

# Risks

# Construction risk - What risk?

**C**onventional wisdom suggests that the construction phase of a PPP project is the most risky, largely, although not exclusively, because of the potential for cost overruns. The operational phase, particularly for projects with no offtake or market risk, looks benign in comparison.

That is the conventional wisdom. It's highlighted at PPP conferences, is emphasised in PPP guides and is typically reflected in term sheets. Margins, for example, commonly step down on successful delivery of an asset (unless they step up specifically to encourage refinancing). But with an increasing number of projects up and running, what does the evidence about PPP construction risk actually tell us?

Well, there's a strong argument to suggest that lenders to well-structured PPP projects with fixed-price contracts (and adequate risk mitigation) and strong, experienced contractors in jurisdictions familiar with PPPs – and the principles of project financing – remain insulated from any material construction cost overrun risk at all.

Nevertheless, risk analysts place considerable emphasis on construction costs and the ability of projects to withstand overruns. Credit committees discuss the matter at length. Financial models are subjected to a barrage of cost-related stresses for expected loss calculations and to determine loan conditions.

Yet the evidence – both empirical and anecdotal – suggests that in many PPP projects construction cost could be taken as a given with no need for subjective and generally arbitrary adjustments by analysts or the “guesstimation” of notional probability distributions. Indeed, over-emphasis on construction costs, although intuitive and seemingly reassuring, may be a distraction from more critical project risks. A bold statement? Perhaps. The argument is set out below.

Are PPP lenders focusing on the right risks? By **Robert Bain.**

## Empirical evidence

A summary review follows 14 of the most prominent studies that have examined infrastructure-related construction cost experience over recent years. At the end, all of the findings are consolidated. The evidence is generally, although not entirely, drawn from the roads sector because of the wealth of related published material. However the findings appear to be relevant to other asset classes.

Many of the studies reflect UK experience but research from Norway, Australia, France – and international analysis – is also considered. Starting from the early 1990s, research focused on conventional public sector procurement. As PPPs developed towards the middle/end of the decade, performance comparisons with PPPs were increasingly drawn. Some caution needs to be exercised with such comparisons, however (see panel).

Back in 1992, the UK Department of Transport (DoT) compared outturn road construction costs observed over recent years with the original tender prices submitted by contractors. The findings revealed an average cost overrun of 22%, largely because of unforeseen ground conditions. Under conventional procurement, this risk is typically passed back to the public sector through variations and claims submitted by the contractor.

In the same year, the National Audit Office (NAO) reported the outturn costs from 120 UK road construction contracts with values exceeding £1m and revealed an average cost increase of 27%. Twenty-eight contracts increased by more than 30% and five by more than 50%. The NAO attributed these increases to ground conditions (particularly earthworks and drainage problems) but also highlighted the contribution of design changes instigated by the public sector client. This is a recurring theme running through much of the literature.

In 1999, a UK study by the Agile Construction Initiative suggested that cost overruns occurred in 73% of conventionally procured road projects (and schedule overruns

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in 70% of projects). Although the magnitude of these overruns was not revealed and the evidence base remains unclear, these figures are often quoted in support of PPP-style contracting arrangements – even today.

A later study by the NAO published in 2001 took a case-study approach, reporting cost overruns of 30%–40%; sometimes higher. Again, much of the cause was attributed to client-initiated specification changes.

In a widely publicised Treasury-commissioned study of 2002, Mott MacDonald was commissioned to size the extent of optimism-bias incorporated in UK public sector construction cost and schedule estimates (across different infrastructure classes) by reviewing 20 years of experience. The research suggested that, on average, outturn costs were higher than original estimates by 47%. Projects classified as standard civil engineering displayed average overruns of 24%, whereas the figure for non-standard civil engineering (innovative projects) was 36%.

Turning to Norway, research published in 2003 examined 620 public sector road projects and found discrepancies between outturn construction costs and initial estimates lying between –59% and +183% (average cost overrun of 8%). The author described the magnitude of these discrepancies as “stunning”, noted that cost overruns were predominant, and reported supporting evidence from earlier Norwegian research looking specifically at toll road construction costs.

In his book, *Megaprojects and Risk: An Anatomy of Ambition* (2003), Bent Flyvbjerg reviewed 258 infrastructure projects from around the world, including 167 road schemes and 33 fixed link projects (bridges and tunnels). The construction costs of roads turned out to be 20% higher than estimates. Fixed links displayed cost overruns of 34%. The average construction cost overrun across Flyvbjerg’s entire sample was 28%.

