



INTERNATIONAL TRENDS IN SMALL-SCALE PPPs

NCP Research Paper

Abstract

There is an argument that small-scale PPPs (SSPPPs) cannot generate sufficient benefits to justify the relatively high cost of PPP procurement. At the same time there are many examples of SSPPPs that generated significant benefits for end-users. This Paper reviews international trends in SSPPPs to test various pre-conceptions about them. It forms part of a wider research initiative on SSPPPs. Its findings were originally published as part of the NCP Research Paper entitled “Improving Value for Money in Small-Scale PPPs”.

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NCP Research Paper

International Trends in Small-Scale PPPs

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List of Acronyms

| | |
|---------------|--|
| b | billion |
| BOO | Build-Own-Operate |
| BOOT | Build-Own-Operate-Transfer |
| BOT | Build-Operate-Transfer |
| BTL | Build-Transfer-Lease |
| capex | Capital expenditure |
| DBFO | Design-Build-Finance-Operate |
| DBFOM | Design-Build-Finance-Operate-Maintain |
| DBFOT | Design-Build-Finance-Operate-Transfer |
| DBFM | Design-Build-Finance-Maintain |
| GBP, £ | British pounds |
| HM Treasury | Her Majesty's Treasury |
| ICT | Information and Communications Technology |
| m | million |
| Mgt | Management |
| O&M | Operation and Maintenance |
| OECD | Organization for Economic Co-operation and Development |
| PFI, PF1, PF2 | UK Private Finance Initiative |
| PPI | Private Participation in Infrastructure |
| PPP | Public-Private Partnership |
| SSPPP | Small-scale PPP |
| UK | United Kingdom |
| USD, \$ | United states dollars |
| VFM | Value for Money |

1. Introduction

1.1 Purpose of the Paper

As a method of procurement, Public-Private Partnerships (PPPs) can be significantly more complex than traditional methods used by the public sector. PPPs require the private partner (Contractor) to take on more of the project's risk and they, and their lenders, need to understand those risks as much as possible. This requires significant work in preparing and analyzing proposed PPP projects and in completing the tender process to appoint the Contractor. Furthermore, since PPP projects extend beyond the completion of construction to include the provision of services by the Contractor, there is a need for the government party to put in place contract monitoring and management systems. These additional costs are considered to be largely independent of the size of the project.

The decision on whether to select PPP procurement for a particular project is determined by whether the project generates greater Value for Money (VFM) as a PPP than traditional procurement methods. In essence, this means that the additional costs of using the PPP approach must be outweighed by the additional benefits that PPP brings, which arise from efficiency gains and other factors. For large infrastructure projects, these additional PPP-related costs amount to a very small share of the total project value (investment plus operations). However, for smaller projects these additional costs are more difficult to justify, since the PPP-specific benefits would have to be a much higher relative to total project value to outweigh the PPP-specific costs.

As a result, some countries consider smaller projects to be unsuitable for PPP procurement. In these countries, only projects (or bundles of projects) that are above a certain size can be included in their PPP programs; projects below the hurdle level are filtered out as part of the initial screening process. At the same time there are numerous examples around the world of successful smaller PPPs that generated significant benefits to their end-users.

This Research Paper presents the results of research into international trends in Small-Scale PPPs (SSPPPs) to determine whether they are increasing or declining in popularity. In particular, it uses the data to test a number of pre-conceptions about SSPPPs. The analysis and findings were originally published as part of a wider study to develop measures to support SSPPPs.

1.3 Methodology

This research examines the market for SSPPPs by using a combination of quantitative (tabulations and charts) and qualitative (case studies) analysis to test common pre-conceptions about SSPPPs.

1.4 Structure of the Paper

The remainder of this Paper is structured as follows:

- Section 2 discusses the data and sets up the pre-conceptions about SSPPPs that will be tested
- Section 3 examines recent trends in SSPPPs by analyzing data from the World Bank PPI database;
- Section 4 examines recent trends in SSPPPs by analyzing data from the UK PFI database;
- Section 5 examines recent trends in SSPPPs by analyzing case study data from various sources;
- Section 6 compiles the analysis of the previous Sections to present key findings and conclusions.

2. Methodology and Data

2.1 Testing pre-conceptions

Countries that set hurdles for minimum PPP project size may take the view that SSPPPs cannot generate sufficient VFM to justify the resources needed to structure, procure and manage them. One way to test this proposition is to review trends in PPP transactions. Increasing use of PPP procurement for small-scale projects and numerous examples of successful SSPPPs would both suggest that SSPPPs can generate positive VFM.

The analysis was structured to test a number of specific questions on SSPPPs. These questions are listed in Table 1 below, along with our a priori expectations as to the outcomes. At the end of this Section, we will revisit these questions in the light of the analysis to assess the extent to which they are justified by the data.

Table 1 Questions about small-scale PPPs

| Issue | A priori view | Explanation |
|--|---|---|
| Are SSPPPs becoming more or less popular? | More popular | As countries gain experience in PPP standardization becomes easier, reducing transaction costs. |
| Are SSPPPs more likely to be sponsored at national or sub-national level? | Sub-national | Regional and Municipal authorities serve smaller populations and are more likely to be budget constrained. |
| Are certain sectors more suitable for SSPPPs? | Social infrastructure, urban transport, housing | Economic infrastructure (power, water, transport) often involves large, national projects. Urban infrastructure projects are often undertaken by local and municipal authorities. |
| Are certain structures more suitable for SSPPPs? | Services, brownfield | These projects require less capital spend than equivalent greenfield infrastructure projects. |
| Are SSPPP contracts shorter or longer term than average? | Shorter | Contract term is often linked to the life of the asset, the term of any financing and the resulting affordability of the services ¹ . SSPPPs that require less financing can be shorter without impacting affordability. |

For the purposes of analysis, the research adopted the World Bank benchmark of USD50m investment cost to define “small” (A Ahmad, 2014).

2.2 The Data

This research uses three sources, each shedding light on different aspects² of the proposition:

¹ For example, a USD100m loan would need to generate USD1.7m per month just to repay the capital (excluding interest) over 5 years; over 15 years it would only have to generate USD0.6m.

² This approach was also used in (A Ahmad, 2014). A comprehensive global database of completed PPP projects has not been identified.

1. The World Bank Private Participation in Infrastructure (PPI) database (World Bank, 2019), covering more than 7,100 PPP and privatization transactions that reached financial close between 1990 and 2018.
2. The UK Treasury database of PF1 and PF2 projects (HM Treasury), covering 715 projects that closed between 1990 and 2017.
3. Case studies on 26 SSPPPs (various sources).

The **World Bank PPI** has a large sample size and covers a 28-year timeframe, which allows examination of trends over time. However, there are limitations:

- i) It only covers low and middle-income countries, thereby excluding most OECD member states, many of which have strong PPP experience;
- ii) It only includes economic infrastructure PPPs, specifically in the energy, water & sewerage, transport and ICT sectors. In other words, it excludes social infrastructure (health, education, housing, etc.) projects that may be more likely to involve SSPPPs; and
- iii) It relies on individual countries to provide the data, which may therefore be incomplete or delayed, especially for projects sponsored by sub-national authorities (which are more likely to be smaller than national-level PPPs).

This suggests that the PPI database may under-count SSPPPs. Nevertheless, it does include 114 projects with an investment cost less than USD50m.

The **UK PFI** database provides detailed information on 715 PF1 and PF2 projects that closed between 1990 and 2017. As the UK is a high income economy with a long PPP track record, this may help counterbalance some of the gaps in the PPI database, especially given the inclusion of a number of social infrastructure (health and education) projects. Initially there were no formal minimum size criteria for projects to qualify for the PFI program. However, the Government adopted a formal investment hurdle of GBP20m (USD29m) in 2010. 363³ projects come in below the USD50m hurdle. No projects smaller than the GBP20m investment hurdle closed after 2013.

Both the PPI and UKPFI databases present financial information in nominal terms, ignoring any inflation effects. Similarly, the hurdle rate for small PPPs is not adjusted for inflation. Over the relatively long time periods covered (28 and 27 years, respectively), therefore, inflation in investment costs will push projects over the “small” hurdle. Inflation is a purely financial phenomenon, while the “viability” of a project is partly driven by physical parameters. This creates an artificial downward trend in the number of small PPPs being undertaken, as projects exiting the “small” category at the top of the range are not replaced at the bottom. Thus, without indexation of the SSPPP hurdle, inflation would tend to result in fewer projects qualifying as “small” over time, as inflation increased their nominal costs even though real outcomes and benefits did not change.

³ For simplicity all costs were converted using the June 2019 exchange rate of GBP1 = USD1.26. Technically it would be more accurate to use the average exchange rate over the period or the rate prevailing for each project at the time of financial close. However, while this may affect the categorization of some projects at the margin, it would not materially affect the conclusions.

Furthermore, many countries, including the UK, allow smaller projects to be grouped in order to meet size hurdles. To the extent that such grouped projects are tendered as a single unit, this would under-count the actual number of SSPPPs being implemented.

