

Insight

Economics like there's no tomorrow

Future generations matter, right? Well you may be surprised...

Do you get the sense that New Zealand doesn't invest in the major public infrastructure facilities like we used to? Previous generations built entire networks for rail, road, water and energy. Only Muldoon's Think Big projects and the current 'Roads of National Significance' might compare.

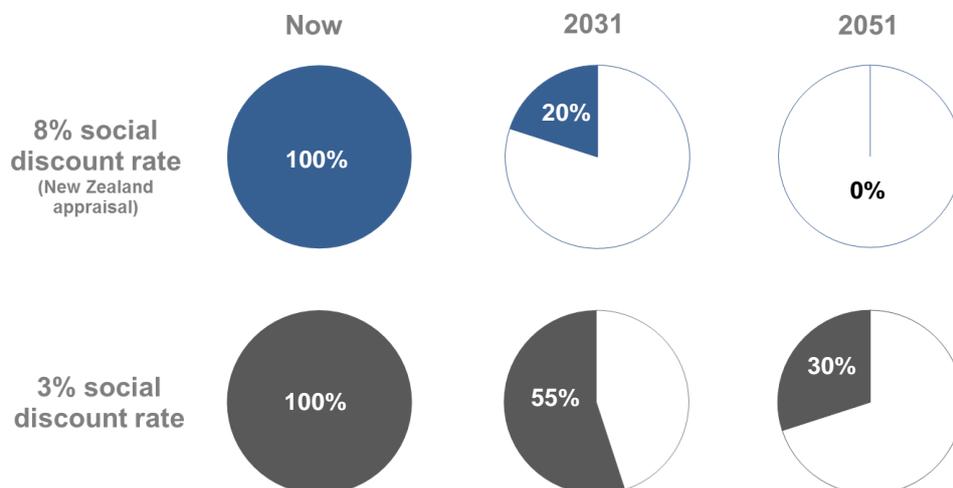
Major infrastructure investment decisions come down to how much we care about our future, and the future of our children and grandchildren.

The government's social discount rate policy captures in a single number how much decision makers care about the future relative to today. The default public sector stance is to use an 8% real (i.e. net of inflation) discount rate. This amounts to not worrying too much about the costs or benefits of a project after ten to 15 years.

But is 8% right? What if something in the range of 3%–3.5% (real) is more appropriate for infrastructure projects, as is used in some other countries? As Figure 1 shows, if we used 3% then we would count a dollar of cost or benefit in 20 years as being 55 cents today. But at 8% that same dollar would be worth less than half – equivalent to only 20 cents today. Impacts that occur after 30 years usually count for nothing. That seems odd, as we still benefit from large public infrastructure built in the distant past.

What might seem an esoteric issue really matters for large public infrastructure projects with long-term benefits but short-term costs.

Figure 1 The present value of a future dollar under different discount rates



Source: NZIER, Auckland Council

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What is the social discount rate?

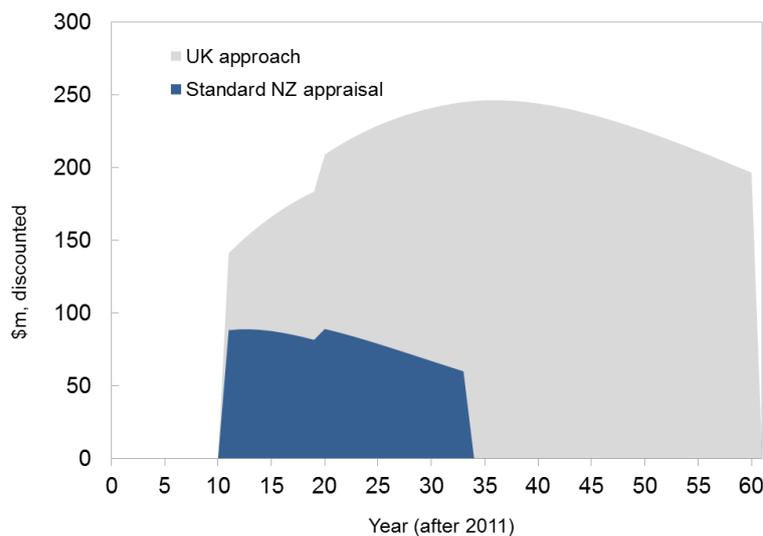
The social discount rate represents how much larger a benefit next year must be over a cost now to make society better off. The higher it is, the more it suggests that we collectively prefer living like there is no tomorrow.

