
ARE WE
INVESTING FOR
THE FUTURE OR
DISCOUNTING IT?
KPMG

Investments in the 'right' infrastructure have the capacity to stimulate and enhance productivity in both the short and long term.

As highlighted by the Australian Government's then Department of Infrastructure and Regional Development, major infrastructure projects have the potential to create a multiplier effect throughout the economy, generating lasting economic, social and environmental benefits[1].

Public agencies around Australia are grappling with an unprecedented pipeline of multi-generational infrastructure projects that will provide significant benefits for our communities and will shape Australia's cities and regions for the future. Many of these large-scale, multi-generational projects seek to not only deliver the transport network improvements, but also facilitate changes to urban form and structure and enhance liveability for generations to come.

These long-term investments have the ability to reflect the needs of the community over differing time horizons – in the near term, where an infrastructure need is present, and in the longer term, where proactive investment in infrastructure can anticipate an infrastructure need and propel growth and economic outcomes for our communities. With delivery periods of a decade or more (particularly when projects are staged), along with economic lives of up to 100 years over which the benefits are likely to be realised, such projects can be truly transformative and multi-generational.

As Australian governments consider the infrastructure agenda ahead, several business cases are being progressed to assess this new wave of transformative, multi-generational infrastructure initiatives. City-shaping investments take time to plan and deliver, but their benefits are significant and long-lived. Given the scale and scope of the potential benefits of these investments for our communities, and for state and national economies, it is appropriate that assessments of such investments reflect these characteristics.

THE USE OF DISCOUNT RATES IN PROJECT ASSESSMENT

Cost-benefit analysis (CBA) is used by government agencies in Australia to assess the economic, social and environmental merits of infrastructure projects. The discount rate is a core element of the CBA process, enabling comparison between project costs and benefits that occur over different timeframes. The higher the discount rate, the greater the emphasis on short term benefits; while lower discount rates emphasise the benefits derived by future generations.

Infrastructure Australia as well as Australia's state and territory's treasury and finance departments advise the use of a discount rate of seven per cent (real) for most public infrastructure projects. This rate has been in place since (at least) 1989[2] at both commonwealth and most state and territory government levels and may be considered appropriate for assessment of investments with relatively short delivery periods and, in turn, relatively short assessment periods.

For some time, there has been growing local and global support for revised, fit-for-purpose discount rates for multi-generational projects. For example, research from the Grattan Institute (2018) noted that longer-term projects should require lower discount rates that vary to reflect the current risk-free rate and the sensitivity of the project's expected returns to the economy[3].

In recent years, fit-for-purpose discount rates have been applied on several major infrastructure project appraisals, such as:

1. **In the UK, London's Crossrail project[4], High Speed Rail 1[5] and High Speed Rail 2[6]** – these projects were assessed over a 60 year period utilising a discount rate of 3.5 per cent for the first 30 years and three per cent thereafter to reflect the impacts on future generations

2. **Grand Paris Express**, a large iconic project aimed at maintaining Paris' world city status through better public transport integration between districts and supporting a city of knowledge through the creation and enhancement of large competitive urban centres[7] – this was assessed using a discount rate of four per cent to demonstrate the rate of return required for public projects in France[8].

3. **Inland Rail, an expansive multigenerational rail infrastructure initiative between Melbourne and Brisbane** – Australia's Commonwealth Government and Australian Rail Track Corporation applied and reported against a discount rate of four per cent as part of the project's economic appraisal[9].

Consistent with the examples above, Australia's new wave of major infrastructure initiatives are intended to significantly benefit future generations. Using appropriate discount rates would enable the future benefit streams of these projects to be appropriately reflected in the economic appraisal and, in turn, underpin robust decision making for investments of this nature.

DEMONSTRATING MULTI-GENERATIONAL BENEFITS

As mentioned earlier, use of the higher discount rate of seven per cent as currently recommended in relevant guidelines, may be suited to CBA of investments with relatively shorter evaluation periods, such as 30 years. However, using a discount rate for multi-generational projects in line with standard investment guidance results in latter year benefits (and equally costs) being discounted to near zero. An investment appraisal methodology that utilises relatively high discount rates therefore creates an incentive towards investment in projects that provide shorter term benefits, but that may fail to effectively address long term, structural problems or that enable long-term productivity benefits to be achieved.

