Discount Rate Methodology for Appraisal of Public Private Partnership Projects

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ABSTRACT

Any Public Sector Agency considering a Public Private Partnership arrangement will need to evaluate the cost of traditional Public Sector based procurement options against Private Sector alternatives and, if the PPP path is followed, it will need to compare competing Private Sector proposals. This financial evaluation is done by comparing projections of future cash flows under the various options and determining the best Value for Money on a basis that is consistent between options. The traditional Public Sector procurement option is known as the Public Sector Comparator and, initially, a representation of each Private Sector PPP option needs to be constructed.

It is likely that each option examined will have a different pattern of cash flows into the future. Some will have large cash outflows in early years and lower cash outflows during the operating stage, whereas others may have a smoother profile over time. In order to express the different cash flows on a consistent basis, Discounted Cash Flow techniques are used and a Net Present Value is determined. On the basis that PPP projects typically involve a net cost to the Public Sector, the NPV is more accurately described as a Net Present Cost.

This paper is prepared from the perspective of projects that have a net cost to the Public Sector. It is the determination of the applicable Discount Rate for evaluating different PPP procurement options that is the focus of this paper. The Methodology outlined in this paper does however; strike a balance between the benefits of delivering a Discount Rate for each project with the cost and complexity that could involve.

To enable simpler implementation this balance is achieved by grouping projects into bands with investments or projects of a similar risk profile and providing reference data for such projects. Where greater precision is required, guidance is studied as to how a project specific Discount Rate can be derived.

Keywords: Discount rate, Public private Partnership, Net present value, Value for Money, Value Engineering

1. INTRODUCTION

Public-private partnership projects are long-term collaboration projects involving the public and private sectors, where the private sector takes on the risks of construction and financing, as well as maintenance or demand. The choice of the PPP model rather than the traditional (budgetary) model is based on the calculation of savings associated with the PPP model.

In the PPP model of delivery of public infrastructure, it is not only the construction costs that are taken into account, but also whole life cost that in addition to the construction costs also include costs of maintenance, replacement, financing and revenues from any business activities - third parties' revenues.

The whole life costs are expressed in present values. The present value of both revenues and costs can only be expressed by applying the discount method. In practice it is often said that the whole life cost are expressed as the net present value, that is, the difference between the present value of cash inflows and the present value of cash outflows.

The aim of this research is to provide an illustration of the discount method in order to render the process of preparation and implementation of PPP projects more effective and efficient.

2. DISCOUNT METHOD

Discounting is a financial method that is the opposite of the interest rate method. The interest rate method is a process in which the value of the stock prices at the present moment is increased in order to estimate the future value of the stock prices. For example, if one invests today 100 units of money (present value) at the annual interest rate of 10%, after one year (future value) the value of the stock price will increase by 10 units of money. Therefore, the future value of the present value of 100 units of money is equal to 110 units of money.

As opposed to the interest rate method, discounting means determining the present value of a known future value. In the process of discounting there is also an interest rate applied, which in this case is called discount rate. To take the opposite example, if we apply the annual discount rate of 10% to the present value of the future value of 110 units of money, the former will be 100 units of money.

When applying the interest rate method, the present value of the stock price (100 units of money) is multiplied by the so-called interest factor equal to $(1+k')$, where k' denotes interest rate. When applying the discount method, the future value (110 units of money) is multiplied by the so-called discount factor equal to $1/(1+d')$, where d' denotes discount rate.

3. EXAMPLE OF DISCOUNTING PROCESS

a) Suppositions

- All the values are constant prices
- The annual discount rate is 7%
- The value of the capital costs is 1000.000
- The total life cycle of the project is 8 years, and the construction shall take 1 year

b) Cash flow forecast

Chart 1: Cash flow forecast – constant prices

Description	1	2	3	4	5	6	7	8	9
Capital costs	-1000								
Operating revenues		300	350	350	400	400	450	450	500
Operating costs		-200	-200	-250	-250	-250	-300	-300	-300
Difference	-1000	100	150	100	150	150	150	150	200

c) Calculation of discount factors

Chart 2: Discount factors forecast

Discount factors	0, 934	0, 873	0, 816	0, 762	0, 712	0, 666	0, 622	0, 582	0, 543

d) Calculation of the present values

Chart 3: Present value

Present value of benefits	2.180.589
Present value of costs	-2.332.690
Present value of the difference (NPV)	-152.102
Difference of the present values (NPV)	-152.102

Discount factors are calculated as follows: $1/(1+0.07)^n$, where n denotes the year to the which the value refers. The present value of a financial value is calculated as the multiplication of that financial value (benefit, cost, difference) and the discount factor for the same financial year.

The net present value (NPV) can be calculated in two ways:
- as the difference between the present value of benefits and costs or
- as the present value of the difference between benefits and costs.

4. PURPOSE AND OBJECTIVE OF DISCOUNTED CASH FLOWS IN PPP PROJECTS

Effective management of public revenues and expenditures, and in particular of public buildings with a long-term life cycle, whose construction and exploitation involve considerable costs over a long period of time, implies taking account of the time preference of money, that is the time value of money. The time preference of money is the value of money over a given amount of time. Hence it is said that the same quantity of money has a higher value today than in the future. The difference in value compared to the relevant time is directly connected with the discount rate.

Considering what has been said above, in order to even up the value in money of future inflows and outflows, it is necessary to discount them to the present value.

