



## Why IRR is an inadequate indicator of costs and returns in relation to PFI schemes

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### ABSTRACT

The Internal Rate of Return (IRR) is a commonly used indicator of the performance of Private Finance Initiative (PFI), schemes in the UK. Treasury guidance recognises, however, that IRR is potentially misleading, unless the relevant payment streams are of a flat, annuity, type. This paper uses data on a number of actual PFI schemes to examine whether the payment streams involved are sufficiently flat for IRR to be a reliable indicator. There is clear evidence that the assumption of flat payment profiles in PFI schemes is violated. As a result, quoting IRR alone in the PFI context is liable to understate both the true opportunity cost of PFI finance to the public sector, and the potential scale of private sector profit.

Our analysis also indicates that a statistic based on average outstanding debt is a reliable indicator of the extent of departures of the relevant payment profiles from annuity type.

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### 1. Introduction

In the UK, the Private Finance Initiative (PFI) is an important method of providing capital assets for the provision of public services; between 1992, when PFI was introduced in the UK, and 2009, contracts had been signed for schemes involving around £60 billion of capital assets (Maitland-Smith, 2009).

The advice which the UK Treasury gives to public sector bodies commissioning PFI schemes is that they should rely primarily on Net Present Values (NPVs), in assessing project costs and benefits. The Treasury recognises, however, that measures based on the Internal Rate of Return (IRR), play an important part in PFI. The following advice summarises the Treasury position:

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“The widespread use of IRRs in PFI projects reflects the generally even pattern of year-on-year operational cash flows in such projects. However, if a project has an uneven cash flow profile, the Authority should exercise great caution in using IRR as the basis of valuing investment in the project.” (Treasury, 2004).

The position outlined in this Treasury quotation makes sense. If there is indeed an even pattern of year on year cash flows in the particular payment stream being assessed (that is, if it is basically an annuity type payment stream), then knowledge of the initial capital investment, and of the IRR, enables the NPV of the payment stream to be calculated at any desired discount rate. So there is essentially the same information content in knowing the IRR as in knowing the NPV profile. And even without the bother of working back from the IRR to the NPV, ranking schemes on the basis of IRRs will correspond (under reasonable conditions), to a ranking on NPVs.

If, however, the relevant payment profiles in PFI schemes are not of an annuity type, then use of IRR as an indicator in relation to such schemes could be potentially very misleading – as the Treasury quotation recognises.

Fundamentally, therefore, there is an empirical issue here; namely, are typical applications of IRR as an indicator in relation to PFI schemes justified in the light of how the payment profiles associated with real life PFI schemes actually behave?

The purpose of this paper is to examine this question. What we will do is to take some examples of the way in which IRR has been used as an indicator in relation to PFI schemes – and then consider whether these applications are potentially misleading, in the light of empirical evidence on the characteristics of the relevant cash flows in a number of real life PFI schemes.

To anticipate the conclusions of this paper, what we will demonstrate is that payment profiles in PFI schemes are commonly not flat, and, as a result, that use of IRR is potentially a very misleading indicator in the PFI context. The effect is that the public sector, which has relied heavily on PFI as an indicator, will commonly have underestimated both the cost of PFI schemes to the public sector, and the potential profitability of PFI schemes to the private sector investors who put up the risk or equity capital for PFI projects.

What is particularly worrying is that undue reliance on IRR as an indicator in the PFI context appears to be very much a public sector phenomenon. This was illustrated for us in a very graphic fashion when we were involved in advising the producers of a recent BBC Panorama programme on PFI. In the course of preparing this programme, the BBC were in correspondence with the Chief Executive of one of the major private sector companies involved in providing risk capital for PFI projects. This chief executive initially justified the returns being made by the private sector by quoting typical IRRs being earned on risk capital in PFI projects. It was only in response to further probing that it became clear that this private sector company knew that IRR quoted on its own could be unhelpful, and it itself did not, in fact, rely primarily on IRR as a measure of the potential profitability of its investments; instead, it used for its own purposes an indicator representing what multiple of its original equity stake the investor could get back if it sold its stake in the PFI company in the secondary market for PFI equity. This measure is akin to the index of profitability we will examine later in the paper.

A number of recent articles in the critical accounting literature have considered issues relating to PFI. Issues dealt with include developing accountability for PFI schemes (Asenova and Beck, 2010; Shaoul, 2005; Shaoul et al., 2012); PFI refinancing gains (Toms et al., 2011); the assessment of value for money in PFI (Khadaroo, 2008); risk estimation in PFI (Broadbent et al., 2008); and experience of PFI in Spain (Benito et al., 2008). None of these papers involves the specific issue studied in this paper, namely, the use of IRR in the PFI context. Nevertheless, the following quotation from Shaoul's 2005 paper is very relevant:

“In conclusion, this [i.e., Shaoul's] study points to a new and important use of accounting: to evaluate public policy decisions in terms of the distribution of resources to different social groups as well as the narrow ostensible objectives set by government. In other words, accounting can be used to provide accountability not just to the providers of finance, ... but to the stakeholders who provide the funding and for whose benefit these facilities are supposedly procured.”

The topic of this paper is very much in line with the need identified in this quotation. What we show is that the use of IRR as an important indicator of the performance of PFI schemes is seriously flawed. The implicit assumptions which would justify its use do not hold in practice. To conform with the spirit of the Shaoul quotation, the use of IRR on its own as an indicator of PFI performance should be abandoned. This article also shows how IRR can be supplemented, by the provision of additional information, to make it a much more informative measure.

The structure of this paper is as follows. Section 2 is a brief general introduction to PFI. Section 3 introduces necessary notation. Section 4 introduces three examples showing how IRR has been used by public bodies and their advisors as an indicator in the context of PFI. Section 5 deals with theoretical background which we will apply in analysing the empirical data. Section 6 introduces the empirical data used in the study, and applies the analytical techniques developed in the preceding section to the relevant payment streams. Section 7 discusses the resulting implications for typical uses of IRR in relation to PFI by the public sector. Section 8 draws conclusions.

## 2. Introduction to PFI

This introductory section gives background information on the Private Finance Initiative (PFI). PFI involves private sector suppliers designing, building, maintaining, and operating major items of public sector infrastructure such as schools,

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