Also in 2003, this time looking specifically at PPPs across different sectors, the NAO examined 37 government-procured projects in England and reported that 22% had resulted in cost increases. They contrasted this with the earlier published (Agile) figure of 73% in support of their hypothesis that, when compared with conventional procurement, PPPs delivered greater price certainty to procuring agencies.

Importantly, however, they reported that the cost increases “... mainly relate to further work which had not been part of the original specification at contract award”. This issue was emphasised further in separate research by the Treasury (2003) which found that cost uplifts were experienced in a fifth of its sample of PPP projects but “... all were driven by changes in the requirements of the public sector client”.

Again focusing on PPPs across different sectors, this time in Scotland, Cambridge Economic Policy Associates (CEPA) reported in 2005 that a surprising 24 of the 35 projects they reviewed had experienced cost uplifts; four of

more than 10% (more than 15% for three). The majority of the uplifts were once again initiated by the respective procuring authority.

In Australia in 2007, the Allen Group published a comparative analysis of 21 domestic PPPs versus 33 traditionally procured infrastructure projects. The cost overruns for traditional projects – measured from the original approval stage – averaged 45%, whereas those for PPPs were just 14%. The authors reiterate an important point made earlier in the Mott MacDonald study. Cost overruns tend to diminish as projects progress through the procurement cycle. When measured at the later stage of budget approval, for example, the Australian cost overruns had reduced to 25% and 3% respectively.

The NAO returned its attention to construction cost overruns in 2007 when it reviewed the Highways Agency’s programme of 36 recently completed road projects. Average overrun, from date of entry into the programme, was 40%. Additionally, the authors examined a further 67 schemes that, although in the programme, had yet to be completed. These costs had already risen by 27%, with further increases expected.

In a short article by SETRA (part of the French Ministry of Transport and Infrastructure) published in 2008, researchers reported that outturn costs on large French transport projects averaged 30% higher than original estimates (at public inquiry) and 11% higher than at final approval stage. French law requires an *ex post* evaluation of major transport projects to be undertaken between three and five years after opening, so it is to be expected that further evidence on construction cost performance will be published by the Ministry in future years.

In closing, the author conducted a review of 66 PPP projects for a major European bank in 2009. Although the details of this review remain confidential, it can be reported that 85% of all projects were delivered within, or under, budget. Of the 15% of projects that overran, three-quarters were delivered within 30% of the bank’s original expectation. The bank suffered no economic loss, however, despite the observed construction cost overruns.

## Consolidating the results

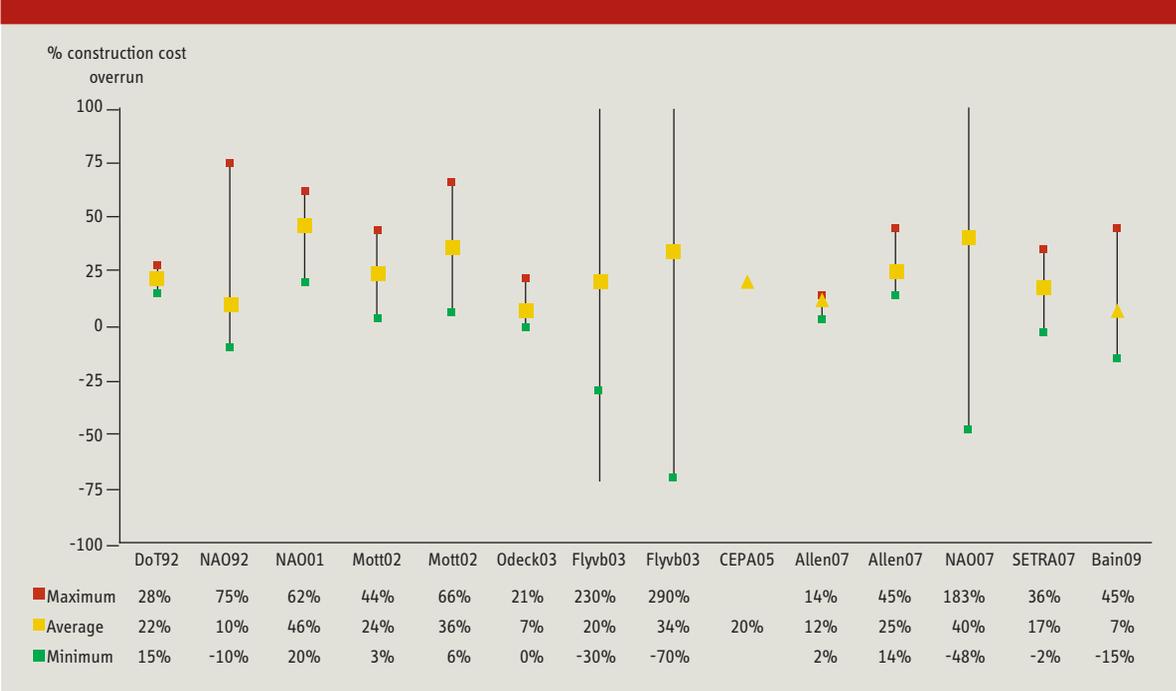
The construction cost overrun findings described earlier are summarised in Figure 1.

