)	40% (1)
Others	Contract variations	2.85	11	Strongly depending	37% (1)	17% (4)	26% (2)	20% (3)
Others	Financial attraction of project to investors	2.78	12	Primarily to private	45% (1)	14% (4)	21% (2)	20% (2)
Others	Residual risk	2.72	13	Primarily to private	55% (1)	3% (4)	21% (2)	21% (2)
Others	Insolvency of subcontractors / suppliers	2.59	14	Solely to private	39% (1)	10% (4)	12% (3)	39% (1)
Others	Level of demand for the project	2.53	16	Primarily to private	27% (2)	18% (4)	32% (1)	23% (3)
Others	Project approvals and permits	2.51	17	Strongly depending	51% (1)	7% (4)	21% (2)	21% (2)
Others	Land acquisition / site availability	2.3	18	Primarily to public	59% (1)	7% (3)	27% (2)	7% (3)
Others	Unproven engineering techniques	2.06	19	Solely to private	30% (2)	12% (3)	12% (3)	46% (1)

Table 5: Survey respondents' preferred treatment of *micro* level risks in UK PPP/PFI construction projects.

Sub-group	Risk Factor	Total		Preferred Risk Allocation	Preferred Treatment Option (% , rank)			
		Mean	Rank		Retention	Avoidance	Reduction	Transfer
Relationship	Authority distribution between partnerships	2.57	1	Shared	54% (1)	14% (3)	23% (2)	9% (4)
Relationship	Lack of commitment from public / private partner	2.53	2	Shared	42% (1)	33% (2)	21% (3)	4% (4)
Relationship	Lack of experience in PPP/PFI arrangements	2.25	3	Strongly depending	41% (1)	22% (3)	32% (2)	5% (4)
Relationship	Organisation and co-ordination risk	2.22	4	Solely to private	47% (1)	10% (4)	20% (3)	23% (2)
Relationship	Responsibilities and risk distribution	2.22	4	Shared	31% (2)	7% (4)	52% (1)	10% (3)
Relationship	Different working methods	1.97	7	Primarily to private	35% (1)	17% (3)	31% (2)	17% (3)
Third Party	Staff crises	2.14	6	Primarily to private	45% (1)	14% (3)	27% (2)	14% (3)
Third Party	Third party tort liability	1.74	8	Primarily to private	25% (2)	8% (4)	21% (3)	46% (1)

No risk factor exhibits a single risk treatment preference from all respondents. This suggests that it is essential in risk management to consider combinations of possible

measures. The specific nature of the PPP/PFI project and the individual characteristics of each risk should determine the choice of risk treatment measure.

Preferred treatment for *macro* level risks

For *macro* level risks, Table 3 shows that risk reduction, transfer and retention, in that order, are the methods most preferred by the private sector for dealing with *economic risks*. However, different economic risk factors have different priorities. Retention is the first preferred option for the *macro* risks of availability of finance, influential economic events, and inflation risk. This suggests that private consortia must include an appropriate, but competitive, level of contingency for economic risks.

Risk reduction is the first choice for financial market risk. One of the basic risk reduction techniques for private consortia is through a more detailed market study. Risk transfer is the most favourable option for interest risk. The transfer of economic risk could be mitigated through appropriate insurance. Risk avoidance is the least favourable choice for economic risk. Economic risk factors are part of any project and, consequently, it is difficult for them to be avoided in any project, rather they must be actively managed.

For *legal risks*, retention is the most favoured choice, followed by risk transfer and risk reduction. Risk avoidance is the least favoured option for the treatment of legal risks. Risk retention is the first preferred option for the risks of legislation change and tax regulation change, and the third favoured option for the risk of industrial regulatory change. Legislation and tax regulation change are beyond the control of the private sector, hence, the need for these risks to be retained by the public sector. Risk transfer is the first preferred choice for the risk of industrial regulation change. Generally, the private sector is more familiar with, and capable of managing, industrial regulation. Consequently, a Special Purpose Vehicle (SPV), the private sector partner in a PPP/PFI project in the UK, would prefer to transfer this risk to a specific subcontractor with an appropriate expertise and knowledge of the industrial regulation associated with the work package. Risk avoidance is the least preferred option for all three risk factors of the legal group. It indicates the fact that legal risk is unavoidable for any project development.

Risk transfer is the most preferred option for *natural risks*, followed by risk retention and reduction, and then risk avoidance. Risk transfer is the first choice for the risks relating to the environment, ground conditions and weather. This could be because PPP/PFI private consortia can transfer these risk factors to specific sub-contractors. Risk avoidance is the least preferred option for all of the four risk factors of the natural group, largely because natural risk is unavoidable for any construction project. However, risk retention is favoured for weather risks. Typically, weather influences most of the project construction process, so a SPV may have to retain it totally or partially. Risk reduction is preferred for force majeure risk. Improving the project feasibility study is one effective measure to reduce natural risk.

All the *political risk* factors share the same features: minor impact, primarily allocated to the public sector, and preferred risk treatment in the same order of risk retention, risk avoidance, risk reduction and lastly risk transfer. Risk retention is particularly preferred, compared to the other three measures. This suggests that if a risk has a minor impact, risk retention is the best option for dealing with it.

Risk retention is the most favoured choice for the *social risk* factor sub-group, followed by risk reduction, risk avoidance and risk transfer options. The risk factors

comprising the level of public support and tradition of private provision of public services have a minor impact on PPP/PFI projects. Although they are allocated to the private sector, depending on the type of PPP/PFI projects, it is actually better if they are retained by the public sector.