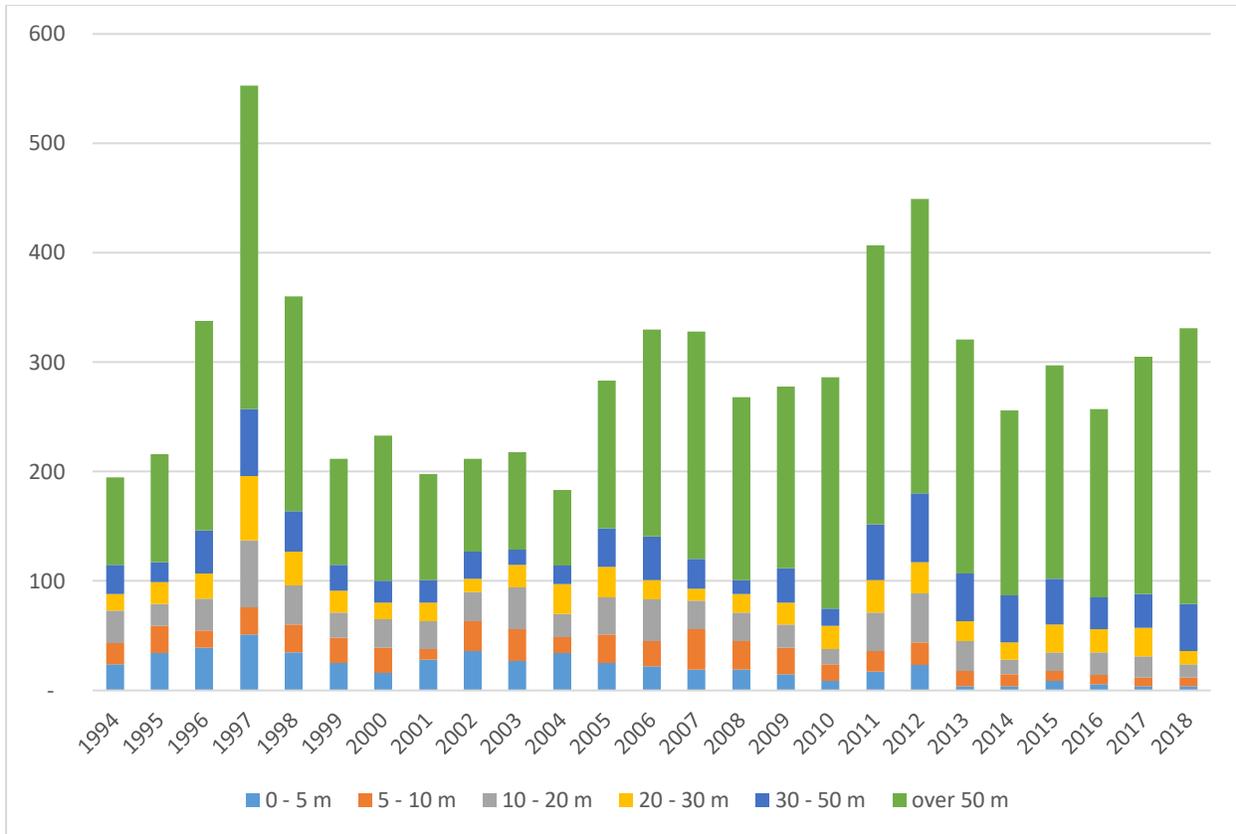
The aim of the **Case Study** analysis is to supplement the quantitative analysis of the PPI and UK PFI data with a qualitative assessment of performance for a number of SSPPPs. An advantage of this approach is that it covers the operations phase, which the other databases do not, and in most cases includes discussion on obstacles faced, which can provide clues as to whether these were related to the size of the project. On the other hand, the sample of 26 projects is quite small and most of the examples were from one country (India, with 16/26). Generally, the results should be seen as indicative only. Furthermore, the case studies came from a variety of sources and the information available may not be consistent across the sample.

3. Analysis of the PPI Database

The PPI database includes 7,314 projects that reached financial close between 1994 and 2018, of which, 3,062 had a total investment of USD50m or below.

Figure 1 below presents the PPI data as a time series for the number of large and small projects reaching financial close each year. The data for small projects was further disaggregated to identify whether there are any major differences within the SSPPP category.

Figure 1 Trends in PPI by size 1994-2018



The data illustrated in Figure 1 suggests that the market is quite cyclical, with peaks in 1997, 2006 and 2012⁴. In general, the number of small PPPs has moved in line with the market, certainly in terms of matching peaks. There seems to have been a decline in the number of small PPPs being closed after 2012, and this decline has been mostly felt in the smallest categories. These findings are examined further in

⁴ In order to close in a particular year, the preparation, structuring and tender process would have started at least 18-24 months previously.

Figure 2 and Figure 3 below.

Figure 2 Trends in Small PPI 1994-2018

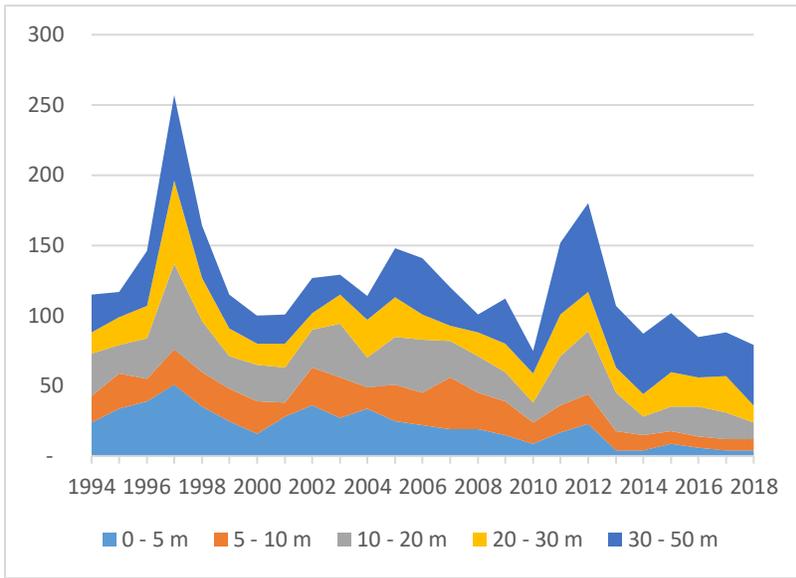


Figure 2 shows a clear downward trend in the number of small PPPs from 2005, with a temporary recovery in 2011 and 2012. The average number of small PPPs closed in the first half of the period (1994-2009) was 132 projects per year. For the second half (2010-2018), this fell to 106 per year, a decline of nearly 20%. Furthermore, the 2018 uptick in total closures was not matched in small PPPs, which continued to decline.

The decline appears greatest among the smallest categories. By 2018, the USD0-5m category had fallen to only 4 projects closed, compared to a 1997 peak of 51. For the USD5-10m category, the peak was 37 projects in 2007, falling to 12 by 2018. The magnitude of this decline appears too great to be attributable to inflation alone, suggesting that there has been a real decline in sub-USD50m projects, at least in the sectors covered by the PPI database.

Figure 3 Shares of Small and Large PPI 1994-2018

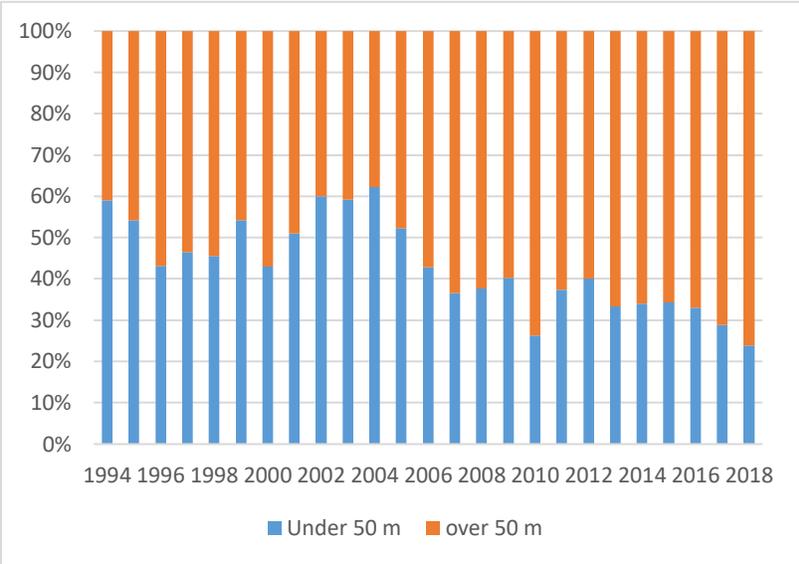
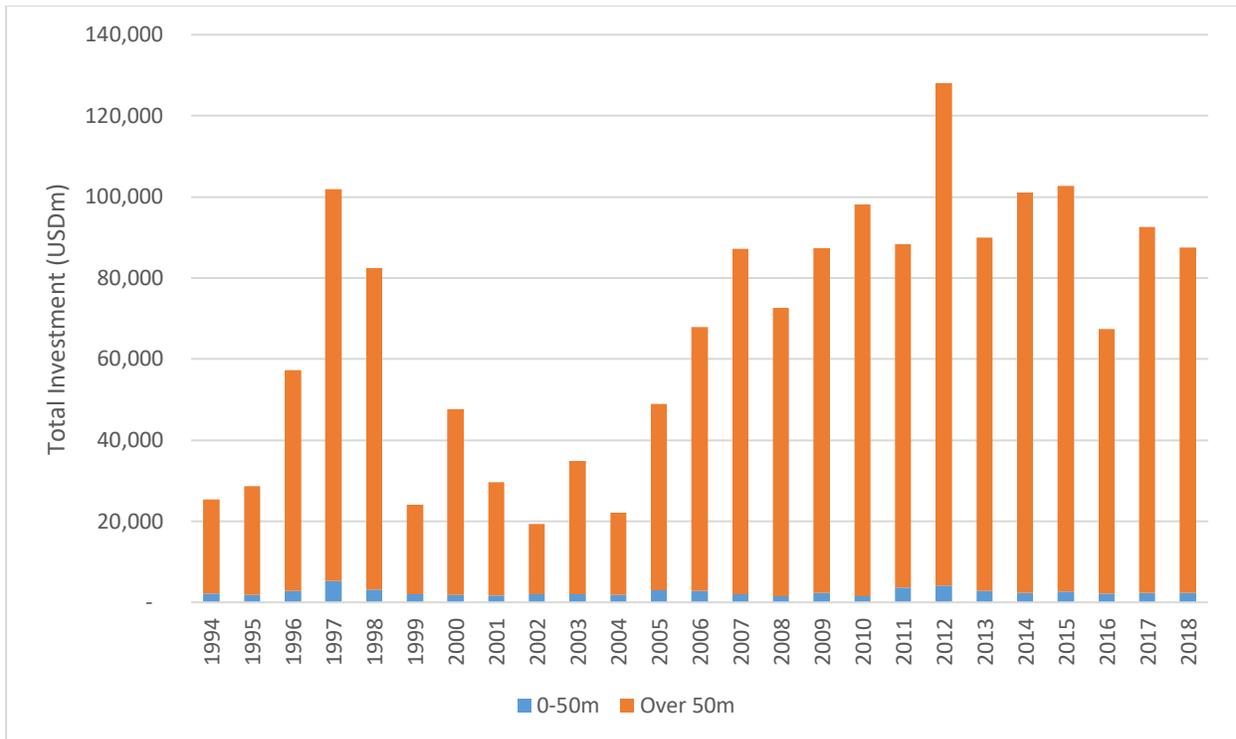


Figure 3 illustrates the declining share of small PPPs over the period, from 1994-2006 (40-60%), compared to 2007-2018 (20-40%). It is unlikely that such a dramatic decline can be explained entirely by inflation.

