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FINANCING ROAD PROJECTS BY PRIVATE FINANCE INITIATIVE: CURRENT PRACTICE IN THE UK WITH A CASE STUDY

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Abstract. The necessity of funds for investment in capital intensive public projects has pushed public agencies to search for new procurement alternatives. Thus, in the early 1980s, the idea of private finance initiative (PFI) as a method of financing large-scale, capital intensive projects emerged in Australia. The method is aimed at resolving the shortage of public funds for major investments through the funding capability of private entities. Later, the method was widely used by other governments with the same name or different names such as BOT (build-operate-transfer) in the countries having different legal structures. This paper describes the mechanism of PFI used by the UK Government and evaluates three case studies in achieving the essential characteristics of adequate risk transfer and value for money to the taxpayer.

Keywords: capital road projects, private finance initiative, project finance, structured finance, payment mechanisms.

1. Introduction

The necessity of funds for investment in public projects such as transportation infrastructure, environmental infrastructure, health facilities and educational facilities has pushed public agencies to search for new procurement alternatives. In the early 1980s, the idea of private finance initiative (PFI) that was later adopted by other governments with the same name or different names such as BOT (build-operate-transfer) or BOOT (build-own-operate-transfer) emerged in Australia. The method is aimed at resolving the shortage of public funds for major investments through the funding capability of private entities.

The method currently is widely used in the countries having different legal structures. In this context, the structure and characteristics of PFI do show variations between countries and sometimes even between contracting authorities among which, furthermore, outcome expectations may differ.

In the UK, PFI is used very extensively, possibly much more than in any other country. The UK Government claim two essential characteristics for the effective use of PFI, namely efficient risk transfer and value for money to the taxpayer. This paper describes the mechanism of PFI used in the UK and analyzes the operating mechanism using data from three case studies demonstrating financial ramifications for both sides of the PFI contract in achieving the key characteristics. Due to commercial sensitivity, the obtained data is analysed and abstracted in a generic format. Conclusions are based on a number of assumptions that are identified later in the text; however, the objective of this paper is to assess whether the two key characteristics made up by the UK Government have been achieved.

2. Private finance initiative (PFI)

PFI is a contractor-led procurement system focused on the principle to Design, Build, Finance and Operate (DBFO) a project. In PFI projects, the private sector offers complete service and has the potential for increased integration within the project value chain. It aligns the interests of the user, service provider and the major financiers. The process establishes relationship based on partnering with the private sector determining the inputs required for achieving quality services specified by the public sector on a consistent basis. The private

sector creates the asset and delivers service in return for payment commensurate with the quality of service delivered.

Currently in the UK, it is usual for PFI projects to be funded by equity investment (Fox, Tott 1999). The financial package is tailored to minimise the total risk. According to De Lemos *et al.* (2000), an important aspect of PFI is that risks are borne not only by sponsors but also by different types of investors such as equity holders, debt providers and quasi-equity investors. Therefore, since risks are shared, the criteria of project suitability for financing are its ability to stand alone as a distinct legal and economic entity, and the separation of project cash-flows from those of the sponsor. These steps add to PFI project bidding costs, which can only be recovered if the consortium wins the tender (De Lemos *et al.* 2000).

Physical assets and future cash flows are of little value if a PFI project is abandoned, and thus pure, non-recourse financing is very rare. It is much more common to arrange funding on a quasi non-recourse basis in which financing is structured to achieve the optimum trade-off between non-recourse and credit support from the lenders in the form of guarantees or undertakings by the sponsor, so that lenders will be satisfied with credit risk. In certain instances, the granting authority, i.e. the public sector client, will offer cash and/or assets to improve the financial viability of the proposed project evaluation being conducted by potential lenders.

3. Structured Project Finance (SPF)

There are two basic types of project finance (PF), namely limited and non-recourse. In the case of limited project financing, lenders utilise the cash flows of a project to repay debt service, but permit creditors and investors some recourse to sponsors for repayment in the case of failure. In non-recourse project financing, lenders utilise cash flows in the same way but only have the assets of the project as security. As reported by Esty (2003), the total project financed investment has grown from less than $10 billion/year in the late 1980s to almost $220 billion/year in 2001.