Preferred treatment for *meso* level risks

For *meso* level risks, Table 4 shows that risk transfer to a third party is the most favoured measure, followed by risk retention, while risk avoidance and risk reduction are the least favoured options. In PPP/PFI projects *design, construction and operation risks* are critical and normally expected to be allocated to the private sector SPV. The preferred solution to design, construction and operation risk for the SPV is to transfer these risk factors to subcontractors through subcontract agreements. This is a common practice in construction work involving complex and specialist work.

Risk retention is favoured because the private consortium is the final liability carrier. Some construction risks may be transferred back to the main contractor, or SPV, if the subcontractor is unable to perform, or complete, the subcontracted work. However, when dealing with operational revenue risk, analysis of the survey response data suggests that this is best retained within SPV. Risk avoidance and risk reduction are rarely used by the SPV in treating construction risks. Once the PPP/PFI contract is awarded, the SPV is bound to design, construct and operate the project with all the associated risks. Although these risks are unavoidable, the SPV may choose to reduce them through better project planning and risk transfer.

In general, the most favoured risk treatment for the other *meso* risk factors is risk retention. Risk transfer and risk reduction are the second and third favoured choice, respectively, while risk avoidance is the least preferred option.

Risk transfer is considered the most favoured option in dealing with the risk factors of *availability of labour/material, insolvency of subcontractor/suppliers* and *unproven engineering techniques*. Since these three risk factors are construction related, and are assigned solely to the private consortium in a PPP/PFI contract, the SPV can transfer them to subcontractors or suppliers. Risk retention is the second favoured choice. If the SPV cannot transfer risks, they have to be retained as they are unavoidable.

Risk retention is the most preferred treatment option for *contract variation* and *project approval* risks. Risk reduction and risk transfer are the second and third favoured choices for dealing with these. This means that no matter how these risk factors are allocated, both public client and the SPV must adopt some contingency plan to mitigate these risks. Risk retention is also the most favoured option for *financial attraction* and *residual risks*, which are primarily allocated to the SPV. These two risk factors are associated with the project feasibility study, which is carried out by the SPV in a PPP/PFI project to ensure that the project is financially attractive, with an appropriate residual value.

Risk reduction is the most preferred option for dealing with a *PPP/PFI project demand risk*, while risk retention, risk transfer and risk avoidance are the second, third and fourth preferred choices, respectively. If the SPV carries out a more detailed market study, it can have clearer information about the project demand level, for example in terms of the minimum, maximum and most likely traffic volume for road PPP/PFI projects. This helps the SPV to determine the exact scale of a project, given the level and scale of design required. Through this activity, the project demand risk can be reduced.

Site availability is the only risk factor within the *meso* risk group that respondents preferred to allocate to the public client. The most favoured treatment option for this risk is for the public client to retain it, while risk reduction is the second favoured choice. Risk avoidance and risk transfer are rarely used in dealing with the site availability risk since they are generally impractical to achieve. One way in which this risk can be dealt with by the public client is to make sure the project site is available before the business case for a PPP/PFI project is produced.

Preferred treatment for *micro* level risks

For *micro* level risks, Table 5 indicates that risk treatments for *relationship risks*, in order of preference, are risk retention, risk reduction, and risk avoidance and risk transfer. This indicates that it is not possible to totally eliminate relationship risk in a partnership. However, the participants should not be passive to this “soft” risk. The governance of a PPP/PFI project, for both the public and private sectors, should meet regularly to deal with individual responsibilities and commitments. Relationships can be improved through good communication and procedures for dealing with conflict. The exception to this is the case of the risk of responsibilities and risk distribution for which risk reduction is the most preferred measure.

The treatment of individual risks within the *third party risk* group differs depending on the risk factor. For a *staff crisis*, risk retention is the most favoured option, followed by risk reduction, risk avoidance and risk transfer. This suggests that dealing with a staff crisis should be the internal responsibility of a PPP/PFI stakeholder organisation. For *third party risk*, risk transfer is the favoured option, followed by risk retention, risk reduction and risk avoidance. Third party risk is typically transferred to another organisation, for example by insurance.

CONCLUSIONS

The findings of survey research, into risk treatment options for PPP/PFI construction projects in the UK, indicate that, among the four risk treatment measures, risk avoidance and risk reduction are the two least preferred treatment options compared with risk retention and risk transfer.

Retention of the risks allocated to either the public or the private sectors is the most favoured measure in dealing with political and social risk at the *macro* risk level; for the demand and residual risks at the *meso* level, and for all *micro* level risks. The technique of risk transfer appears to be the most common technique in dealing with critical *meso* level risks such as the risks of construction, operation, design and interest rates.

For *macro* risks, risk retention is the most popular choice for managing political and social risks, and some economic and legal risks. Risk transfer is the most favoured option for dealing with interest rate and natural risks. Risk reduction is preferred for treating financial market, force majeure and inflation risks. Risk avoidance is always the least favoured option, although it was found to be the second preferred option for dealing with political risks.

At a *meso* risk level, almost all the construction and operation risks, and the risk of design deficiency, are preferably managed by risk transfer. Risk retention is the second favoured treatment choice for these risks. Risk retention is preferred for other *meso* level risks, such as demand, residual, and contract. Risk reduction is the preferred option for project demand risk.

Risk retention is the most frequent choice by both the public and private sectors for treating *micro* level risks. Six risk factors within this group have risk retention as the first and second options, out of a total of eight individual risk factors. Risk transfer is the most favoured option for dealing with the risk of third party liability, through insurance transfer. The preferred risk management technique for the risk of “responsibilities and risk distribution” is risk reduction.

These findings should help both public and private sector stakeholder organisations to develop a more focused approach to the risk analysis and risk response processes of risk management in the development stage of PPP/PFI construction projects.

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