This unintended consequence has been recognised by the Commonwealth Government's House of Representatives Standing Committee on Infrastructure, Transport and Cities who noted that high discount rates were "skewing the field in favour of certain outcomes (for example, road over rail) and producing potentially unproductive and perverse outcomes (for example, urban sprawl rather than densification)."[10]

In the context of multi-generational projects, selecting an alternative discount rate that places a greater relative consideration on the impacts to future generations allows for a more balanced assessment. Long-term, city-shaping projects that have long construction periods and generate benefits multiple generations require a discount rate that will enable the latter year benefits to be equitably reflected in the analysis.

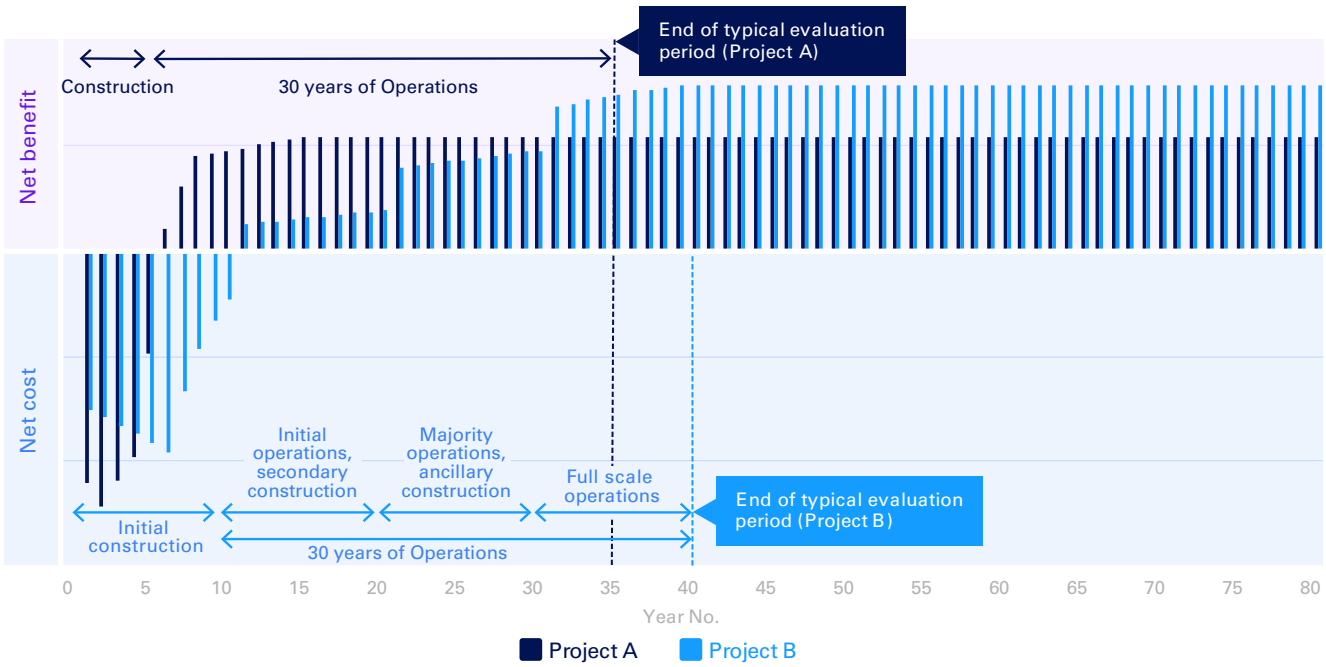
DISCOUNTING IN PRACTICE

The practical effect of applying relatively high discount rates on intergenerational projects – where the majority of costs are borne now for the benefit of the future generations – is that any long-term benefits created for the community are devalued relative to any short-term net returns.