Across all of the studies, the mean construction cost overrun reported was 23% (average range from –9% to +88%). However, the studies include the experience from both conventional procurement and PPPs (the mean for PPP studies is represented by a triangular yellow marker in Figure 1). The separate results for conventional procurement and PPPs are presented in Figure 2.

Figure 2 suggests that the average construction cost overrun on PPPs (at 13%) is around half that observed from conventionally procured projects, and the range of outturn costs is significantly narrower.

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**FIGURE 1 - CONSTRUCTION COST OVERRUNS (ALL STUDIES)**



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## Conclusions

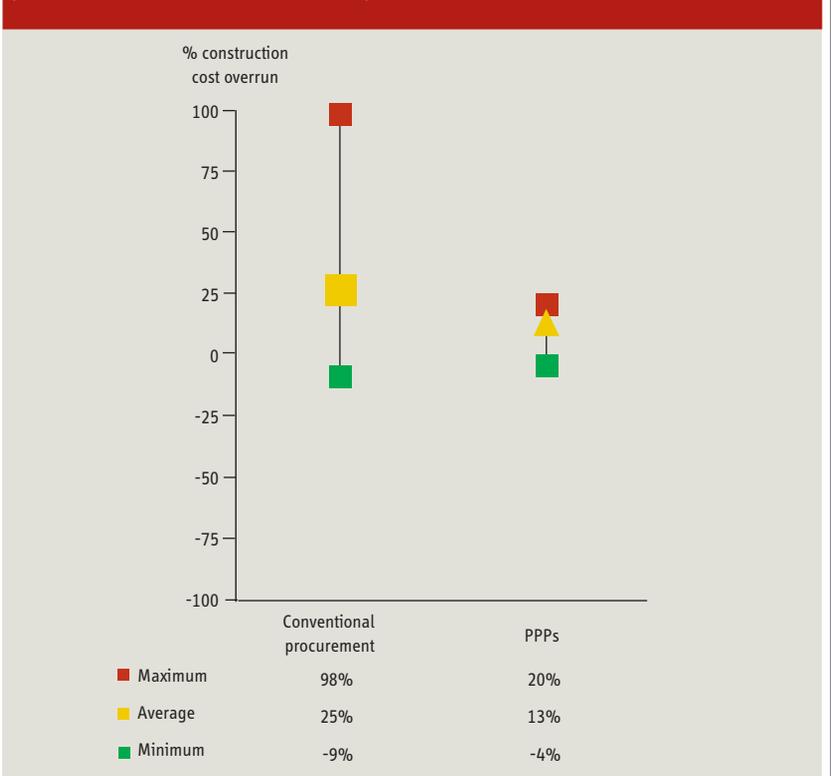
The studies described here typically examined construction cost overruns from the perspective of the public sector procuring agent. Rarely, the impact of overruns on the contractors themselves was explored. However, the literature remains silent on the specific exposure of PPP borrowers or lenders to construction cost overruns.

When the public sector has been exposed to overruns, the studies almost unanimously attribute this to procurer-initiated scope or specification changes – for which contractors are compensated separately (as it is outside their control) and from which PPP lenders would generally be contractually insulated. There is no evidence to suggest that lenders to well-structured PPP projects with fixed price construction contracts and adequate risk mitigation are exposed to any material construction cost overrun risk at all.

Anecdotal evidence – what there is of it – would appear to support this somewhat bold stance. Setting aside the issue of specification changes, do PPP construction contractors generally bear the risks of overruns themselves?

On the A13 PFI contract in the UK, the Highways Agency reports that the contractor lost heavily on the construction contract yet none of the overrun was passed on to the SPV (leaving lenders whole). On the Spencer Street Station PPP in Melbourne, the contractor (Leighton) admitted that it had suffered significant losses yet it completed the works with no additional payments from the

**FIGURE 2 - CONSTRUCTION COST OVERRUN SUMMARY (CONVENTIONAL PROCUREMENT V PPPS)**



# Operational period risks actually represent bigger potential risks

## Construction cost overrun risk is negligible.

public sector (again leaving lenders whole). This reinforces the view that experienced PPP contractors with strong balance sheets and reputational issues at stake will complete their obligations as intended and at their own risk.