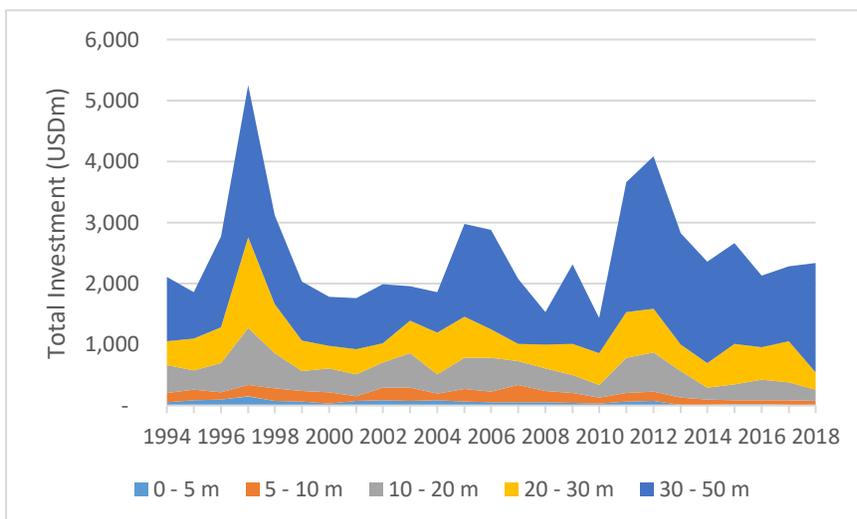
The same analysis can be carried out in terms of the total investment rather than the total number of projects. As presented in the Figures below, total investment in large PPPs has significantly exceeded that in small PPPs over the period.

Figure 4 Total investment in Large and Small PPI 1994-2018



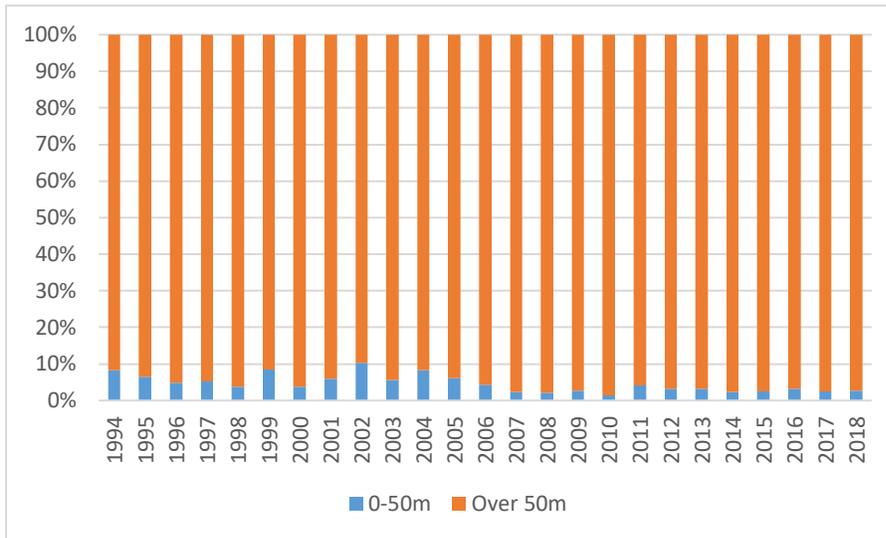
The data shows that investments in large PPPs have grown significantly over the period, with peaks of USD97b in 1997 and USD124b in 2012. While the value of investment in SSPPPs has followed a similar cyclical pattern, the peaks show a downward trend: USD5b in 1997 falling to USD4b in 2012.

Figure 5 Investment in Small PPI 1994-2018



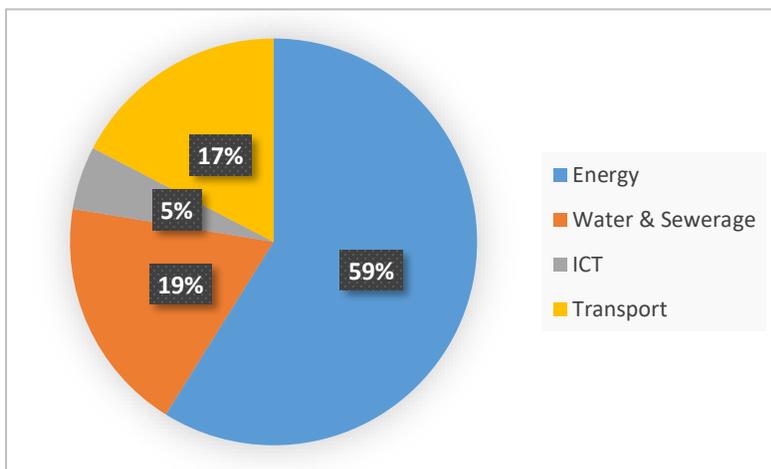
From a value perspective, there has been a marked shift towards larger projects even within the SSPPP category. This may partly be driven by inflation, which, as noted previously, would tend to increase the cost of all projects over time. However, it could also reflect a genuine move away from the smallest projects.

Figure 6 Split between large and small PPI by value 1994-2018



The share of SSPPP investment in the total has also been on a downward trend, peaking at 10% in 2002 and reaching its lowest point in 2010 at 1%. The average share was 4% over the entire period but this hides a significant decline. The average between 1994 and 2005 was 6%, while between 2006 and 2018 it was only 3%.

Figure 7 Small PPI by sector, 1994-2018 cross-section



In terms of the sectoral breakdown of SSPPPs (**Error! Reference source not found.**), energy is by far the most significant, followed by water, transport and ICT. Power is one of the first to feel public sector investment constraints, as demand frequently outpaces both economic growth and the ability of emerging market governments to invest in new capacity. The economic benefits from power investments mean that users are more willing to pay. At the same

time, the technologies, PPP structures and contracts are mature and well known to stakeholders. Power generation, in particular, is usually the first sector to use PPP as a procurement mechanism. Water & sewerage tends to follow on from power – governments in emerging markets often find it more difficult to set tariffs that cover costs in this sector. As a result, PPP structures can be more complex, especially for water networks. As noted above, the PPI excludes social infrastructure PPPs, which tend to be smaller on average.

The PPI database also provides information on the PPP structure used for each project.

Table 2 below presents the data on PPP structures for all projects including SSPPPs and larger PPPs separately. It shows that SSPPPs are more likely to use services structures such as leases and management contracts. This is illustrated in As shown in Figure 8, for brownfield projects SSPPPs are more likely to use Rehabilitate-Operate-Transfer (ROT) than larger projects, which more often use Build-Rehabilitate-Operate-Transfer (BROT). This is consistent with the previous propositions, since BROT projects are more likely to involve higher capex. For greenfield projects, SSPPPs are less likely to use BOO structures and more likely to rent assets or use merchant structures than large PPPs. Finally, as noted above, SSPPPs are more likely to use management contracts and lease arrangements than larger PPPs.

Figure 8.