The core element of PF is that investors have no claim to any of the assets other than the project itself. Therefore, they must completely satisfy themselves that the project is fully capable of meeting its debt and equity liabilities and still offers an acceptable margin of profit.

According to Kavanagh (2003), PF has historically been undertaken by commercial banks in two phases involving a relatively short-run construction/completion phase and a 'permanent' financing phase with maturities ranging between 15÷20 years. In the UK, cases having maturity as long as 40 years also exist.

SPF is a legitimate financial management tool with well established roots in capital optimisation and risk management; generally, it has its own inherent checks and balances protecting the interests of all parties involved. SF has its origins in two different phenomena dating back to the 1970s: securitisation and the use of special purpose entities (SPE's) (Kavanagh 2003). These are synonymous with UK SPV's (special purpose vehicles) – a separate legal entity created by equity partners to manage a specific project.

Securitisation is the process by which cash-flows on one or more assets are bundled and conveyed to a SPV that in turn issues debt or equity securities that represent claims on those underlying assets or cash flows. In most cases, the original assets are conveyed by the originator to the SPV, which then issues securities to investors. Interest and principal paid on new securities are financed by cash flows emanating from the underlying asset pool (Kavanagh 2003).

The purpose of SPV is to minimise the sponsor's exposure to risk and help with preserving its own credit standing and future access to financial markets. As a consequence, and in notable contrast to the parent company borrowing, SPVs are set up to facilitate off-balance sheet finance and asset divestiture. SPVs are usually owned and controlled by parent companies that establish them.

The UK projects are a combination of both these forms. Typically, 90% of the total anticipated finance requirement is provided by 'bank' loans and the remaining 10% (namely point finance) – by SPV stakeholders.

Nevitt and Fabozzi (2000) asserts that the key to successful PF is structuring finance with as little recourse as possible to the sponsor while at the same time providing sufficient credit support through guarantees or undertakings from a sponsor or third party, so that lenders will be satisfied with credit risk. Therefore, the crux of PF is the stability of cash flow and its security structure to accommodate credit risk in the transaction (Nevitt, Fabozzi 2000).

Esty (2003) notes that PF combines an investment decision involving a capital asset and a financing decision. He argues that PF solves two financing problems, namely by reducing the cost of agency conflicts inside project companies and reducing the opportunity cost of underinvestment due to leverage and incremental distress costs in sponsoring firms.

Furthermore, Esty (2003) argues that PF reduces the net cost of financing the assets. Project companies have evolved as institutional structures that reduce the cost of performing important financial functions such as pooling resources, managing risk and transferring resources through time and space.

4. SPF within PFI

According to Merna and Dubey (1998), Merna and Smith (1999) and Estache and Strong (2000), the basic features of PF are built around contractual commitments to PFI. Hence, a SPV is created to undertake the project on the principle that the cash-flow of the project is the principal source for the repayment of debt and the assets of the project are the principal collateral for any borrowings. Thus, once the project is operational, lenders have no or very limited recourse to the credit of the project owners. The main participants and relations between them are shown in Fig. 1.

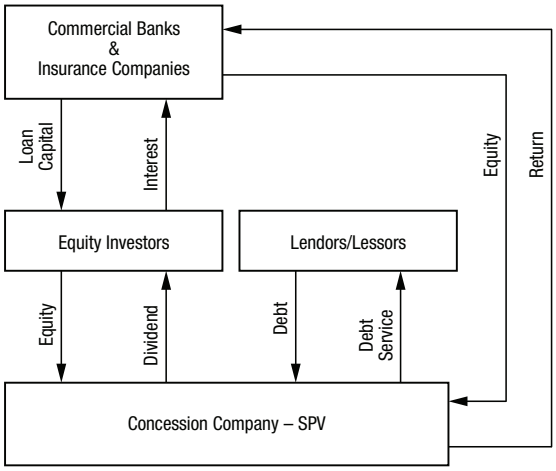

Fig. 1. The main participants in project finance in PFI road projects

Shareholders invest equity (point finance) into the SPV. These shareholders are usually a construction company, an operation company and a facility management and maintenance company. In roads, this point finance (equity and subordinated debt) is around 10% and loan debt is around 90%. Commercial banks and institutions fund this 90%. Debt from these lenders is referred to as senior debt as in the case of project default, senior debt lenders have first right to the project assets and cash over the providers of point finance.

