

## Appendix 2 – Discounting

< previous (<https://www.pharmac.govt.nz/medicines/how-medicines-are-funded/economic-analysis/pfpa/appendix-1-pharmac-guidelines-for-reviewing-cuas/>) | next > (<https://www.pharmac.govt.nz/medicines/how-medicines-are-funded/economic-analysis/pfpa/references/>)

### Discounting Costs and Benefits at the Same Rate

PHARMAC recommends that both costs and benefits be discounted at the same rate, for the following reasons:

- Health and money can be exchanged at the margin at a rate that remains constant over time. If different rates are used for costs and benefits, inconsistencies may appear over time in the relativity of money and health.
- If benefits are discounted at a lower rate than costs, future programmes always look better (high benefit, low cost) than current programmes, and the cost-effectiveness ratio will always improve on delay (as the cost numerator decreases more quickly than the benefit denominator).
- Individuals can only be treated equally over time if the same discount rate is used for benefits and costs. If health benefits are not discounted, benefits for future patients would be considered better.
- If a lower rate was used for benefits compared with costs, a treatment with high annual payments but minimal benefits per year would appear highly cost-effective because costs are discounted more broadly than future benefits.

### Approaches to Determining the Discount Rate

#### Discount Rate used in Other Countries

Some argue that the discount rate used in New Zealand should be more consistent with that used in other countries. However, there are several reasons why this argument does not hold.

- New Zealand's economic performance is not identical to other economies. Hence the use of an international discount rate may not reflect societal or individual preferences in New Zealand.
- Economic analyses cannot be directly transferred and compared between countries.
- The risk-free bond rate and resources available in New Zealand are not identical to those in other countries.

#### Social Rate of Time Preference

The social rate of time preference is the rate at which society is willing to exchange present for future consumption.

It is frequently argued that the after-tax interest rate of a risk-free investment (eg long-term government bonds) represents an individual investor's willingness to forgo present consumption for the future, and that this rate reflects the individual's rate of time preference. Then if society's collective rate of time preference is an aggregate of individual rates, the required rate is given by the rate of return on long-term government bonds.

#### Social Opportunity Cost Rate

The social opportunity cost rate of discount is the real rate of return forgone in the private sector (ie the cost in financial market terms if government projects were undertaken in the private sector). The basic notion behind this is that public investments can displace or crowd out private investments or consumption. This can be estimated using a number of different models which aim to work out what the market would expect to receive for a particular project. However, it is likely that the discount rate in the public sector is lower than that in the private sector. (If it was not, there would be no need for government provision of health care, and private health insurance markets would be more dominant.)

#### Weighted Average Social Discount Rates

The social discount rate is a weighted average of the social rate of time preference and social opportunity cost rate, hence reflecting both the loss in private investment and the costs of forgone consumption. This is based on the risk-free rate of capital, a market risk premium, and an adjustment for risk.

## Shadow Price of Capital

The shadow price of capital seeks to establish the loss to society that occurs when a dollar that would otherwise have gone to private investment is displaced. This is based on the principle that the ultimate purpose of investment is consumption; hence, if money is not spent on new pharmaceuticals, the funds would remain in the economy for private consumption or investment.

Funds that would otherwise have been used for consumption are discounted at the consumption (or market) rate of interest – the rate at which individuals are willing to exchange present for future consumption. As consumer preferences should dictate government policy, the consumption (or market) rate should equal the social rate of time preference (68 (PFPA%202.2%20z%20compiled%20chapters%20and%20Appendices.docx#\_ENREF\_68), 69 (PFPA%202.2%20z%20compiled%20chapters%20and%20Appendices.docx#\_ENREF\_69)).

## 'Bottom-Up' Approach

In the 'bottom-up' approach, it is assumed that government spending should finance projects with the highest rate of return first and then in order of return rankings. Therefore, the opportunity cost is the rate of return of the last project funded (ie rate of return of the marginal project). Problems with this approach relate to the problems with Internal Rate of Return (IRR) calculations, and the level at which government spending is scrutinised.

## Formula to adjust nominal discount rate for inflation

$$\text{Real cost of capital} = [(1 + \text{nominal rate}) / (1 + \text{inflation})] - 1$$

This can be approximated as the nominal rate minus inflation.

[< previous](https://www.pharmac.govt.nz/medicines/how-medicines-are-funded/economic-analysis/pfpa/appendix-1-pharmac-guidelines-for-reviewing-cuas/) (https://www.pharmac.govt.nz/medicines/how-medicines-are-funded/economic-analysis/pfpa/appendix-1-pharmac-guidelines-for-reviewing-cuas/) | [next >](https://www.pharmac.govt.nz/medicines/how-medicines-are-funded/economic-analysis/pfpa/references/) (https://www.pharmac.govt.nz/medicines/how-medicines-are-funded/economic-analysis/pfpa/references/)

Last updated: 10 August 2017

---