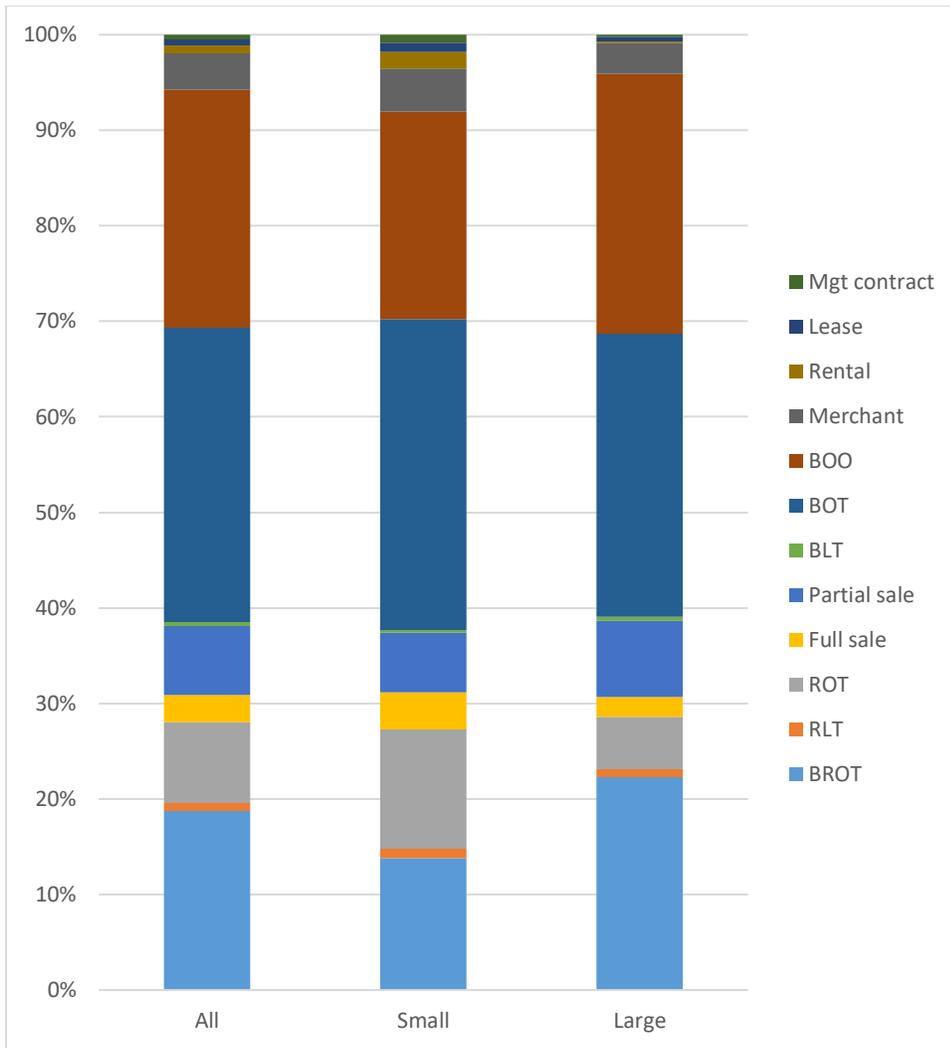
Table 2 Most common PPI structures, 1994-2018 cross-section

| Type of PPP | Subtype of PPI | All Projects | | Below USD50m | | Above USD50m | |
|-------------------------------------|--|---------------|-------------------|---------------|-------------------|---------------|-------------------|
| | | # of Projects | Investment (USDm) | # of Projects | Investment (USDm) | # of Projects | Investment (USDm) |
| Brownfield | Build, rehabilitate, operate, and transfer | 1,363 | 347,939 | 422 | 9,452 | 941 | 338,487 |
| | Rehabilitate, lease or rent, and transfer | 63 | 7,753 | 28 | 607 | 35 | 7,146 |
| | Rehabilitate, operate, and transfer | 615 | 73,286 | 382 | 5,904 | 233 | 67,382 |
| | Other | 5 | 1,427 | | | 5 | 1,427 |
| | Not Available | 7 | 2,018 | 1 | 37 | 6 | 1,981 |
| Brownfield Total | | 2,041 | 432,423 | 832 | 15,962 | 1,209 | 413,016 |
| Divestiture (Privatization) | Full | 206 | 62,219 | 119 | 2,158 | 87 | 60,061 |
| | Partial | 525 | 160,189 | 189 | 4,000 | 336 | 156,188 |
| | Other | 1 | 195 | | | 1 | 195 |
| Divestiture Total | | 731 | 222,603 | 308 | 6,158 | 423 | 216,249 |
| Greenfield project | Build, lease, and transfer | 27 | 7,203 | 10 | 202 | 17 | 7,002 |
| | Build, operate, and transfer | 2,244 | 558,325 | 991 | 20,987 | 1,253 | 537,338 |
| | Build, own, and operate | 1,812 | 408,399 | 663 | 14,794 | 1,149 | 393,604 |
| | Merchant | 273 | 44,931 | 136 | 2,063 | 137 | 42,868 |
| | Rental | 61 | 1,816 | 54 | 867 | 7 | 949 |
| | Other | 2 | 269 | | | 2 | 269 |
| | Not Available | 27 | 6,703 | 12 | 331 | 15 | 6,372 |
| Greenfield project Total | | 4,417 | 1,027,646 | 1,854 | 38,913 | 2,563 | 981,761 |
| Management and lease contract | Lease contract | 49 | 7,300 | 30 | 384 | 19 | 6,916 |
| | Management contract | 34 | 2,993 | 25 | 242 | 9 | 2,751 |
| Management and lease contract Total | | 83 | 10,292 | 55 | 626 | 28 | 9,667 |
| Grand Total | | 7,272 | 1,692,964 | 3,049 | 61,659 | 4,223 | 1,620,692 |

As shown in Figure 8, for brownfield projects SSPPPs are more likely to use Rehabilitate-Operate-Transfer (ROT) than larger projects, which more often use Build-Rehabilitate-Operate-Transfer (BROT). This is consistent with the previous propositions, since BROT projects are more likely to involve higher capex. For greenfield projects, SSPPPs are less likely to use BOO structures and more likely to rent assets or use merchant structures⁵ than large PPPs. Finally, as noted above, SSPPPs are more likely to use management contracts and lease arrangements than larger PPPs.

⁵ “Merchant. A private sponsor builds a new facility in a liberalized market in which the government provides no revenue or payment guarantees. The private developer assumes construction, operating, and market risk for the project (for example, a merchant power plant).” (World Bank, 2019)

Figure 8 Sub-types of PPI structure by size of project, 1994-2018 cross-section



The PPI data confirms the premise that SSPPPs are more likely to be sponsored by sub-national (regional, municipal or local authorities, State-Owned Enterprises (SOEs), universities, etc), as shown in Table 3.

Table 3 PPI by size and type of PA, 1994-2018 cross-section

| Procuring Authority | All Projects | | Below USD50m | | Above USD50m | |
|---------------------|---------------|-------------------|---------------|-------------------|---------------|-------------------|
| | # of Projects | Investment (USDm) | # of Projects | Investment (USDm) | # of Projects | Investment (USDm) |
| National | 3,641 | 1,084,391 | 1,132 | 25,373 | 2,509 | 1,059,018 |
| Sub-national | 2,067 | 319,361 | 1,143 | 22,296 | 924 | 297,065 |
| n.a. | 1,606 | 289,211 | 787 | 14,358 | 819 | 274,853 |
| Grand Total | 7,314 | 1,692,964 | 3,062 | 62,027 | 4,252 | 1,630,936 |
| % of total | | | | | | |
| National | 50% | 64% | 37% | 41% | 59% | 65% |
| Sub-national | 28% | 19% | 37% | 36% | 22% | 18% |
| n.a. | 22% | 17% | 26% | 23% | 19% | 17% |
| Grand Total | 100% | 100% | 100% | 100% | 100% | 100% |

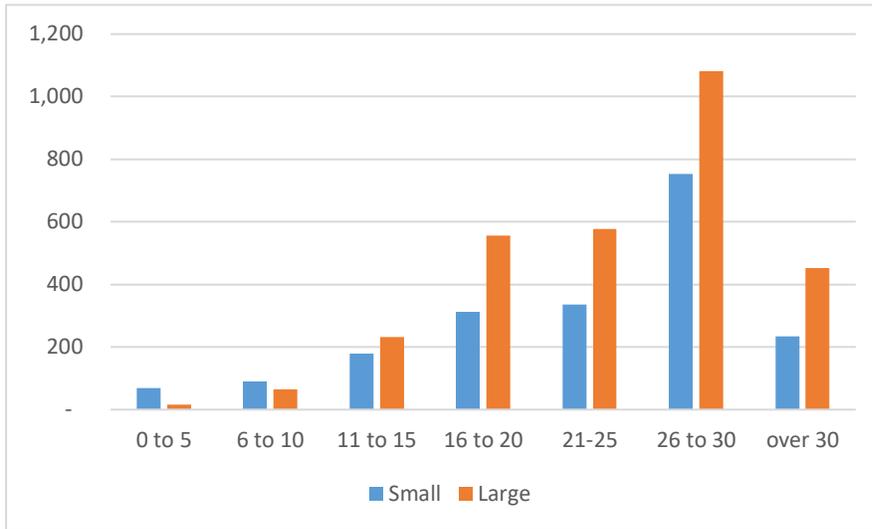
By number of projects, 37% of SSPPPs were sponsored by sub-national entities, compared to 22% of larger projects. Similarly, 59% of larger projects were sponsored by national authorities compared to 37% of SSPPPs. This supports the proposition that sub-national entities are more likely to have smaller projects. Nevertheless, nearly 40% of national level PPPs are also small. This suggests that targeting SSPPP support exclusively to sub-national bodies risks excluding a significant proportion of smaller national-level projects that: i) may need support; and ii) could generate significant benefits.