Debt funding can either consist of bank debt or financing from bond issues or a combination of both. Bank debt tends to be more expensive than bonds with higher rates and shorter loan duration and bonds can offer longer loan periods at lower interest rates. To date there has been relatively few bond financings in UK-PFI projects. Bonds are long-term interest-bearing documents of debt, issued by public as well as private sector organisations, which oblige the issuer to pay the principal amount after a specified period of time called maturity (Fitch 2006). The term 'maturity' refers to the length of time to the expiry of a loan/debt.

Once a project has completed the development phase including construction, the risk profile alters and the SPV can obtain better re-financing terms and lower rates for the rest of its projected life. This re-financing has been excluded from this article. Equity and debt funds are used for financing project construction with funds generated from the cash-flow of the project covering the O & M (Operation and Maintenance) period. Lenders will not normally demand the repayment of the principal and interest on the loans until the construction phase has been completed and the project enters its operational phase.

Banks and other financial institutions (providing senior debt) are more risk averse than point financers, and as they provide the majority of funding, their important financial role in the realisation of the PFI project leads them to ensure that proper due diligence is performed; all risks are identified, assessed, quantified and allocated to the parties best able to manage them.

5. PFI for Road Projects

In this particular case, project finance is utilised as investment in infrastructure road projects. According to Ergün *et al.* (2004), this investment provides 'basic services to industry and households', 'key inputs into economy' and 'a crucial input to economic activity and growth'.

The public sector objective of PFI procurement is to provide high quality public services that represent value for money (VfM) to the taxpayer. It is therefore VfM, and not the accounting treatment, which is the key determinant of whether a project should be procured by PFI or not. Purchasers should focus on how procurement can achieve risk transfer in a way that optimises VfM (Technical Note… 1999).

Fig. 2 shows cash-flow potential differences between public-funding and the PFI project. From the point of view of the public sector, PFI requires no upfront capital but involves larger operating expenditure over time to purchase services. However, on the other hand, the public asset approach requires a large upfront capital funding commitment and relatively lower operating expenditure over time.

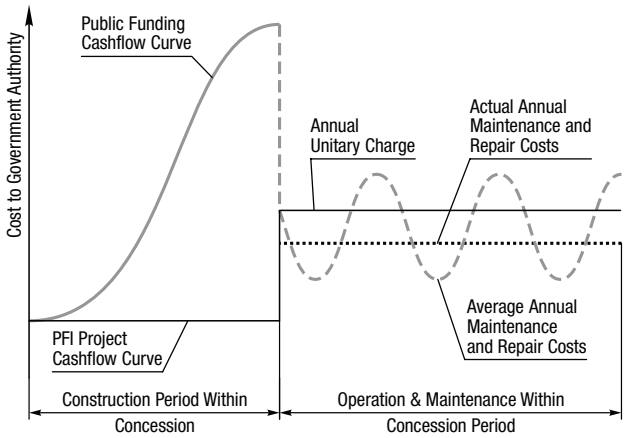

Fig. 2. Generic cash-flow differences between public funding and PFI project

By making no payments until services are provided in accordance with the Granting Authority's Output Specification, the payment mechanism transfers significant design and construction risk to the SPV and provides significant incentives for the faster implementation of infrastructure projects. The objectives of the payment mechanism are highly dependent on the requirements set out in the Output Specification and the results of risk assessment. These three items are closely related, and therefore it is important to establish mechanisms to facilitate iteration between these as shown in Fig. 3.

Senior debt providers need assurance that unitary charge, creating the cash-flow of the project, proposed as the payment mechanism can be paid by the project sponsor. For the projects launched by central UK government, this is supported by departmental financial allocations. For the UK local authorities, the process is slightly different.

