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Understanding the Risk Adjusted Discount Rate for Infrastructure Projects

Recent challenges have put increased pressure on public agencies to reduce capital spending through cost effective solutions to provide public services, including essential water infrastructure.

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As a means to meeting these budget constraints and managing assets effectively, public agencies across the world have increasingly looked to leverage the expertise of the private sector. Quantifying Public costs against a Public-Private Partnership (PPP) approach is a common practice in countries such as Australia, Canada, the U.K. and South Africa, but is still emerging in the United States.

Without an accurate assessment of the total costs, intended service objectives will not be met and additional costs may be incurred by the taxpayer. The most common method of analyzing value for money in a long term contract is undertaking a Net Present Value (NPV) analysis. This evaluation determines economic flows, which account for costs, risks and benefits resulting in a quantitative financial benchmark against which bids can be assessed. A fundamental ingredient in the NPV calculation, along with identification of risks and an understanding of costs, is defining the appropriate discount rate commensurate by the level of risk transferred and retained by public agency.

The discount rate applied to the public and private sector bids should be different in order to account for risks transferred under a PPP which could increase the total cost of the project. These risks should be added to the risk free rate, which is the public agency's borrowing rate where all risks are assumed by the borrower. The established discount rate for the public bid (i.e. the borrowing rate for the public agency) will therefore be smaller; otherwise the present value of the cost stream to the private entity will be overestimated.

One common method used to determine the appropriate discount rate for public and private bids is to use the **Capital Asset Pricing Model (CAPM)**. Please see the basic formula below:

$$\mathbf{Ra = Rf + \beta a(Rm-Rf)}$$

- Ra is the required return, which factors in systemic risk
- Rf is the risk free rate (this is the rate at which all risks are born by the borrower i.e. public agency)
- βa (Beta Factor) is the variation of asset returns in the market (which should be adjusted to reflect the project's risk)
- (Rm-Rf) is the return expected above the risk free rate

The Beta risk adjustment is based on three risk bands in the Australian application. Depending on the riskiness of the investment, Beta factors of 0.3, 0.5 and 0.9 are applied relative to the market risk premium of 1. Water, Energy and Transportation projects are considered in the middle band. To apply the CAPM to an example of a new water infrastructure project, the appropriate discount rate used for the private bid would be 6.5%, which assumes a premium of 3% above the risk free rate of 3.5%.

$$\mathbf{6.5\% = 3.5 + [0.5x6]}$$

In summary, the discount rate for Net Present Value should be calculated with respect to the various cost and risk factors in order avoid making improper investment decisions.

For additional reference:

- Partnering for Value - Structuring effective public-private partnerships for infrastructure, Deloitte
- Public Cost Comparator for Public-Private Partnerships, National Council for Public-Private Partnerships
- Delivering Water Infrastructure Using Private Finance, KPMG

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Mr. Storan joined PERC Water in May 2008. His professional experience has focused on the development of Design-Build-Operate-Finance projects for water and wastewater. His previous experience includes working in data analysis for the Market Research Bureau of Ireland and as part the Applied Business faculty of UCD lecturing in Business Research Skills.