Table 4 PPI by size and contract term, 1994-2018 cross-section

| Contract term (years) | All Projects | | Below USD50m | | Above USD50m | |
|-----------------------|---------------|-------------------|---------------|-------------------|---------------|-------------------|
| | # of Projects | Investment (USDm) | # of Projects | Investment (USDm) | # of Projects | Investment (USDm) |
| 0 to 5 | 84 | 3,075 | 68 | 1,077 | 16 | 1,998 |
| 6 to 10 | 155 | 19,707 | 90 | 1,355 | 65 | 18,352 |
| 11 to 15 | 410 | 58,257 | 178 | 3,279 | 232 | 54,978 |
| 16 to 20 | 868 | 164,595 | 313 | 6,674 | 555 | 157,921 |
| 21-25 | 914 | 313,469 | 336 | 6,525 | 578 | 306,945 |
| 26 to 30 | 1,836 | 403,374 | 754 | 15,780 | 1,082 | 387,595 |
| over 30 | 686 | 206,215 | 234 | 4,898 | 452 | 201,316 |
| n.a. | 2,361 | 136,099 | 1,089 | 22,439 | 1,272 | 501,832 |
| grand total | 7,314 | 1,692,964 | 3,062 | 62,027 | 4,252 | 1,630,936 |
| % of total | | | | | | |
| 0 to 5 | 1% | 0% | 2% | 2% | 0% | 0% |
| 6 to 10 | 2% | 1% | 3% | 2% | 2% | 1% |
| 11 to 15 | 6% | 3% | 6% | 5% | 5% | 3% |
| 16 to 20 | 12% | 10% | 10% | 11% | 13% | 10% |
| 21-25 | 12% | 19% | 11% | 11% | 14% | 19% |
| 26 to 30 | 25% | 24% | 25% | 25% | 25% | 24% |
| over 30 | 9% | 12% | 8% | 8% | 11% | 12% |
| n.a. | 32% | 8% | 36% | 36% | 30% | 31% |
| grand total | 100% | 100% | 100% | 100% | 100% | 100% |

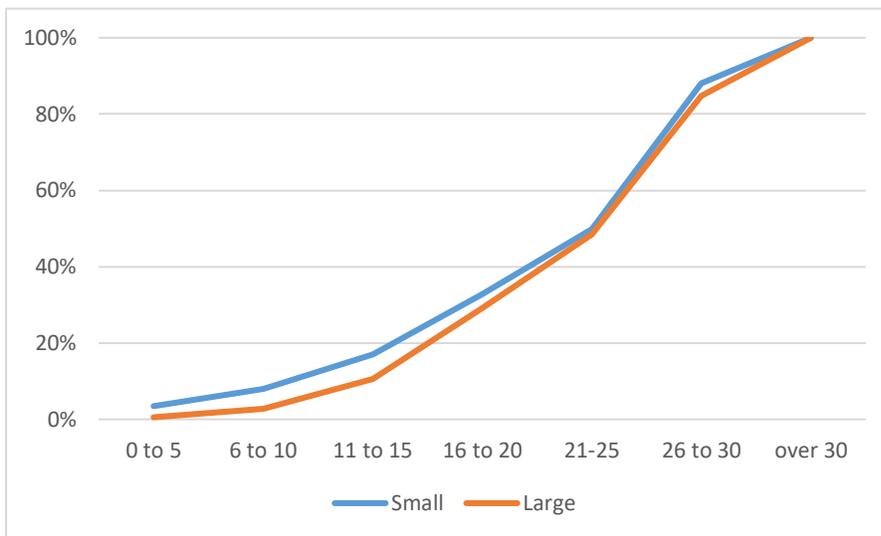
Table 4 presents the PPI data by contract term. A priori, SSPPP contracts might be expected to be shorter, either because they have a smaller capex element, or because smaller loans can be paid off more quickly without unduly impacting on affordability. The data somewhat supports this proposition: 11% of SSPPPs have terms of 15 years or less compared to 7% of large projects. Besides, only 8% of SSPPPs have terms longer than 30 years compared to 11% of larger projects. 27% of larger projects have terms between 16 and 25 years compared to 21% of SSPPPs. However, 25% of both large and small projects have terms between 26 and 30 years. This is illustrated in Figure 9 and Figure 10.

Figure 9 PPI by size and contract term, 1994-2018 cross-section (number of projects)



Up to 10 years, there are more SSPPPs than larger projects, even though there are fewer altogether (1,973 vs 2,980 larger projects). Beyond 10 years, larger projects dominate every category. The cumulative analysis (Figure 10) shows that SSPPPs are more weighted toward the shorter term, with larger projects “catching up” in the 20-25 year slot.

Figure 10 PPI by size and contract term, 1994-2018 cross-section (cumulative %)



Above 25 years, there is slight difference between small and large. This suggests that, while SSPPPs are more likely to use shorter term contracts than larger PPPs. There is also no inherent obstacle to longer term SSPPP contracts if the specifics of the project support such timeframes⁶.

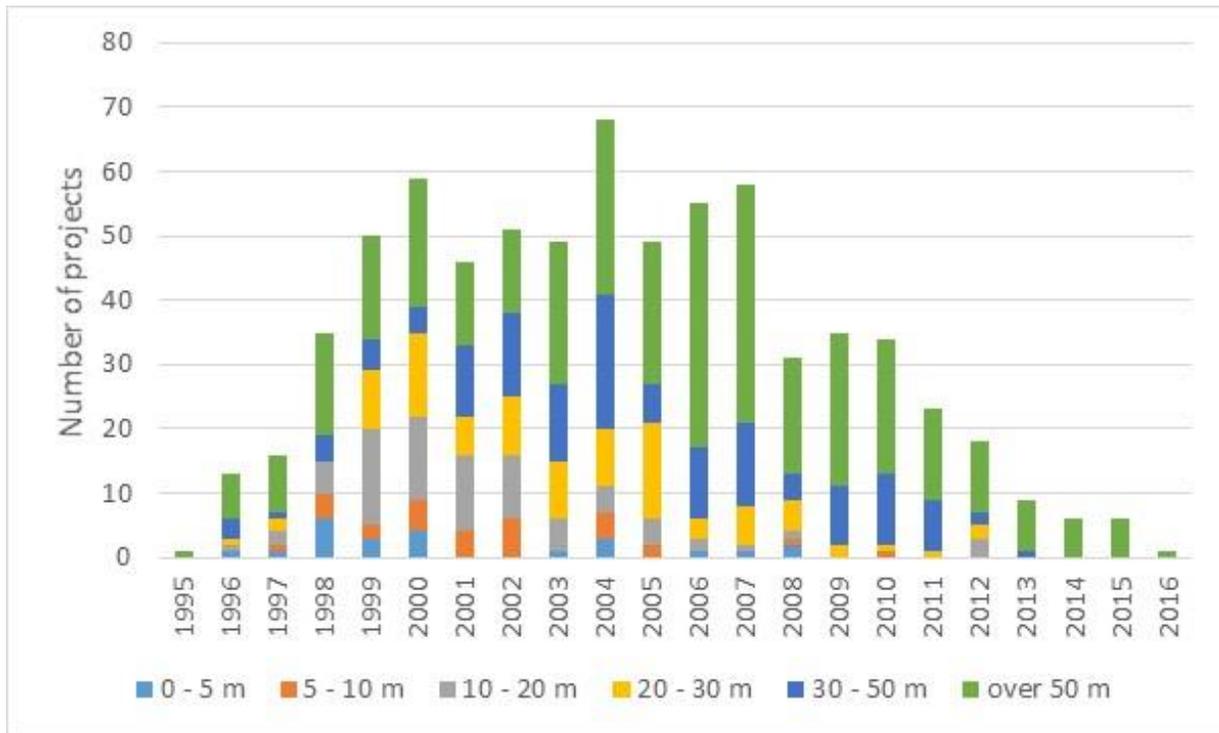
⁶ An alternative explanation might be that sub-national Procuring Authorities, being less experienced, are more likely to agree contracts that are longer than necessary. If final contract terms for SSPPPs are consistently longer than the what was expected at the time the RFP was issued, that would tend to support this “poor negotiator” argument. It is not possible to test this using the data currently available.

4. Analysis of the UK PFI Database

The UKPFI database includes 715 projects that reached financial close between 1990 and 2017, of which, 363 had a total investment of USD50m or below.

Figure 11 below presents the UKPFI data as a time series, showing the number of large and small projects reaching financial close each year. The data for small projects was further disaggregated to identify whether there are any major differences within the USD0 – 50m category.

Figure 11 Trends in UKPFI by size 1995-2016



The data shows three peaks, in 2000, 2004 and 2007, then a long tail off. In November 2018, the UK government announced the end of the PFI program. In general, the number of small PPPs has moved in line with the market but with a more pronounced decline after 2012. No PPPs with capex below USD50m have closed since 2013 and none below USD30m since 2012. This reflects a 2010 policy change that excluded projects below GBP20m (USD29m) from the PFI program. Small projects closing in 2010 and 2011 would have been started before the policy change.

Figure 12 Trends in small UKPFI, 1995-2016

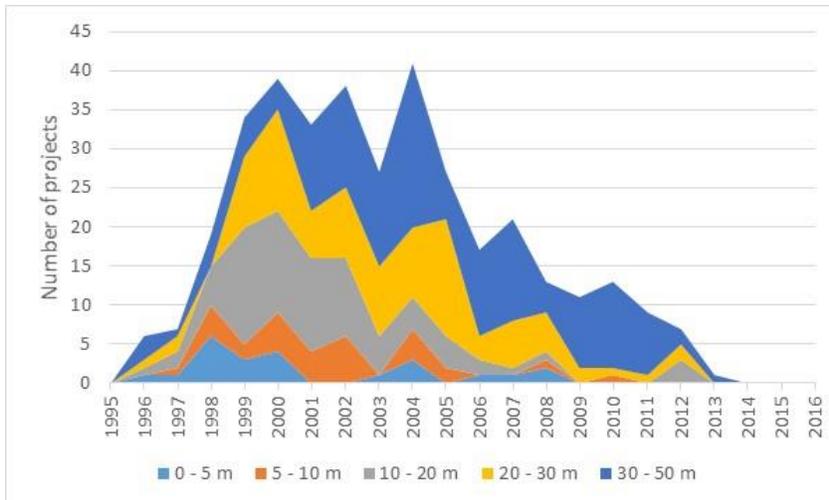


Figure 12 provides more detail on trends in the number of SSPPPs. The peak period for closing PPPs was 1999-2004. There was a rapid decline thereafter, despite slight recoveries in 2007 and 2010. The decline was most pronounced in the smallest bands (below USD10m).