The following charts demonstrate the practical implications of appropriate discount rate selection through an indicative illustration of the potential undiscounted cash flows for two hypothetical projects over a typical project evaluation period. Project A is a significant infrastructure project with a delivery period of five years; Project B is a multi-generational project, which in this example is planned to be delivered in multiple stages, with a total phased construction period spanning 30 years (10 for the initial phase with first year of benefits occurring in year 11).

As demonstrated in Figure 1, both projects experience a significant net loss over the construction stage early in the appraisal period. This is then followed by a slow ramp up of project benefits once construction is completed and the benefits from the project start to materialise. For Project B, where construction spans multiple decades, the significant ramp up of benefits does not occur until approximately year 31 when all the stages of its construction are completed.

FIGURE 1: Major Infrastructure Projects – Undiscounted Net Cash Flows (illustrative only)



When discounting, cash flows are weighted exponentially lower the later they are expected to be incurred. Higher discount rates weight costs expected to be incurred early in an appraisal period higher, and benefits materialising late in an appraisal period lower. For example, using the indicative examples above, the equivalent of $1 in undiscounted economic benefit in:

- year six, the year when Project A is fully operational and the benefits start to accrue, would be valued at 71 cents in present value terms when using the discount rate of seven per cent; while
- year 31, the year when Project B is delivered and the first year when the full project benefits are realised, would be valued at just 13 cents in present value terms (at seven per cent).

This is demonstrated for Project A in Figure 2 and Project B in Figure 3.

At a discount rate of four per cent, for example, the cumulative net present value (NPV) profiles for Project A and Project B provide a reasonable cash flow profile with an initial period of cost expenditure followed by an extended period of benefit realisation. At a discount rate of seven per cent, future benefit streams are weighted lower, such that the cumulative NPV initially represents the undiscounted cash flow profile for both projects, then begins to plateau as the discounted value of benefits approaches zero.

FIGURE 2: Cumulative NPV – Project A (illustrative only)

