2 Approaches to discounting

While everyone agrees that the choice of discount rate is a crucial determinant of the value of public projects, there is less agreement on the appropriate discount rate to use to calculate present value. Academics, cost-benefit guides and textbooks give widely conflicting advice.

2.1 Different views on the social discount rate in practice

International practice is summarised in table 2.1 (countries are ranked by the discount rate), with recommended rates varying from 1 to 15 per cent.

The table shows that the highest rates are used in developing countries.[1]

Low discount rates are often used in environmental applications, especially when benefits accrue in the distant future. The United States Environmental Protection Agency recommends a discount rate of 2-3 per cent, 'the consumption rate of interest', and also using 7 per cent.[2] It recommends no discounting for inter-generational projects, and sensitivity testing with 2-3 per cent and 7 per cent.[3]

---

[1] Views that there is a higher opportunity cost in developing countries are not reflected in the realised returns to capital. Recent evidence suggests that the marginal rate of return to capital in developing countries is no higher than in developed countries, Caselli and Feyrer (2007, p. 555). The preferred estimates average 8.4 per cent real in rich countries and 6.9 per cent in poor. These are gross rates of return for 1996. They do not include any capital gains from holding capital.

[2] United States Environmental Protection Agency (2000, p. 48).

[3] United States Environmental Protection Agency (2000, p. 52).

Table 2.1 **Current real discount rates in practice**
International

Country	*Agency*	*Discount rate (per cent)*
Philippines		15[a]
India		12[a]
Pakistan		12[a]
International Multi-lateral Development Banks	World Bank	10–12[a]
	Asia Development Bank	10–12[a]
	Inter-American Development Bank	12[a]
	European Bank for Reconstruction and Development	10[a]
	African Development Bank	10–12[a]
New Zealand	Treasury and Finance Ministry	8[g]. From 1982 to 2008 it was 10[abf]
Canada	Treasury Board	8[c]. From 1976-2007 was 10 (and test 8–12 per cent)[ab]
China (People's Republic)		8[a]
South Africa		8 (and test 3 and 12 per cent)[d]
United States	Office of Management and Budget	7 (and test 3 per cent). Used 10 per cent until 1992.[a]
European Union	European Commission	5 From 2001–2006 was 6 per cent[a]
Italy	Central Guidance to Regional Authorities	5[a]
The Netherlands	Ministry of Finance	4 (risk free rate).e
France	Commissariat General du Plan	4. From 1985-2005 used 8 per cent[ab]
United Kingdom	HM Treasury	3.5 (declining to 1 per cent for costs and benefits received more than 300 years in the future) from 2003.[a] From 1969–78 used 10 per cent[a]
Norway		3.5. From 1978–98 used 7 per cent[ab]
Germany	Federal Finance Ministry	3. From 1999–2004 used 4 per cent[ab]
United States	Environmental Protection Agency	2–3 (and test 7 per cent)[a]

[a] Zhuang et al. (2007, table 4, pp. 17-18, 20). [b] Spackman (2006, table A.1, p. 31). [c] Treasury Board of Canada (2007, p. 37, 1998, p. 45). [d] South African Department of Environmental Affairs and Tourism (2004, p. 8). [e] van Ewijk and Tang (2003, p. 1). [f] Use of the 10 per cent rate by New Zealand government departments is confirmed by Young (2002, p. 12); Abusah and de Bruyn (2007, p. 4). [g] New Zealand Treasury (2008) recommends a default rate of 8 per cent (after adjusting the market risk premium of 7 per cent for gearing).

Some, following suggestions in the academic literature, use a lower rate to discount costs and benefits that accrue decades in the future. For example, the UK Treasury uses 3.5 per cent real, which it identifies as the ‘social time preference rate’. The rate slowly declines to 1 per cent for costs and benefits accruing more than 300 years in the future.[4] The Stern Report used 1.4 per cent real to discount the benefits from greenhouse gas emission abatement policies.[5] The Garnaut Report used 1.35 per cent and 2.65 per cent.[6] Both would be at the bottom of the range in table 2.1.

Not that academics agree on the appropriate discount rate, with numerous symposiums of papers from leading economists demonstrating their conflicting views.[7] There is academic support for the investment (or producer) rate i (the before-tax rate of return), the consumption (or consumer) rate r (the after-tax rate of return) and for a weighted average of the two, $w = ai + (1 - a)r$.[8] Others oppose the use of the weighted average.[9] Some conclude that the appropriate discount rate need not even lie in the range between r and i.[10]

Academics also disagree on whether to include a risk premium.[11] Some reject adding a risk premium, but recommend converting expected values into certainty

---

4 HM Treasury (2003, pp. 98-100).

5 Cole (2007, p. 10) and Weitzman (2007, p. 708). It is difficult to find an explicit statement of the discount rate used in the Stern report itself or in the Technical Annex which sensitivity tests the discount rate.

6 Garnaut (2008, p. 19).

7 For example, the Intergenerational Equity and Discounting Symposium, *University of Chicago Law Review* (2007, vol. 74, Winter); Lind (1982) and Portney and Weyant (1999a).

8 Those recommending the investment rate include Kaplow (2006b) and Stiglitz (1982). The consumption rate (usually the after-tax return to savers) is recommended by Arrow et al. (1996) and Feldstein (1972). Harberger (1969); Sandmo and Dreze (1971) and Sjaastad and Wisecarver (1977) recommend a weighted average of the consumption and investment rates.