Figure 13 Shares of small and large UKPFI by number of projects, 1995-2017

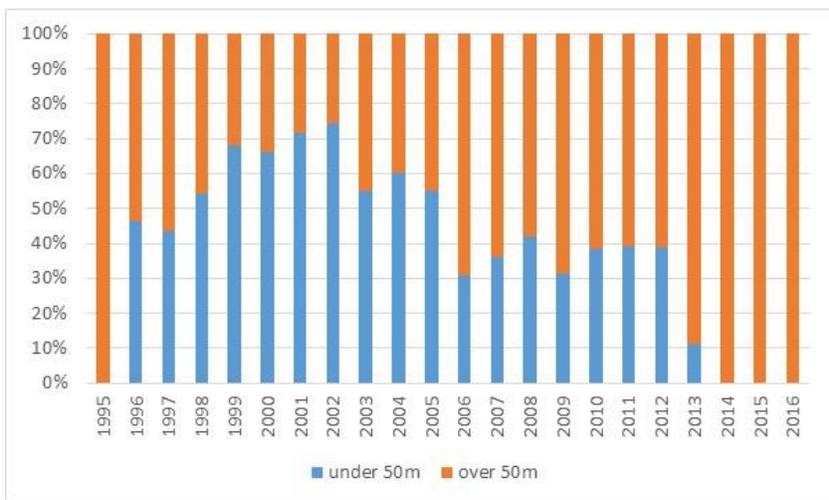
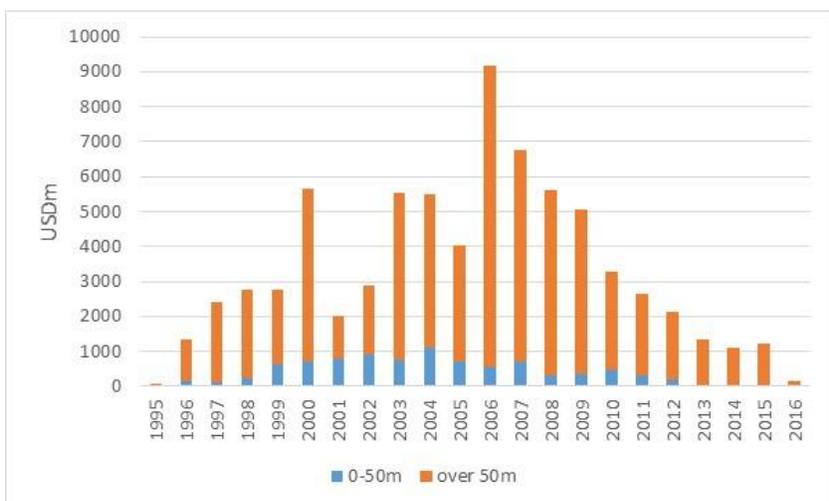


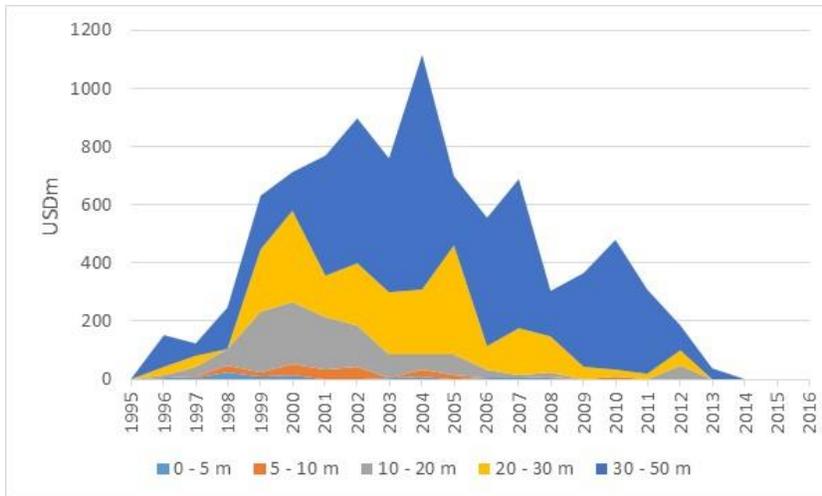
Figure 13 shows that during the peak years of the program (1998-2005), SSPPPs made up more than half of all projects closed. From 2006 – 2012, their share fell to around 30-40% and then to 10% in 2013, with no small projects closing thereafter.

Figure 14 Total investment in small and large UKPFI 1995-2016



As might be expected, Figure 14 shows that by value, larger UKPFIs have consistently dominated SSPPPs.

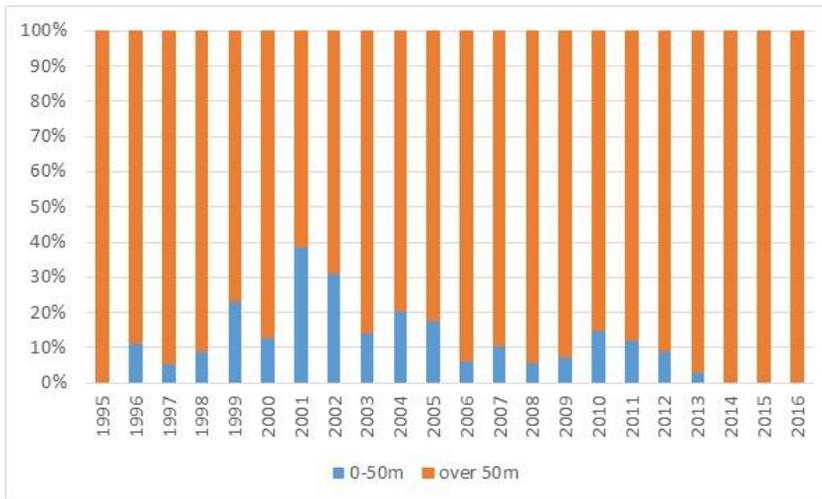
Figure 15 Investment in small UKPFI 1995-2016



Disaggregating the SSPPP category, Figure 15 shows a rapid decline in the smaller categories (below USD20m) after 2000, even when the larger categories (USD20m to USD50m) showed some recovery. It is unlikely that this was due to inflation alone, which would have affected all categories equally. However, the UK government had signaled its concerns over the cost:benefit equation for smaller projects as

far back as 2003 (HM Treasury, 2003) and the decline may have been a response to that.

Figure 16 Split between small and large UKPFI by value 1995-2016



Large PPPs consistently contributed the largest share of investment. The contrast with the PPI database is noteworthy. In the global PPI data, the peak investment share for SSPPPs was 10% and it was achieved in only one year (2002). By contrast, in the UKPFI program, SSPPPs contributed 10% or more to total investment on 11 occasions, in two of which the contribution exceeded 30%.

The difference between the PPI and UK data could be explained by sectoral differences. The PPI database includes only economic infrastructure, while the UKPFI program focused on social infrastructure projects which tend to be smaller on average. The average size of all UKPFI projects over the period is USD104m. Within this, however, the average size of economic infrastructure projects was USD215m while that of social infrastructure projects was USD90m. The average size of projects in the PPI database (which only includes economic infrastructure) over the period was USD232m.

This would support the proposition that because of its sectoral emphasis, the PPI database understates the importance of SSPPPs by excluding social infrastructure.

Figure 17 Small UKPFI by sector 1995-2016 cross-section

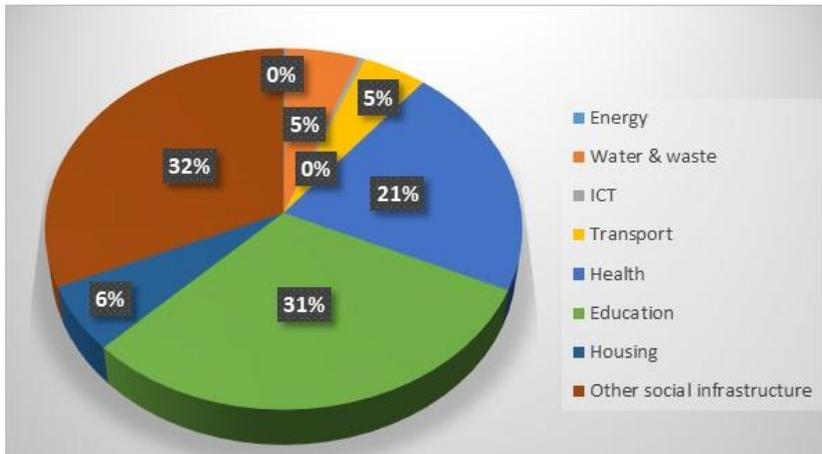


Figure 17 shows the breakdown by sector of the UKPFI program. Health, education and other social infrastructure (including law and order, housing and leisure) make up 90% of all SSPPP projects, only 10% were for economic infrastructure. The relatively low contribution of economic infrastructure in the UKPFI program can be explained by the successful UK privatization

program that started in the 1980s. The ICT, energy, water/sewerage and transport sectors were taken permanently into the private sector, which took over responsibility for infrastructure investment.

Table 5 shows the split between national and sub-national project sponsors. 85% of all projects were procured by sub-national authorities and this rises to 90% for SSPPPs, thus supporting the proposition that sub-national entities are more likely to have smaller projects.

Table 5 UKPFI by size and type of Procuring Authority, 1995-2016 cross-section

| Procuring Authority | All projects | | Below USD50m | | Above USD50m | |
|---------------------|---------------|-------------------|---------------|-------------------|---------------|-------------------|
| | # of projects | Investment (USDm) | # of projects | Investment (USDm) | # of projects | Investment (USDm) |
| National | 74 | 19,058 | 22 | 465 | 52 | 18,593 |
| Sub-national | 641 | 55,351 | 341 | 8,573 | 300 | 46,778 |
| Grand Total | 715 | 74,410 | 363 | 9,039 | 352 | 65,371 |
| % of total | | | | | | |
| National | 10% | 26% | 6% | 5% | 15% | 28% |
| Sub-national | 90% | 74% | 94% | 95% | 85% | 72% |
| Grand Total | 100% | 100% | 100% | 100% | 100% | 100% |

For longer term contracts, the distribution is similar for small and large projects. Most SSPPPs (83%) have terms between 20 and 30 years. For larger projects, 66% fall between 20 and 30 years, significantly less than for SSPPPs. However, 28% of larger projects have contracts lasting longer than 30 years, compared to 13% (49 projects) of SSPPPs.