However, a number of conditions must be satisfied before lenders can subscribe to the bold stance suggested above, and it is perhaps here that analytical focus should be directed:

- ▶ Is the contractor strong and incentivised enough to complete the works at its own risk?
- ▶ What is the risk of contractor bankruptcy?
- ▶ Could the contractor be replaced at no (cost) risk to the SPV/lenders?
- ▶ Are the key contracts (concession agreements and construction contracts) worded strongly enough to afford lender protection?
- ▶ Have the contractual provisions and protections been tested in the project's host jurisdiction?
- ▶ Can the general principles of project financing be relied upon in the host jurisdiction?
- ▶ Are the liquidated damages – and the terms of those damages – and liability caps (and other limits on the contractor's risks) appropriately set?
- ▶ Is the capital structuring adequate (sufficient equity and sub-debt cushioning senior lenders)?
- ▶ What is the risk of subcontractor failure impacting on the SPV's costs (and, hence, impacting on lenders)?
- ▶ What are the compensation on termination provisions in the contract that speak specifically to termination during construction – and are these adequate?
- ▶ Have technical advisers considered project risks in the specific context of the transaction's mitigant package such that lenders' residual risk exposure has been adequately identified and sized?

The danger for PPP analysts is that the conventional, simple and convenient focus on construction cost overrun risk (and the conventional response of stressing those costs in financial models) moves attention away from the possibly more critical issues listed above. In many PPP deals – particularly in mature economies – arguably:

A – Construction cost overrun risk is negligible and the real construction period risk relates to the potential for construction delays;

B – Operational period risks – to which the SPV (and hence lenders) may be more exposed – actually represent bigger potential risks to lenders.

Neither A nor B above reflect conventional wisdom.

### Caution with comparisons

Over the years a number of studies – most of them reviewed here – have purported to contrast the delivery performance of PPPs with that of conventional procurement. Few, however, have acknowledged that there are methodological challenges associated with this form of analysis. Readers are asked to bear the following

points in mind before accepting any comparative study findings at face value:

▶ *Non-comparable samples* – For a true comparison of PPPs with conventionally procured projects, it is important to ensure that the projects being compared are similar in nature, sector and size (and that they were procured at similar times under similar procurement policy guidelines). The inclusion of atypical projects in either sample will – unintentionally or intentionally – introduce bias.

▶ *Different definitions* – In some cases, estimates of capital costs include contingency allowances. In other cases they do not. In many cases, it remains unclear exactly what has (and has not) been included in a capital cost figure or estimate.

▶ *Transparency* – A number of official reports about infrastructure costs contain headline statistics. However, the underlying data remain absent from the public domain – and therefore the results do not lend themselves to independent scrutiny.

▶ *Policy bias* – Some of the literature reviewed when researching this article was clearly written by authors keen to find evidence in support of a particular policy (and sometimes ideological) stance on PPPs. The views reflected were polarised and lacked balance. A couple of authors – typically academics – had a wider political agenda against PPPs. Other works were commissioned by parties very active in the PPP sector or organisations representing such interests. The allegiance of the seemingly independent researcher is not always evident at first.

▶ *The evidence base is old* – Critics suggest that much of the evidence on construction cost overruns is old and, because of institutional learning and improved working practices, the experience today is much better (ie, lower cost overruns). However, results contained in the recent NAO study regarding the UK Highways Agency's estimation accuracy may be regarded as countering this criticism

▶ *Sample sizes are small* – The often-quoted Mott MacDonald study used to derive the optimism bias uplifts for standard engineering projects, for example, was based on a review of just seven standard engineering projects.

▶ *At-fault versus no-fault overruns* – Many comparative studies, unhelpfully, fail to separate incidences of cost overruns for which the construction contractor was responsible from cost increases – such as those caused by scope changes/creep – over which they have no control. The literature is both confused and confusing in this regard.

However, the biggest criticism of construction cost comparative analyses (outturns versus estimates) centres on the issue of measurement bias. This is mentioned several times in the main article and relates to the use of comparable reference points (baselines). This is critical for infrastructure projects as the planning and procurement process may extend over 10 (sometimes 20) years or more.

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Different estimates will be made at different times (relying on different levels of information) as the process evolves. Comparison of procurement route A's estimate accuracy – made at the early stages of planning – with procurement route B's estimate – made at financial close – is simply invalid. Despite this fundamental point, few of the studies reported in the main article attempted to control for construction cost estimates made at different stages in the procurement process.

The point of this cautionary note is not to undermine the studies referenced here nor their findings. It is included to alert readers to issues seldom highlighted in construction cost research reports and to suggest the type of question that might be put to researchers. Before any firm conclusions are reached and lessons are drawn from comparative analyses, the basis of the comparisons being made should be fully understood.

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