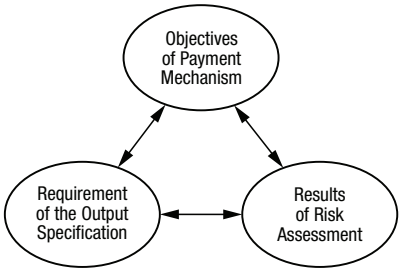

Fig. 3. Relation between payment mechanism, output specification and risk

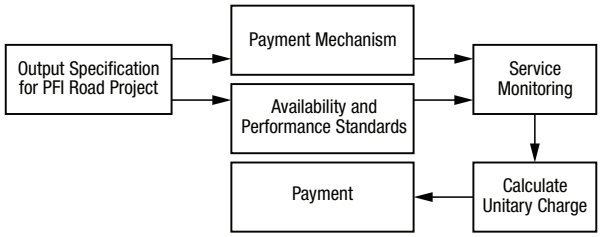

Fig. 4. The payment mechanism and performance in the PFI road project

The UK government makes available Revenue Support Grants to local authorities (LA) for each financial year, thus spreading across all service sectors (including roads). In addition, as a part of the annual government's comprehensive spending review (CSR), additional PFI credits for each of the next three fiscal years are announced to fund the capital element of PFI schemes for the local authority. To provide confidence in the availability of LA funds, central government publishes a list of approved projects updated quarterly.

Having achieved satisfactory assurance that the Government funds are available, lenders have to be assured that repayments are adequate. These repayments are specified by the payment mechanism that defines the financial effect of the allocation of risks, roles and responsibility between the granting authority and special purpose vehicle (SPV) which is the service provider. It is important that the payment mechanism reflects both the level of service required and the most cost-effective transfer of risk to the private sector (Public Private Partnership Programme 2009). The payment mechanism should give the SPV an incentive to perform well and should provide the granting authority with remedies in the event that the SPV does not meet its obligations. The payment mechanism ensures that the objectives of the granting authority for the project are being delivered and should be linked to the outputs of the project set out in the output specification.

The payment mechanism sets out the basis for calculating the payment of the unitary charge to the SPV for the provision of output specification services. The payment mechanism in a PFI contract forms the sole basis of payment to the private sector of the service provider. The general objectives of the payment mechanism (Public Private Partnership Programme 2009) should:

- provide realistic, challenging but achievable availability and performance standards for the service provider to meet in order to secure full unitary charge agreed in the contract;
- provide an incentive to meet availability and performance standards set out in the output specification by placing the payment of the unitary charge at risk if performance falls below the agreed standard;
- match payments to the outcomes and outputs that the local authority (Council) wishes to see delivered from the project;
- provide an incentive to the service provider to rectify problems by escalating penalties for worsening performance, or failure to act promptly on the items failing to meet the agreed availability and performance standards;
- provide an incentive for the service provider to innovate and secure efficiency gains and deliver the best value throughout the period of the contract.

The link between the payment mechanism and performance in a generic PFI road project is shown in Fig. 4.

By requiring no payments until services are provided to an acceptable standard, the payment mechanism provides significant incentives for the faster implementation of infrastructure road projects. The payment mechanism should include appropriate incentives for the service provider to deliver service in a manner that achieves the best value and promotes partnership working. The key to a successful payment mechanism will be the relationship and inter-operability between the output specification and its availability and performance standards and the payment mechanism. The service provider (SPV) is paid for the provision of road core services. This can be in the form of road toll payment paid directly by the user or the granting authority pays the SPV an amount based on the number and type of vehicles using the road with adjustments made for lane closure and safety performance. These are known as shadow tolls when the road user pays nothing. The predominant form in the UK roads is shadow tolling.

6. Case Study

The PFI road projects studied include A55 in North Wales, A92 Dundee-Arbroath and the Newport Southern Distributor Road. Full details were provided in a study by Eaton and Akbiyikli (2005).