Table 6 shows the distribution of UKPFIs by contract duration. It is inconclusive as to whether SSPPPs are more likely to use shorter term contracts. The data shows that only 3% of SSPPPs (by number of projects) have terms below 20 years and none of these are less than 10 years.

For longer term contracts, the distribution is similar for small and large projects. Most SSPPPs (83%) have terms between 20 and 30 years. For larger projects, 66% fall between 20 and 30 years, significantly less than for SSPPPs. However, 28% of larger projects have contracts lasting longer than 30 years, compared to 13% (49 projects) of SSPPPs.

Table 6 UKPFI by size and contract duration, 1995-2016 cross-section

| Contract period (years) | All projects | | Below USD50m | | Above USD50m | |
|-------------------------|---------------|-------------------|---------------|-------------------|---------------|-------------------|
| | # of projects | Investment (USDm) | # of projects | Investment (USDm) | # of projects | Investment (USDm) |
| 0 to 5 | - | - | - | - | - | - |
| 6 to 10 | 1 | 284 | - | - | 1 | 284 |
| 11 to 15 | 10 | 684 | 5 | 104 | 5 | 580 |
| 16 to 20 | 24 | 7,143 | 9 | 157 | 15 | 6,986 |
| 21 to 25 | 268 | 20,511 | 155 | 3,902 | 113 | 16,609 |
| 26 to 30 | 264 | 20,874 | 145 | 3,474 | 119 | 17,400 |
| Over 30 | 148 | 24,914 | 49 | 1,402 | 99 | 23,512 |
| Grand Total | 715 | 74,410 | 363 | 9,039 | 352 | 65,371 |
| % of total | | | | | | |
| 0 to 5 | 0% | 0% | 0% | 0% | 0% | 0% |
| 6 to 10 | 0% | 0% | 0% | 0% | 0% | 0% |
| 11 to 15 | 1% | 1% | 1% | 1% | 1% | 1% |
| 16 to 20 | 3% | 10% | 2% | 2% | 4% | 11% |
| 21 to 25 | 37% | 28% | 43% | 43% | 32% | 25% |
| 26 to 30 | 37% | 28% | 40% | 38% | 34% | 27% |
| Over 30 | 21% | 33% | 13% | 16% | 28% | 36% |
| Grand Total | 100% | 100% | 100% | 100% | 100% | 100% |

The distribution of small and large projects by contract term is illustrated in Figure 18.

Figure 18 UKPFI by size and contract term, 1995-2016 cross-section (number of projects)

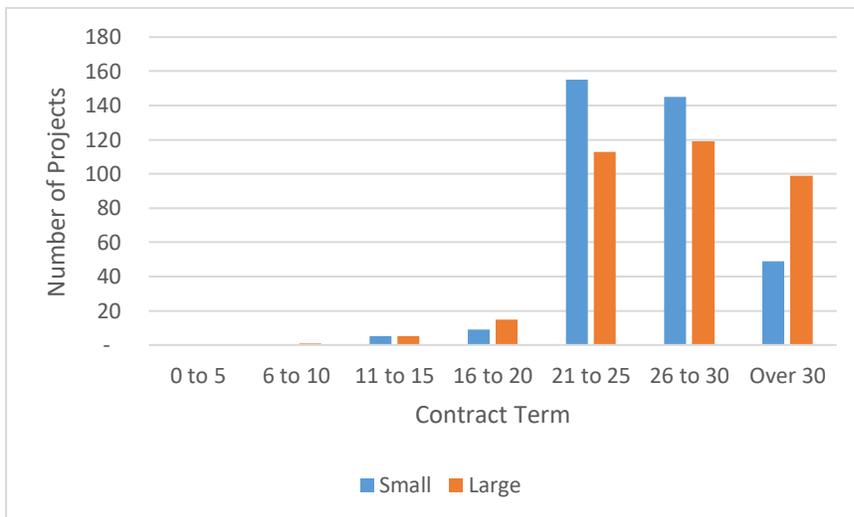


Figure 18 shows that the peak duration for SSPPPs is 21-25 years. For contract durations above 30 years, the number of projects drops off dramatically. For larger projects, the peak lies between 25 and 30 years and the drop off is less marked.

This provides some support for the “smaller is shorter” proposition but only at the upper end of the scale, that is,

for contract terms longer than 20 years.

5. Case Studies – Cross-cutting analysis

Table 7 below presents cross-cutting information on 26 SSPPPs from 11 countries⁷. The sample includes developing countries (Chile, Bhutan, India, Philippines) and more developed countries (France, Korea, Poland). The information includes: sector, size (capex), PPP structure, contract term, type of sponsoring authority, structure of the SPV (local vs international investors), project needs and outcomes. Projects are listed by capex, from largest to smallest.

⁷ This includes the 10 case studies used in the 2014 World Bank paper on SSPPPs (A Ahmad, 2014)

Table 7 Cross-cutting analysis

| Country | Project | Sector | Size (USDm) | Structure | Term (years) | PA | Investor (local:int) | Need | Outcomes | Ref |
|-------------|--|-------------|-------------|----------------|--------------|------------|----------------------|--|---|----------------------------------|
| Kenya | Kenyatta University Students Hostel | Housing | 50 | DBFOT | 30 | university | both | Provide 10,000 units of good quality accommodation to students below market rents | Retendered after conflict of interest found during 1st tender | (A Ahmad, 2014) |
| France | Biarritz Cité de L'Océan | Urban | 46 | DBFM | 30 | municipal | 0:1 | Stimulate tourism beyond Summer peak by building marine museum/research facility | Significant losses, demand over-estimated by 35%; after 7 years legal action the Courts cancelled the project | (DG for Internal Policies, 2017) |
| India | Kakinada Deep Water Port | Transport | 46 | BOT | 30 | state | 1:3 | Expand port capacity; improve operations | In 5 years cargo increased by 150%; all vessels by 576%; cargo vessels by 249%; revenue for govt | (Ministry of Finance, 2010) |
| India | Tuni Anakapalli Annuity Road | Transport | 44 | BOT (annuity) | n.a. | national | 1:0 | Increase highway capacity from 2 - 4 lanes without toll | govt-pays by fixed annuity; construction cost below estimate | (Ministry of Finance, 2010) |
| India | Bhiwandi Electricity Distribution Franchisee | Electricity | 44 | O&M/ franchise | 10 | state | 1:0 | Help address power deficit by improving energy management; improve revenue collections | In 2 years technical and commercial losses fell 34%; transformer failures from 40% to 7.5%; load shedding from 6 to 3.5 hours/day | (Ministry of Finance, 2010) |
| Philippines | Automated fare System, Manila | Transport | 38 | Con-cession | 10 | national | 2:0 | More efficient fare collection; reduce fraud; demand management | Successful tender | (MacDonagh, 2016) |
| Poland | Sopot Railway Station | Transport | 30 | DBFO | 8 | municipal | 0:1 | Redevelopment of urban space in a tourist destination | Delivered on time and on budget; but commercial rental income below forecast | (DG for Internal Policies, 2017) |
| India | Timarpur Okhla Integrated Solid Waste Mgt. | Waste | 28 | DBFOM | 25 | municipal | 0:1 | Increase landfill capacity for Delhi; manufacture fuel, electricity, recycled water | Successful tender | (Ministry of Finance, 2010) |

| Country | Project | Sector | Size (USDm) | Structure | Term (years) | PA | Investor (local:int) | Need | Outcomes | Ref |
|----------|--|-------------|-------------|--------------|--------------|-----------|----------------------|---|--|-----------------------------|
| India | Provision of Urban Amenities | Urban | 25 | Con-cession | 13 | municipal | 2:0 | Provision of infrastructure & services, including roads, waste mgt., cold store | 13 month delay before 1st projects, long approval process | (A Ahmad, 2014) |
| India | Vadodara Halol Toll Road | Transport | 23 | DBFOM | 30 | state | 0:1 | Increase highway capacity to Halol industrial town from 2 - 4 lanes | Construction completed early and nearly 10% below estimated cost | (Ministry of Finance, 2010) |
| India | Latur Water Supply | Water | 20 | Mgt contract | 10 | municipal | 3:0 | Water scarcity; population growth; lack of operating capacity at the municipality | Successful tender; 100% metering improved revenues; network optimization | (Ministry of Finance, 2010) |
| Chile | Center for vehicles removed from circulation | Transport | 19 | Con-cession | 25 | municipal | 1:0 | Centralized facility; economies of scale; save police time | Successful tender | (APEC, 2014) |
| India | Karnataka Urban Water Supply | Water | 14 | DBFOM | 5 | municipal | 0:1 | Rehabilitate and expand the water network to provide 24x7 service | Service increased from 3 hours to 24; public standpipes eliminated; 25,000 new connections | (Ministry of Finance, 2010) |
| India | Salt Lake Water & Sewerage | Water | 10 | DBFOM | 30 | municipal | 2:0 | Support development of IT hub; prevent illegal groundwater extraction | Construction delayed due to land hand-over issues | (Ministry of Finance, 2010) |
| India | Berhampur Solid Waste | Waste | 10 | BOT | 20 | municipal | 1:0 | Collection, disposal of waste; construction, operation of composting facility; closing existing dump site | Annual GHG emissions savings of 16,000 tons | (A Ahmad, 2014) |
| India | Gandhinagar Rooftop Solar | Electricity | 9 | BOO | 25 | state | 2:0 | Install PV panels on rooftops & connect to grid | Lack of policy framework, multiple contracts needed eg with building owners | (A Ahmad, 2014) |
| Bhutan | Thimphu Parking | Transport | 8 | DBFOT | 22 | municipal | 2:1 | Congestion; facilitate urban transport | 550 new spaces; \$230k revenue share; improved traffic flow | (IFC, 2017) |
| S. Korea | Anwha High School | Education | 8 | BTL | 20 | national | n.a. | Reduce overcrowding; improve conditions; replace unsuccessful BTO model | Estimated saving of \$2m over project life; "school of the year" 2007 | (Kim, 2011) |