For nearly 40 years prior to 2008 we used a 10% real social discount rate. The United Kingdom, Germany, France and parts of the United States now use about 3%-4%.

Figure 2 demonstrates how much this matters for infrastructure projects. It shows how the United Kingdom would appraise the Auckland City Rail Link, with the only difference being the social discount rate and the appraisal period. Under the United Kingdom's approach direct benefits are about five times larger.

The result is that, for the same cost, the City Rail Link is far more likely to be funded under the United Kingdom's discount rate than if New Zealand's rate were applied.

Figure 2 Auckland City Rail Link benefits under alternative social discount rates



Source: Auckland Council (2011) *Funding and prioritising significant infrastructure – the impact of the social discount rate upon decision making*. Report to October 2011 Economic Forum.

So, how do we determine the social discount rate?

The first approach: the social rate of time preference

The rate of growth in the consumption of goods and services to make society indifferent between one period and the next is called the ‘social rate of time preference’.

We can work out what this rate is by looking at the markets for savings and borrowing. The literature generally recommends using the after tax return on long-term government bonds. The long-term historical average is about 1%-1.5%.

Many economists think market-based values are inappropriate,¹ and that the discount rate should be derived from a theoretical basis² This usually leads to higher discount rates than 1%–1.5%.

Applying similar logic to the literature that supports the United Kingdom’s approach leads to the New Zealand social rate of time preference at about 3%–3.5%.³ NZIER’s initial survey of elected Auckland officials also indicated something in this order is appropriate.⁴

Costs and benefits are usually expressed in units of consumption, which seems to make the social rate of time preference the natural basis for the social discount rate. So why 8%?

The second approach: the social opportunity cost rate

There is a complication. In a simplified world, without tax, uncertainty or risk, the social returns on private investment would equal the social rate of time preference. But in the real world, the average returns from stock market investments are considerably higher than the risk-free return. Policy makers have estimated the social opportunity cost rate based on the returns from the New Zealand sharemarket (inclusive of tax) to be about 8% real.

So is 8% the right rate to use after all?

¹ E.g. access is restricted to these markets, and people’s actual savings and borrowing behaviour is quirky.

² Typically used is the ‘Ramsey equation’ $L + \delta + \eta g$, where L is the risk of catastrophe (discounting because there may be no tomorrow); δ is pure time preference (discounting for the sake of it); η is the elasticity of marginal utility of consumption (discounting because there is a lower marginal utility from more plentiful consumption in future); and g is annual growth rate of per capita consumption. The UK Treasury reviewed the components in detail and use values of $\delta + L = 1.5\%$ (presumably $\delta = 0.5\%$ and $L = 1\%$), $\eta = 1$ and $g = 2\%$ to result in a 3.5% social discount rate (*The Green Book* available at www.hm-treasury.gov.uk)

³ Based on $\delta = 0.5\%$; L between 0.5%–1%; η between 1.25–1.5 and $g = 1.5\%$ — refer to Parker, C (2009) *The implications of discount rate reductions and transport investment and sustainable transport futures*. NZ Transport Agency Research Report 392.

⁴ We asked Auckland Councillors a series of questions as to what they thought most appropriately reflects society’s overall preferences over projects that provide larger benefits in the medium/long-term versus smaller benefits sooner.

New Zealand public sector uses a social discount rate based on the social opportunity cost

For such an important policy, which has a major effect on the relative priority between long-term and shorter-term projects, there is surprisingly little public discussion or documentation to substantiate the default 8% rate used in public policy. There is the 40-year old Treasury Circular 1971/13 when the 10% was set, which is not readily accessible, and the short Treasury (2008) document that explains the revision to 8%.⁵

The policy seems to be made on the basis that if 8% is good enough for the private sector, then it is good enough for the public sector. Using a social discount rate less than 8% makes society worse off by investing in less profitable public projects than taxpayers would themselves.

The social rate of time preference does not capture all effects

The two approaches above relate to two crucially important issues: how society values time ('intertemporal preference') and wider investment opportunity costs. They are compatible issues.