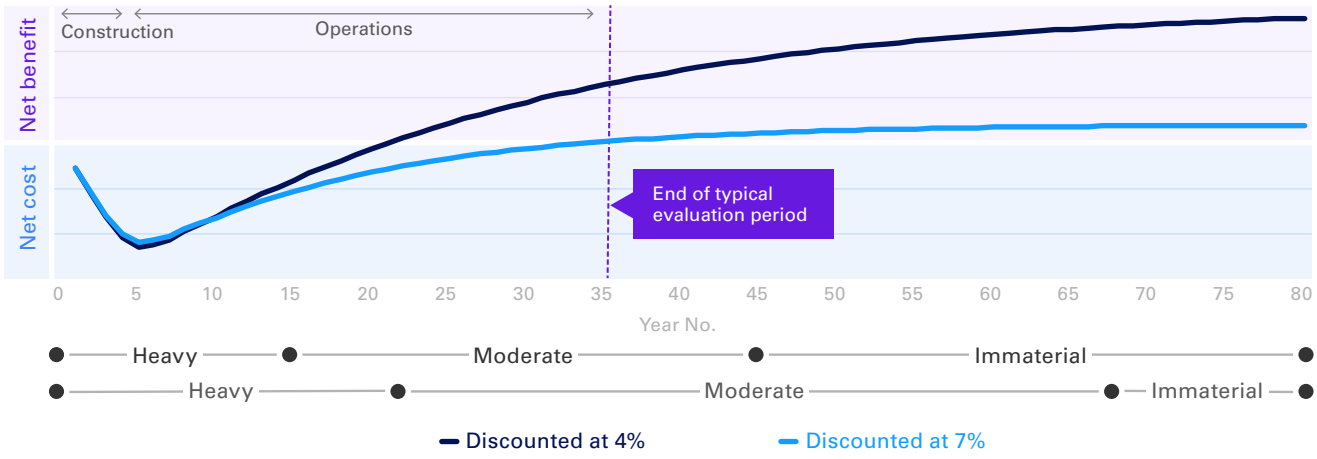
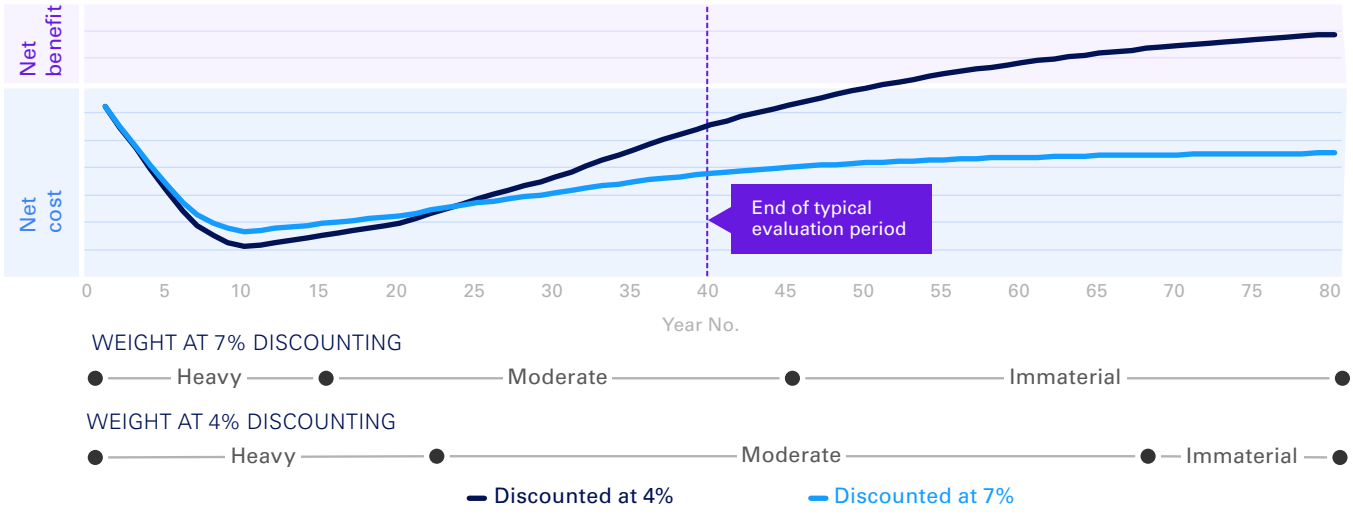


FIGURE 3: Cumulative NPV – Project B (illustrative only)



As the discount rate used to evaluate a project increases, the more immaterial later cash flows become to the NPV.

As seen in the case of Project A and Project B, applying higher discount rates to long-term projects leads to the discounted value of cash flows approaching zero before the appraisal period has finished – notwithstanding that the projects will continue to deliver benefits beyond the assumed evaluation period of 50 years. The effect is an underrepresentation of the long-term benefits (represented in Figures 2 and 3 by the distance between the two curves outside of the typical evaluation period).

MELBOURNE UNDERGROUND RAIL LOOP

Illustrating the impact of selecting the right discount rates

Melbourne's underground rail loop (or City Loop) was a city-shaping infrastructure project that has transformed the central city and laid the foundation for the vibrant central business district (CBD) now enjoyed by residents, workers and visitors. Together with significant underground rail investment, targeted land-use policies and initiatives such as 'Postcode 3000' (a policy that provided incentives to live in the CBD), the City Loop played a critical role in reshaping Melbourne's CBD into the economic and cultural heart that it is today.

