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Discount Rates and 'Optimism Bias'

Introduction:

When undertaking investment analysis of a number of project opportunities, the conventional method for determining the value of one opportunity against another is to calculate the Present Value of each option. As these opportunities can often span many years, e.g. 20-30 years for a PPP Concession, the discount rate chosen to bring future values back into today's terms is key. Conventional investment theory dictates that the discount rate to be used is the opportunity cost of capital, e.g. the interest rate for 30 year government bonds, by way of example. It is, of course, important to choose a discount rate which reflects the overall period of the analyses.

A second issue is how to treat inflation. Inflation exists in every jurisdiction come what may! If one is undertaking investment analyses of options which include finance, e.g. PPPs, then the cost of finance (e.g. interest rate) has to be included. As market interest rates reflect actual, or nominal, rates, the analysis should be undertaken in nominal terms too. This reflects reality, as we all see it.

Commentary:

a) The UK Government, when it undertakes analysis of investment options for public service asset projects, uses data in the calculations quoted in 'real' terms, i.e. ignoring inflation and the cost of money. In this respect, the UK is out of step with most, if not all, other countries.

   The UK government dictates to its Ministries, Local Authorities and Agencies through the publication of the 'Green Book' how to undertake such investment analyses and determines the discount rate to be used to express future values in today's terms. From 1991 to 2003 the discount rate was 6% 'real', which, with inflation through that period being, say, 2-3%, gives an approximate equivalent 'nominal' rate of 8-9%.

   From 1991-2003, the cost of 30 year, UK Government bonds ("gilts") varied, but on average was 5.5 – 6%. This, of course, is a 'nominal', as opposed to 'real', value.

   Hence, one can see that, by using a 6% 'real' discount rate for such analyses, the UK Government was imposing a higher rate of discount than conventional investment analysis would suggest, i.e. 8-9% versus 5.5 – 6%; a differential of 3 – 3.5%.

   The consequence of using a too high discount rate was twofold:-

- firstly, this choice favoured PPP/PFI options against conventionally-funded alternatives. In cash-flow terms under a PFI/PPP the payments to be made by the purchaser (i.e. Government), which include the cost of funding the underlying asset, are later in the Concession period than for conventional funding, just like for a credit card.

  If one calculates the value of a 3 – 3.5% differential in Present Value terms over 30 years, this shows an advantage to the PFI/PPP option amounting to 35-37% of the Present Value purely by using such artificially high discount rate. The result was that a number of deals, e.g. West Middlesex Hospital PFI, were undertaken as PPPs, when in cost terms it would have been cheaper to fund them conventionally; and

- secondly, if the underlying cash-flows from the analysis are to be used for budgeting purposes at a later date, they will underestimate the payments to be made to a PFI/PPP Concessionaire as they exclude the impact of inflation. This may well be the main reason why many NHS Health Trusts, who undertook PFI/PPP projects some years ago, now find they are very expensive, i.e. the Trusts have under-budgeted.

  Fortunately, inflation has been relatively low in recent times, so this impact has been limited. But when inflation is high, under-budgeting arising from the use of a high discount rate could be very significant.

b) In 2003, Government changed the discount rate from 6% to 3.5% 'real'. Given inflation was low at 2-3%, this discount rate thereafter reflected nominal rates prevailing at the time.

   To counterbalance this abrupt change, Government (HM Treasury) introduced the concept of 'Optimism Bias' to reflect, as they thought, the inherent under-estimation of costs that Government departments had demonstrated over past decades. A consultant (MM) report on a number of major projects undertaken previously showed various grades of cost over-runs, and so the empirical concept of Optimism Bias was introduced as a multiple to be applied to departmental cost estimates (the Public Sector Comparator) to cover this possibility. The minimum multiple was 1.24, i.e. a 24% increment for simple projects, whereas for complex projects the multiple could be 1.5-1.6 reflecting 50-60% cost over-runs.

   It is well known universally that Governments often over-spend on projects. However, no other government has formalised the over-runs into a 'cross the board' regulation as has the UK through the application of Optimism Bias. Other governments prefer to evaluate these possibilities through conventional sensitivity testing on 'base case' cost estimates.

   Arguably, the project data used to develop the UK Optimism Bias multiples was an inconsistent sample. Furthermore, if a multiple of 40% were to apply to any project estimate, could not a strong project manager be employed to control costs for 10% of the cost, plus paid another 10% as a bonus for success, and the sponsor would still be better off by 20%?

   Another flaw in the methodology was identified in that HM Treasury applied Optimism Bias before risk analysis, whereas some agencies, e.g. Network Rail, applied Optimism Bias after risk analysis. Mathematically the answers are different. When this anomaly was raised with HM Treasury and Network Rail, they both claimed they were right and the answers were the same anyway!!

Conclusion:

The overall net effect of the introduction of Optimism Bias was to largely compensate for the errors which arose through the use of an erroneous discount rate for the years 1991-2003.

Today, there is greater realism in the UK Government's approach to this topic, but there is, on occasion, a reluctance to use these quantitative tools. However, the UK Government remains out of step with other governments on this methodology, which, while not perfect, is probably the best that can be derived. 70-80 countries worldwide now are considering PPP's, but evaluate the opportunities in 'nominal' terms.

Obviously, other factors such as efficiency, innovation, etc., have to be taken into account before arriving at a final figure for 'Value for Money'.

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