| Country | Project | Sector | Size (USDm) | Structure | Term (years) | PA | Investor (local:int) | Need | Outcomes | Ref |
|--------------|-----------------------------------|--------------|-------------|--------------|--------------|-----------------|----------------------|---|---|-----------------------------|
| India | Punjab Grain Silo | Agri-culture | 7 | BOO | 30 | SoE | 1:0 | 4 silos of 12,500 MT each to store government grain | govt saved \$6m due to reduction in wastage and retention of grain quality | (A Ahmad, 2014) |
| India | Radiology Services Andhra Pradesh | Health | 7 | BOOT | 7 | state | 2:0 | Build/upgrade/operate radiology facilities in 4 teaching hospitals | Double number of patients with same budget, tariff 50% of market - market prices fell, waiting time reduced | (A Ahmad, 2014) |
| India | Alandur Sewerage | Water | 6 | BOT+lease | 5+14 | municipal | 1:0 | Unregulated sewage disposal; health concerns | Eliminated mosquitos, groundwater contamination; fiscal discipline | (Ministry of Finance, 2010) |
| India | Street Lighting Bhubaneswar | Urban | 5 | O&M | 10 | municipal | 2:0 | Finance and install lighting, operate and maintain | Lack of appetite from local lenders - had to be funded from equity | (A Ahmad, 2014) |
| South Africa | Cape Nature Tourism Project, | Tourism | 4 | Con-cession | 30 | regional | 1:0 | Design, refurbish, build, finance and operate tourism facilities | n.a. | (A Ahmad, 2014) |
| India | Amritsar Inter-city Bus Terminal | Transport | 3 | DBFOM | 11 | national, state | 3:0 | Increase capacity, rehabilitate existing site | New terminal; lease income to government; better facilities for passengers | (Ministry of Finance, 2010) |
| Palestine | Solid Waste Project | Waste | 0 | O&M | 5+2 | sub-national | 0:1 | Build & operate landfill & waste transfer stations to serve several villages | Lack of expertise & financing; needed help from World Bank & others | (A Ahmad, 2014) |
| Lesotho | Health Care Waste Management | Waste | 0 | Mgt contract | 1+1+0.75 | national | 2:1 | Waste collection, operation of incinerators at 2 hospitals & 15 primary health facilities | Reduced disposal of medical waste on general landfill sites | (A Ahmad, 2014) |

A review of Table 7 suggests the following:

- Based on the outcomes, a qualitative assessment⁸ suggests that 14 of the projects were successful, 5 were unsuccessful and 7 were inconclusive or insufficient information was available to make a judgement. This demonstrates that SSPPPs are not inherently doomed to fail. Given the small data set⁹, a degree of caution is necessary, however.
- The data set extends across 7 different sectors. The most common sectors were transport (8 projects) and water & waste (8), followed by urban infrastructure (3), electricity (2), and tourism, housing, health, education and agriculture (1 each). Thus, 22 of the 26 SSPPPs in the sample were in economic infrastructure sectors and only 4 were in social infrastructure. This data does not support the argument that economic infrastructure PPPs must be large scale in order to be successful or that SSPPPs are more suitable for social infrastructure projects than for economic infrastructure.
- All but 2 of the projects in the sample included some capex, with amounts ranging from USD3m to USD50m.
- All but one project (Biarritz Cité de L’Ocean) in the sample involved operation by the private partner. 21 of these projects used DBFOM/BOT/Concession structures¹⁰ which are probably the most common structure for all infrastructure PPPs. 3 projects used O&M and 2 projects used management contracts. This suggests that there are no material limitations on the type of structures that can be used for infrastructure investment SSPPPs.
- As regards the term of the contracts, 10 projects were for durations of 10 years or less (although one of these, Alandur Sewerage, was extended by a further 15 years after its initial 5 year term expired), 13 projects were for 20 years or more (7 of these were for 30 years), with 2 projects between 11 and 19 years. This data may provide some support for the argument that SSPPPs may be shorter than larger projects. However, there do not seem to be any material obstacles to setting longer terms.
- The case studies support the proposition that SSPPPs are more likely to be used at sub-national level. The national government was the PA in only 5 of the sample projects (one of which was in co-operation with a state government), 6 were sponsored by state or regional governments alone and 12 were sponsored by Municipalities. 3 others were sponsored by other types of sub-national entity, including a university and a state-owned enterprise.
- A priori, it would be expected that smaller projects may require fewer private partners and would be more attractive to local investors as they are less complex and require less financing. The data provides some support for this observation: 13 projects had only 1 investor rather than a consortium (for 7 of these projects the investor was local and in the other 6, foreign). Nevertheless, 5 of the 26 projects had 3 or more investors.
- It seems that local investors are more attracted to PSPPPs. However, there is no solid support for the argument that the returns would be too small to attract foreign investors. 15 of the 26

⁸ A full quantitative analysis would require information on VFM for each project, as estimated before the tender and actual after completion. This was not cited in any of the case studies used in this analysis.

⁹ And a potential bias towards selecting only successful projects for case studies.

¹⁰ Different countries use different terminology to describe what is effectively the same structure, where the private partner designs, builds, finances, operates and maintains the project during the contract life, then hands it over to the public authority.

projects were won by local investors or consortia, 6 were foreign only and 4 included both local and foreign parties.

Overall, some of the a priori propositions are supported by the case study data. In particular, the case studies suggest that SSPPPs are more likely to be sponsored by sub-national entities, and they may be more attractive to local investors. Others are not supported: specifically, the proposals that SSPPPs are less likely to be successful, that economic infrastructure projects are less likely to be suitable for SSPPPs and that international investors would not be interested. It is less clear whether SSPPP contracts are likely to be shorter than larger projects as the sample included both relatively short contracts (as would be expected, this includes the services-only projects) and quite long-term ones. There were only 2 projects between 11 and 19 years. This suggests that the mechanism for determining contract terms incorporates more considerations than just project size/asset life.

6. Key Findings

Overall, there is conflicting evidence as to whether SSPPPs can generate sufficient VFM to outweigh the cost of preparation and the contract management costs associated with the PPP procurement approach. On the one hand, the quantitative analysis suggests that interest in SSPPPs has been declining in recent years. On the other hand, the majority of the SSPPP case studies provide examples of successful projects. However, there are caveats for both of these statements. The PPI database is likely to under-count SSPPPs since it only includes economic infrastructure projects. At the same time, the sample of case studies was quite small and may be self-selecting for success stories.

Table 1 (Section 2.1) set out a number of propositions about SSPPPs that were subsequently tested using three different data sets on small and large PPPs. Table 8 below indicates whether the analysis supported the propositions.

Table 8 Some Questions about SSPPPs ... and answers?

| Issue | A priori view | Supported? |
|--|---|---|
| Are SSPPPs becoming more or less popular? | More popular | Not supported. The PPI database shows that SSPPPs have not matched the growth in larger projects and there has been a significant absolute and relative decline in the number of SSPPPs since 2005/2006. |
| Are SSPPPs more likely to be sponsored at national or sub-national level? | Sub-national | Supported. Both the PPI and the case study data found that sub-national authorities are more likely to sponsor SSPPPs. |
| Are certain sectors more suitable for SSPPPs? | Social infrastructure, urban transport, housing | Inconclusive. The PPI data excludes social infrastructure PPPs while the UK PFI program as a whole emphasizes social infrastructure PPPs. Transport, water and waste were the most common sectors in the case study data but the sample size is very small. |
| Are certain structures more suitable for SSPPPs? | Services, brownfield | Partially supported. The data for brownfield projects showed little difference between small and large PPPs; however, services PPPs tended to be smaller. |
| Are SSPPP contracts shorter or longer term than average? | Shorter | Partially supported. The PPI and case study data both show that shorter-term contracts are more likely to be for SSPPPs than for larger projects. However, there were also examples of SSPPPs with much longer terms, especially in the UKPFI program, suggesting that there is no inherent obstacle preventing a project involving investment below USD50m from having a term of 20+ years. |

The data also suggests some interesting findings, in particular:

- For brownfield projects, SSPPPs are more likely to use ROT structures;

- There is partial support for the propositions that SSPPPs require fewer private partners and that they are more attractive to local investors;
- The data shows a partial support for the proposition that SSPPPs are unattractive to international investors.

As a note of caution, there are concerns about each of the data sets used for the analysis which suggest that they may under-state the actual number of SSPPPs. In particular, the PPI database does not cover social sectors that are likely to be strong users of services structures (health, education) or that are likely to be attractive to municipal and local authorities (housing, for example). Using investment cost as a proxy for “size” is also likely to downplay the importance of services-only PPPs and of brownfield projects that use existing infrastructure. The UK data incorporates a similar bias, at least after 2010, when it became more difficult to gain approval for PPPs with an investment below GBP20m.

Furthermore, neither database adjusts for inflation, which over time would increase investment costs, pushing projects over the SSPPP hurdle even though their real benefits are unchanged. These concerns suggest a direction for future research, to improve the scope and coverage of the data and to adjust for inflation.

Conversely, the case study data provided numerous examples of successful SSPPPs. This suggests that measures to address key constraints facing SSPPPs may already have a foundation to build on, since there have been successes even without such support. These issues are explored further in Section 4.

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