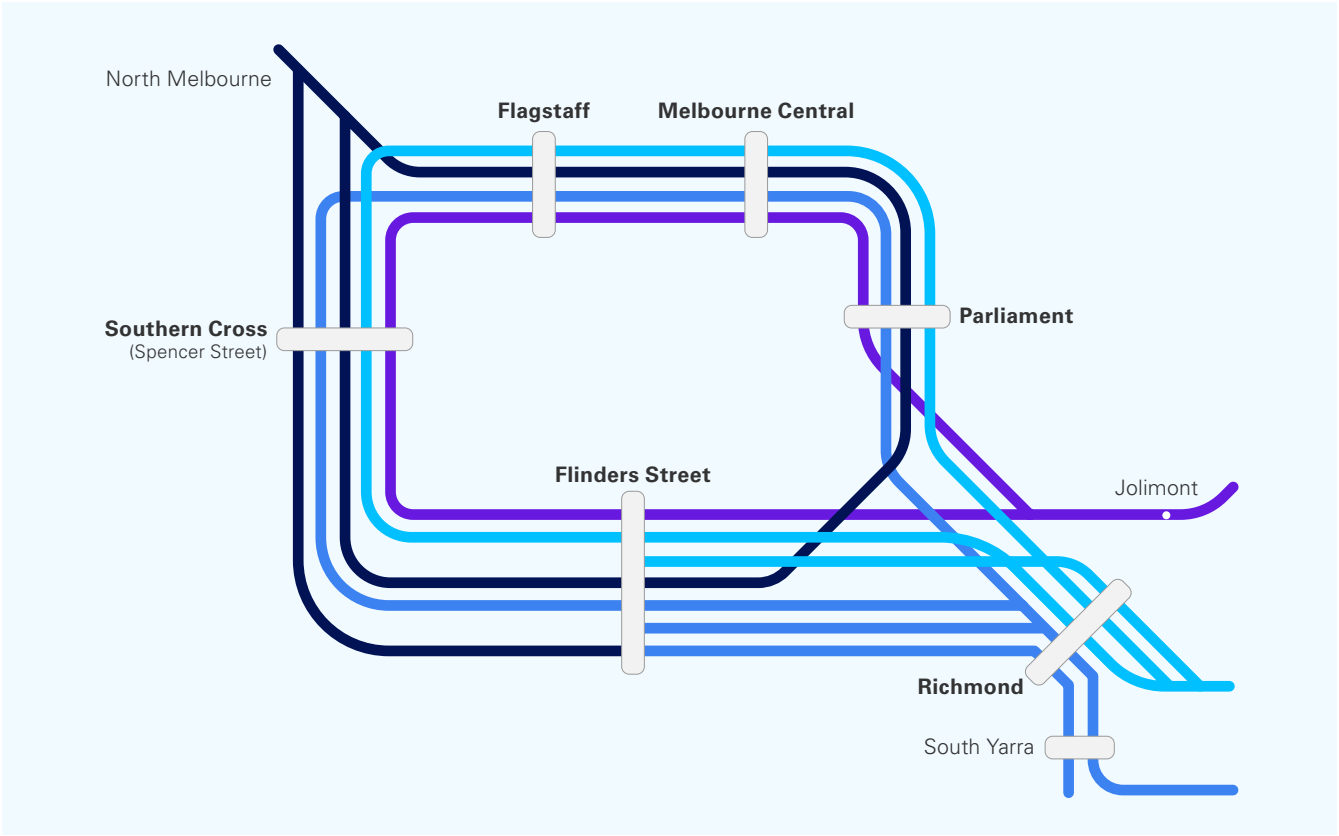
Analysis undertaken by KPMG shows that if we were to assess the City Loop in early 1970, before its ~15 year construction, using the same approach and the discount rate of seven per cent that we use today, to assess the economic benefits of major transport projects, the project would have delivered a Benefit to Cost Ratio (BCR) of around 0.6.

In contrast, using a four percent discount rate, the project would have yielded a BCR of around 1.0.

This suggests that the significant benefits that City Loop generates for Melbourne today, and is expected to continue generating for years to come, would not have been accurately represented when applying a seven per cent discount rate. Conversely, the City Loop is deemed to be an economically viable project when assessed with a discount rate that is a better representation of the multi-generational nature of the project.

> Without the City Loop, however, Melbourne would not have the dynamic and vibrant CBD that it is globally renowned for today.