As presented above, the payment mechanism is fundamental to the PFI contract defining the financial effect of the allocation of risks, roles and responsibility between the granting authority and SPV which is the service provider. Hence, in the project on A92, the granting authority devised a base monthly payment schedule parallel to deductions in case of lane unavailability and performance failure. The scheduled rates for monthly payment, lane unavailability and performance failure are shown in Tables 1, 2 and 3 respectively. All rates shown in the tables are in the UK pound. Monthly

payment is calculated separately for heavy vehicles and vehicles other than the heavy ones. Due to space limitations displayed in Table 1, only rates for other vehicles are tabulated. However, the schedule for heavy vehicles is the same with the exception of a different number of vehicles and unit rates.

Table 1 shows that the rates of base monthly payment (BMP) increase by increasing usage but decreases by the progressing operation period. Such nature of BMP can easily be seen in Fig. 5, which is simply the graphic form of Table 1. Monthly lane unavailability charge (MLUC) is calculated based on the time of the day, the length of the closed lane in multiples of 4.0 km and whether a single lane or the full carriageway is closed. For further assurance of the service level, there is an additional charge calculated based on the performance as tabulated in Table 3.

All charge and BMP values are the values at the beginning of the contract and are further adjusted annually by the retail price index based on the annual indexation factor which is the minimum of 1.025 for annual inflation rates of less or equal to 2.5%. However, for inflation rates above 2.5%, only 26.95% of the excess is included in the indexation factor.

Table 1. Rates for calculating base monthly payment

Band	Years	2	10	15	19	25	31
B1	No. of Veh.	0÷408	0÷430	0÷444	0÷454	0÷468	0÷482
	£/veh./day	0	0	0	0	0	0
B2	No. of Veh.	409÷1361	431÷1434	445÷1479	455÷1512	469÷1559	483÷1605
	£/veh./day	0.27	0.26	0.25	0.24	0.24	0.23
B3	No. of Veh.	1362÷1442	1435÷1554	1480÷1626	1513÷1683	1560÷1768	1606÷1854
	£/veh./day	0.51	0.35	0.28	0.24	0.2	0.17
B4	No. of Veh.	1443÷1468	1555÷1594	1627÷1676	1684÷1743	1769÷1844	1855÷1946
	£/veh./day	1.5	0.99	0.79	0.66	0.52	0.43

Table 2. Lane unavailability charge for the closure of one carriageway (per 4 km closure or part thereof) – part detail

Band	Years	2	10	15	19	25	31
B1	No. of Veh.	0÷408	0÷430	0÷444	0÷454	0÷468	0÷482
	£/veh./day	0	0	0	0	0	0
B2	No. of Veh.	409÷1361	431÷1434	445÷1479	455÷1512	469÷1559	483÷1605
	£/veh./day	0.27	0.26	0.25	0.24	0.24	0.23
B3	No. of Veh.	1362÷1442	1435÷1554	1480÷1626	1513÷1683	1560÷1768	1606÷1854
	£/veh./day	0.51	0.35	0.28	0.24	0.2	0.17
B4	No. of Veh.	1443÷1468	1555÷1594	1627÷1676	1684÷1743	1769÷1844	1855÷1946
	£/veh./day	1.5	0.99	0.79	0.66	0.52	0.43

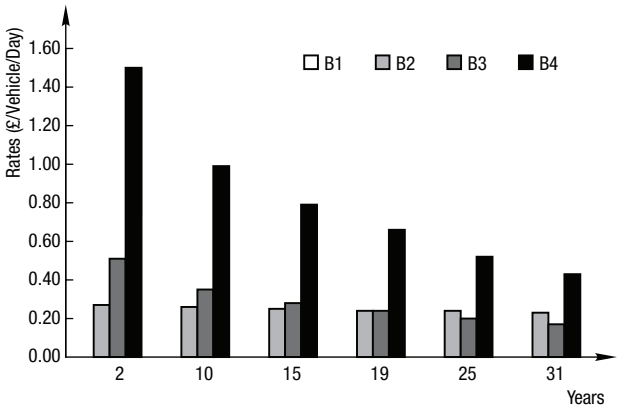

Fig. 5. A summary of payment rates for different bands and years

Table 3. Performance failure deduction chart – part detail (full service period)