There is yet another very important impact of discounting which is related to a different statement of revenues and expenditures at the time of their occurrence. Namely, the same non-discounted values of the whole life cost will have different present values if the individual values of revenues and expenditure are calculated at different times. Therefore, one important conclusion that can be drawn is that the financial values calculated in earlier periods of time have a higher present value. Consequently, the public benefit is higher when the revenues are calculated in the near future and expenditures in the distant future.

5. CHOICE OF DISCOUNT RATE

In the economic and financial practice discount rates are most often differentiated according to the object of discount (financial and social discount rate) and the way of expressing the price (nominal and real discount rate).

a) Financial discount rate

The financial discount rate represents the opportunity cost of capital (Brealey, Myers, 1996; Brigham, 1995). The opportunity cost of capital is the cost of investing in one project rather than in another – alternative – one. The loss incurred from opting for the first project and not the second – alternative – one is the opportunity cost. And vice versa, making gains in the second project and not in the first one represents the capital gain opportunity. Therefore, the financial discount rate is

used in the process of evaluation of the performance of an investment option. That is the reason why it is important which financial discount rate will be used when judging the acceptability of investment opportunities. It is possible to opt for:

- weighted average cost of capital, that is weighted average cost of all sources of finance of a project. The choice of this discount rate implies the preference to derive the expected rates of return from third party (loan, bonds) or own (capital) sources of finance taking into account the relative weight of each source of finance;

- Minimum marginal rate of return on investment that needs to be earned on an investment option.

b) Social discount rate

In the last fifty-odd years there have been controversies and differences in opinion in economic theory and practice over the development of a method of calculation of the social discount rate. On the other hand, it is completely logical that a discount rate should be applied in the assessment of public investment alternatives in order for the public management to make the optimum decision on public investment based on an analysis of gains and losses.

Public investments have an impact on the gross social product, and the value of the social discount rate draws attention to the necessary (or planned) difference between future inflows and outflows that need to be achieved through exploitation of public investments. Thus a higher social discount rate requires a larger difference between public inflows and outflows in order to justify public investments, whereas a lower social discount rate requires a smaller difference between public inflows and outflows.

Different countries apply different social discount rate, but the majority agree that developed countries need to apply a lower rate, whereas in developing countries a higher discount rate is required. A method based on the long-term economic growth rate and in its calculation the following parameters are used:

- Rate of growth of public expenditures (g);
- Elasticity of demand (n);
- Rate of time preference of money (p);

Based on which the social discount rate (SDR) is calculated as: $SDR = ng + p$.

6. CONCLUDING REMARK

As discussed in paper, PPPs are increasing in popularity as procurement options for the public sector. The strength of a PPP is that it shares the risk between the public and private sectors with each sector responsible for the risk they can most easily manage. That being said, PPPs are not

always the best decision for the public sector. Discount rate methodology analysis enables the public sector to decide if a PPP is a better procurement method than traditional public provision. If a PPP is shown to be the better option, then Discount rate methodology analysis can help the public sector pick the best private sector bid to provide the infrastructure or service. The hope is that when Discount rate methodology analysis is used to evaluate proposed projects and private sector bids, the best procurement decision is made so projects do not fail and the public sector does not waste its limited resources on projects that fail. This report attempts to distill the general components of a Value for Money assessment when considering a public private partnership. We start with a working definition of Discount rate methodology, explain the key components therein: the Public Sector Comparator, proper life cycle costs and discounting methods, and risk allocation. We go on to explain common pitfalls experienced when conducting a Discount rate methodology analysis. These sections explain best practices for each aspect of a VfM analysis and will help public sector workers understand VfM analysis and its components. It is our hope that this report, along with the industry-specific appendices, can provide a good instructional tool for public managers considering a PPP. This paper should help public sector workers able to not only calculate and analyze VfM, but to avoid common and easily made mistakes when doing so to ensure projects are carried out in the best manner possible.

REFERENCES

[1]   Spackman, M. (2008): Time Preference, the Cost of Capital and PPPs, Conference on "Discount Rate for the Evaluation of Public Private Partnerships", Queen's University, Kingston, Ontario, October.

[2]   Philippe Burger and Ian Hawke worth OECD Journal on Budgeting Volume 2011/1© OECD 2011, How To Attain Value for Money: Comparing PPP and Traditional Infrastructure Public Procurement" OECD 2011

[3]   Katalin TÁNCZOS and Gi Seog KONG Periodica Polytechnica Ser. Transp, "A Review Of Appraisal Methodologies Of Feasibility Studies Done By Public Private Partnership In Road Project Development" . Eng. Vol. 29, No. 1-2, Pp. 71–81 (2001)

[4]   Lawrence Devon Smith Manager, Project Evaluation, Rio Algom Limited, "Discounted Cash Flow Analysis Methodology and Discount Rates"

[5]   Dawn Bidne, Amber Kirby, Lucombo J. Luvela, Benjamin Shattuck, Sean Standley, and Stephen Welker, "The Value for Money Analysis :A Guide for More Effective PSC and PPP Evaluation"

[6]   Government of western Australia Dept of treasury, " Public Private Partnerships Public Sector Comparator Policy Additional Policy Guidance" January 2013

[7]   Partnerships Victoria, "Use of Discount Rates in the Partnerships Victoria Process", , Technical Note - July 2003

[8]   Aziz, Ahmed M. Abdel. "Successful Delivery of Public-Private Partnerships for Infrastructure Development." Journal of Construction Engineering Management 21.6 (2007): 918-931

[9]   Department of Economic Affairs Ministry of Finance Government of India 2011, "National PPP Policies draft for consultation"

[10]   http://en.wikipedia.org/wiki/Social discount rate