FIGURE 4: Schematic of Melbourne Rail City Loop



THE BENEFITS OF FIT-FOR-PURPOSE DISCOUNT RATES

Infrastructure investment decision-making criteria should ensure that public funds are directed towards projects and initiatives that deliver the best outcomes for our communities – both now and into the future. Not only can strategic and transformative infrastructure projects help deliver benefits in the near term, they can help us better position for the long term by helping address long-term structural problems and/ or enable long-term productivity benefits.

Discount rates are a critical input into the economic appraisals that inform the investment decision-making process. The selection of a discount rate should reflect the expected timing of project impacts, ensuring all appraisals provide a transparent and balanced assessment of the full suite of both near-term and long-lived impacts.

A fit-for-purpose discount rate provides the opportunity to deliver:

- A more transparent prioritisation of projects that better reflect the desired objectives of the initiatives being assessed – i.e. the prioritisation of projects that help solve the longer term, underlying problems and not just those that provide immediate benefits.
- Proactive investment that is directed towards initiatives that plan and invest ahead of the curve, mitigating the risk of costly investments when the need has become overwhelming.
- Reprioritisation of project scoping away from reducing upfront costs and towards delivering solutions optimised for society – for example, investing in infrastructure and technology that allows for productivity and efficiency gains in operations and maintenance for the longer term.

Applying a discount rate that places a greater emphasis on the benefits to future generations for long-term, transformative and multi-generational projects will not only incentivise proactive long-term planning but is an appropriate approach to robust investment decision making for major infrastructure investments.

Fit-for-purpose application of discount rates to better reflect the nature of projects being assessed will provide better outcomes for our communities and will encourage investment decision making that appropriately values planning for the benefit of all.

FREQUENTLY ASKED QUESTIONS AND COMMON MISCONCEPTIONS

"Keeping the discount rate at seven per cent means that only the best projects get up..."

when we keep the discount rate at seven per cent, as shown in this paper, it skews decisions towards projects that generate higher returns sooner at lower costs (e.g. where the need for the project is overwhelming, rather than investing ahead of the curve). In practice, keeping the discount rate at seven per cent (under current economic conditions) means that multi-generational projects are likely to be foregone in favour of projects that deliver a short-term benefit / 'sugar hit' and may not address the underlying problems.

"In a fiscally constrained environment with competing government priorities, keeping the discount rate at seven per cent helps us as a budgeting tool..."

CBA is not intended to be used as a budget setting tool, but rather to inform decision makers on the merits of a proposed intervention to a potential market failure. The outcomes of a CBA inform us as to whether or not the intervention is desirable under the assumptions of the assessment. The question of allocating the fiscal budget to these types of projects is a subsequent policy decision which considers a significantly broader range of factors and competing uses.

"Maintaining a higher discount rate can be used to deal with inherent optimism bias in the economic appraisal..."

the treatment of optimism bias should be undertaken as part of the economic appraisal through the adoption of expected values of costs and benefits using robust and transparent methods based on informed risk assessments and assigned probabilities. Relying on the discount rate to account for optimism bias will distort the flow of benefits and costs which may not be reflective of the potential impact of the underlying risks. This is acknowledged by the Productivity Commission, which notes that ad-hoc approaches such as using a higher discount rate to counter optimism bias is likely to perform poorly[11].

ENDNOTES

1 Department of Infrastructure and Regional Development as cited in The Senate, Select Committee into the Scrutiny of Government Budget Measures (2016). Second Interim Report, Chapter 2. Available at https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Scrutiny_of_Government_Budget_Measures/Budget_Measures/Second%20Interim%20Report/c02. Accessed 25 September 2020

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11 Productivity Commission, 2014, Public Infrastructure Inquiry, p102

Contact us

Praveen Thakur
Lead Partner – Planning & Infrastructure Economics
Infrastructure, Assets & Places
KPMG Australia
E: thakurp@kpmg.com.au

John Sams
Lead Partner – Commercial Advisory & Transactions
Infrastructure, Assets & Places
KPMG Australia
E: jsams1@kpmg.com.au

Matthew Hall
Manager – Planning & Infrastructure Economics
Infrastructure, Assets & Places
KPMG Australia
E: mghall@kpmg.com.au

KPMG.com.au

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