Number of Relevant Performance Failure Points	Performance Deduction
0÷30	0.000%
61÷85	0.525%
96÷100	1.050%
151÷155	2.000%
201÷205	3.000%
296+	7.500%

This payment mechanism provides a powerful incentive for the SPV to ensure high quality sustained availability of the road meeting the pre-defined performance standards in output specifications. Non-performance puts at risk unitary charge payment as defined above. It provides a mechanism to ensure the earliest rectification of defects. The mechanism is not available within non-PFI roads. The payment mechanism for each road project will need to be tailored and structured to reflect particular needs for the local authority.

Two very important pieces of data in such an estimation process are inflation rates and lending rates. Investment will be made by using some form of borrowing as explained above and costs will be recovered through a long term repayment process making the results of estimation analysis sensitive to these data.

Inflation in the UK between 1989 and 2008 (see Fig. 6) was reasonably low for the last 10 years and averaging an arithmetic mean of 2.73% and a geometric mean of 2.23% for the 20 year term were reported. The difference between the two values is mostly due to rates 7.0% and 7.4% in 1990 and 1991 respectively. However, as a conclusion it can be assumed that the average inflation is quite close to base inflation at 2.5% specified in tender documents.

The other important rate in calculations is lending rate. As can be seen from Fig. 6, the prime lending rate as reported by the Bank of England is around 4.5% in the post 1990 period and seems fairly stable. Therefore, calculations will be based on this lending rate and will be assumed that the contractor will receive a long term loan, i.e. 10, 15 or 30 year loan at a rate prime lending rate plus 175, 200, 225 basis points for 10, 15, 30 year loans respectively. For comparison purposes, it will be assumed that granting authority can borrow at the same rate.

Regarding the construction period spending of this particular project, two assumptions can be made. First, profit content in construction budget can be accepted as a part of spending, and hence the accumulated amount of potential profit is not reused in project funding. This is justified since construction is sub-contracted out by the SPV. The second assumption is the distribution of construction spending as the project involves major rehabilitation work and can be assumed as relatively flat with slightly higher spending in the initial months. Monthly and cumulative spending curves are given in Fig. 7.

Regarding the operation period and potential penalties for unavailability and performance failures, it can be assumed that in the cost, the contractor has included an estimated amount to cover for these values. It is also as-