The social rate of time preference seeks to represent society's preferences for *overall* costs and benefits over time. But there's a whole class of costs and benefits we call 'wider economic investment effects' that are missing from conventional appraisals. Society misses out on future benefits when a project causes less private investment to occur.

For instance, consider an infrastructure project that costs \$1 billion to build. If that money is raised by people consuming \$1 billion less goods and services in that year, then the *overall* cost is simply \$1 billion. But if the money is raised by firms investing \$1 billion less in plant, equipment and staff, then there could be \$80 million annually forgone (the 8% return, say, these firms would otherwise have expected to get on that \$1 billion).

These wider investment opportunity costs need to be added in (before discounting at the social rate of time preference). Doing so increases the cost of the project, which raises the investment hurdle.

⁵ Treasury, NZ (2008) *Public sector discount rates for cost benefit analysis*. Accessed 10 November 2011. www.treasury.govt.nz/publications/guidance/planning/costbenefitanalysis/disconrates

Capturing wider economic investment effects

NZIER indicated in a recent report for the Auckland Council⁶ that including these wider costs and then discounting by the social rate of time preference is the same as applying a mark-up factor in the order of 40%–80% to present value costs (using the formula advised in a leading textbook⁷). This mark-up, called the ‘shadow price of capital’, would apply to the proportion of direct costs that displace private investment. It would also apply to any benefits being reinvested by the private sector to grow the economy.

Does the current policy broadly get it right?

The Treasury (2008) document acknowledged that a ‘shadow price’ approach is an alternative to using the social opportunity cost rate, but argued that it can be ignored because:

The practical effect of doing so is arguably not that different from taking the social opportunity cost of capital approach, at least where cashflow profiles are similar. (p2)

If this is right, then it would seem to not matter whether we use an 8% social discount rate or use the social rate of time preference jointly with the shadow price of capital.

Parker (2009) found that the Benefit Cost Ratios (BCRs) for some motorway projects nearly quadrupled from about 5 to 19 when the discount rate was lowered from 8% to 3%. The large increase happens because large public infrastructure projects tend to have growing net benefits in the medium to long-term. Does applying a shadow price as discussed bring those BCRs back down to about 5?

In practice only a portion of the costs would displace private investment, depending on whether the project is resourced by borrowing, tax, or cutting other spending. But even if we marked up all of the costs by our upper limit of 80% the BCRs still remain over 10, not the 5 we found in our motorway examples when using the 8% discount rate.

This means the social opportunity cost rate approach currently used and the theoretically preferred combination of the social rate of time preference and shadow pricing would make a massive difference to the relative priority of long-lived projects and policies, compared to those with a shorter horizon.

⁶ NZIER’s report to the Auckland Council is publicly available and can be found in the October 2011 Agenda of the Auckland Council’s Economic Forum.
www.aucklandcouncil.govt.nz/EN/AboutCouncil/meetings_agendas/committees/Pages/economicdevelopmentforum.aspx

⁷ Boardman, A, D. Greenberg, A. Vining and D. Weimer (2006) *Cost-benefit analysis: concepts and practice*. L. Jewell (Ed). New Jersey: Prentice-Hall. 560pp.

But what about risk?

One may argue that the current 8% social discount rate also seeks to account for public projects' risk and uncertainty, which is different from 'benefits forgone'. It is difficult to tell from the Treasury (2008) document if this is a driver of the current policy.

Debate remains on whether the social discount rate should be materially higher because of 'risk'. The welfare economics literature often argues that including risk relating to the project in the discount rate would make appraisals short-sighted in ways that do not relate to risk. Like wider investment effects, it is better for risk to feature in the annual costs and benefits directly where possible.

Where to from here?

The social discount rate is a factor in deciding what the government spends taxpayers' money on. A change in the discount rate policy would have implications for any areas where long term impacts matter, such as transport, education, energy, health, and the environment.

Other advanced economies we compare ourselves to, such as the United Kingdom, Germany, France and parts of the United States apply the social rate of time preference, which in the New Zealand context would suggest a value of between 3%–3.5%. This rate can be improved by applying a mark-up to discounted costs and benefits wherever wider economic investment effects matter.

Momentum for change is brewing. The Auckland Council's Economic Forum recently agreed that this is the direction that government policy needs to go in.

This is not a trivial choice and we need open debate and research on the appropriate social discount rate for public programmes.

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