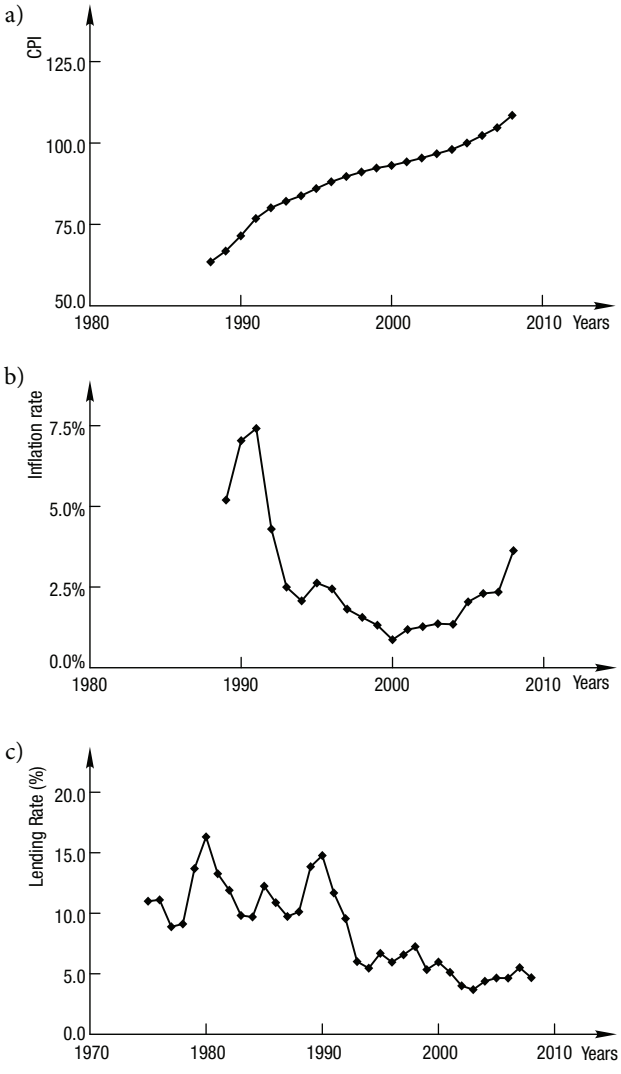

Fig. 6. UK consumer price index – (a), source: UK stats web site; inflation (b), source: UK Stats web site; lending rates (c), source: Bank of England web site (*http://www.bankofengland.co.uk*)

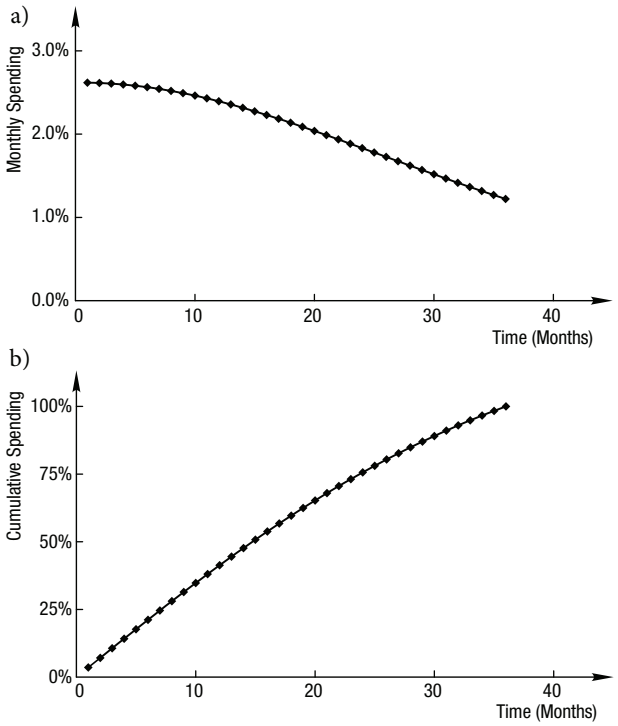

Fig. 7. Monthly and cumulative construction spending: a – monthly spending as the percentage of total spending; b – cumulative spending flow as the percentage of total spending

sumed that the expenditure of the operation period will be low in the beginning and higher towards the end of the period. Furthermore, it is assumed that a bid of £27M is at tender rates, so the annual expenditure is adjusted by the inflation factor. The results are shown in Fig. 8. However, if the granting authority was operating for the carriageway, the values shown on the graphs in Fig. 8 would be lower since the contractor's values also contain the penalties to be paid. For calculation purposes, this reduction in LA expenditure is assumed to be 25%.

The only contractor's source of covering his/her operating expenses is BMP. The figures include the minimum inflation adjustment of 2.5% over the years. Revenue from heavy vehicles comprises about 10% of the total revenue.

Using the data and assumptions presented above, analysis was made to calculate difference in cost between the two alternatives, namely the traditional bid and build type and the PFI structure presented earlier. The results obtained are converted to the net present value considering the date of beginning the operation. For this purpose, a discount rate of 10% has been utilized. The results reveal that the contractor receives additional earnings before interest, taxes, depreciation and amortization of £15.2M, £12.3M and £10.8M for 10, 15 and 30 year loans respectively. Certainly, these amounts can be decreased or increased by financial market conditions and contractor's performance. Nevertheless, as calculated, additional earnings seem to be reasonable compensation granted to the contractor for the risks assumed.

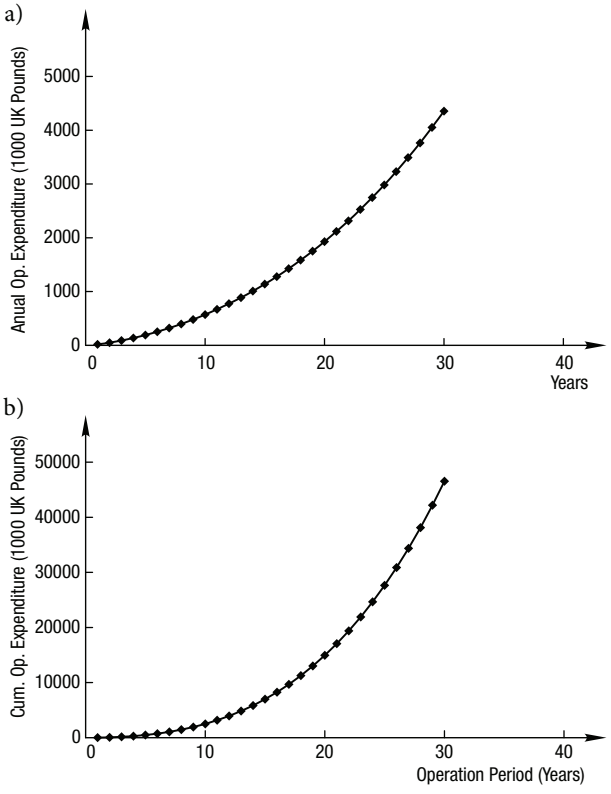

Fig. 8. The expenditure of the annual (a) and cumulative (b) operation period

7. Conclusions

This paper has focused on financial implications for public and private sectors in delivering the key characteristics of adequate risk transfer (RT) and value for money (VfM) to the taxpayer. Based on the previously justified assumptions, the interrelationship between RT and VfM has been discussed and analysed showing the private sector risk premium of 15.2M, 12.3M and 10.8M for 10, 15 and 30 years respectively. This is considered by the authors to demonstrate good VfM to the taxpayer.

Finance for road projects is a commodity (however, scarce at a particular point in time), hence the case for private sector involvement must be financially justifiable. This paper has shown that the cost of finance is dependent on the investors' perception of risk and the security of repayments. The case studies have demonstrated that by adequately defining risk transfer and payment mechanisms, a balance between requirements for both private and public sector demands can be achieved. In seeking to establish RT and VfM, a number of qualifications must be presented. In exclusively public sector financed projects, many implicit risks associated with investment are never exposed or evaluated. Public sector authorities invest current and future revenue streams against implied and occasionally unspecified risks of a particular road project. They become 'bundled' in the contingency fund of the public sector. Therefore, the total cost to the public authority is therefore unspecific, with variations, claims, delays, unanticipated repairs and damage thus all leading to the unspecified increases in the original project estimate. In PFI projects, the private sector must specify these factors since they accept full financial liability. Hence, the cost of finance will vary with risk profile and risk allocation for each individual project. All of risk is accepted based on risk premium charged for each individual project. If risk premium is sufficient, then the private sector makes profit; otherwise, the private sector makes financial loss.

The private sector lenders require thorough scrutiny and due diligence before agreeing to any debt issuance. Incomplete documentation, ill-prepared proposals, etc. will lead to increased finance charges. Alternatively, for well prepared projects, the same lenders can offer an extremely competitive financial package for the project.

In combination with the private sector incentive for the SPV to maximise the efficiency and effectiveness of the life cycle of the whole project, PFI package is competitive with other contractual forms. It also offers the public sector the additional benefit of pre-determined future cash flows. The total cost to the public authority is fixed before the commencement of any activity. The certainty of such cost within the PFI project provides the local authority with the opportunity to incorporate specific costs rather than unspecific contingency with future fiscal planning processes. When capital cost is combined with fixed operational payments, there is solid evidence that UK PFI road projects are providing an improved value for money, compared to the previous forms of road procurement whilst also offering improved risk

transfer from the public sector. An additional benefit is that technological and managerial innovations associated with improving the whole life asset and service quality as derived from PFI roads are being disseminated to local authorities and thus become capable of being incorporated into non-PFI project specifications. In conclusion, PFI roads have proved to be timely, high quality and cost effective and have provided local authorities with value for money schemes and improved risk transfer.

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