9 Feldstein (1972); Bureau of Transport and Regional Economics (1999); Abelson (2000, pp. 129) and United States Environmental Protection Agency (2000, pp. 41–2).

10 See Stiglitz (1982) and Bradford (1975).

11 For example, Arrow (1966); Spackman (2004); Viscusi (2007) and Grant and Quiggin (2003) reject using a market risk premium.. Those who argue for a market risk premium to be part of the discount rate include Sandmo (1972); Jensen and Bailey (1972); Lind (1982a); Hirshliefer (1964); Klein (1997); Hathaway (1997); Bazelon and Smetters (1999); Currie (2000); van Ewijk and Tang (2003); Grout (2003); Kaplow (2006b); Brealey et al. (1997); Nordhaus (2007); Dixit and Williamson (1989) and Wright et al. (2003).

equivalents.[12] Some guides explicitly reject adding a risk premium,[13] some implicitly reject it by recommending the government bond rate, usually considered to be the risk free rate. Others explicitly recommend a risk premium,[14] or implicitly by recommending a private sector rate that includes a risk premium over the risk free rate.

Weitzman (2001) surveyed professional Ph.D. level economists about their 'professionally considered gut feeling' for the discount rate that should be used to evaluate the costs and benefits (measured in real dollars) of mitigating climate change. He received 2 160 responses, with a sample mean at around 4 per cent per year, a standard deviation of around 3 per cent, a median of 3 per cent and a mode of 2 per cent. The suggested rates varied from -3 per cent to 27 per cent.

Textbooks also vary in their recommended rates. For example, Perkins (1994) suggests 7 to 13 per cent real. Boardman et al. (2006) recommend 3.5 per cent, with a lower rate for benefits more than 50 years in the future.[15]

The difference reflects a trend towards using lower discount rates. Many agencies have reduced the discount rate they use (as set out in table 1.2). The UK Treasury recommended 10 per cent real from 1969-78. The German Federal Finance Ministry uses 3 per cent real, down from 4 per cent in 1999. Since 1998 Norwegian authorities use 3.5 per cent, down from 7 per cent real (used from 1978). The French Commissariat General du Plan uses 4 per cent real, changed in 2005 from 8 per cent. The US Office of Budget Management specified 10 per cent real until 1992, but now uses 7 per cent real (with sensitivity testing for 3 per cent).[16] From 1974 the Canadian Treasury recommended 10 per cent, but reduced it to 8 per cent in 2007.[17] From 1982 the New Zealand Treasury recommended 10 per cent, reduced to 8 per cent in 2008. And these are only the agencies known to have reduced their rates.

---

12 Boardman et al. (2006, p. 238; footnote 3, p. 271); Bureau of Transport and Regional Economics (2005) and Abelson (2000, pp. 130–31). Certainty equivalents are defined in chapter 4, box 4.1.

13 Bureau of Transport and Regional Economics (2005, 1999, p. 74, 78) and the Victorian Competition and Efficiency Commission (2007).

14 Partnerships Victoria (2003); Department of Finance (1991) and Infrastructure Australia (2008a).

15 Perkins (1994, p. 310) and Boardman et al. (2006, p. 270). Throughout the chapter on the social discount rate, Boardman et al 'assume benefits and costs are measured in terms of certainty equivalents' (p. 238).

16 Spackman (2000, table A.1).

17 Treasury Board of Canada (2007, p. 37).

In Australia, some agencies (including the Commonwealth's Office of Best Practice Regulation) recommend rates around 7 per cent real, usually justified as being approximately the before-tax rate of return on private investment (the investment or producer rate). For example, the NSW Treasury recommends using a real rate of 7 per cent (with sensitivity tests using 4 and 10 per cent).[18] The Australian Department of Finance used to recommend 8 per cent real, and still supports using the before-tax rate of return on investment, but does not prescribe a specific rate because it may vary over time and between proposals.[19] Likewise, the Queensland Treasury used to recommend 6 per cent,[20] but now requests that it be consulted over the appropriate rate (mainly to determine the appropriate risk premium).[21] The Office of Best Practice Regulation uses 7 per cent real (with sensitivity testing at 3 and 11 per cent).[22] Infrastructure Australia recommends cost-benefit studies submitted to it should use 'real risk free' discount rates of 4, 7 and 10 per cent.[23] The Commonwealth Department of Health and Aging and enHealth Council recommends evaluating environmental health policies with a discount rate of 5 per cent, with sensitivity tests ranging from 3 to 7 per cent.[24]

Another group tends to choose around 3 to 3.5 per cent, usually based on the before-tax rate of return on government bonds. The justifications given vary; the rate is said to represent the social rate of time preference, the consumers' rate of time preference (the consumption rate of interest), the risk free rate, or the government's cost of funds. For example, the Victorian Competition and Efficiency Commission recommends 3.5 per cent, 'a recent average of the ten year Commonwealth bond rate to determine the risk free opportunity cost of capital'.[25] The Victorian Department of Treasury and Finance endorses 3.5 per cent (although it adds a risk premium based on a market risk premium of 6 per cent when assessing private sector bids for public-private partnerships).[26] The South Australian Treasury also uses the long-term government bond rate as a risk free rate, which it estimates to be

[18] New South Wales Treasury (1997, p. 52).

[19] Department of Finance and Administration (2006, p. 66-68).

[20] Department of Health and Ageing and enHealth Council (2003, p. 21).

[21] Queensland Treasury (2006, p. 27).

[22] Australian Government (2007, p.120).

[23] Infrastructure Australia (2008b) p.14. Infrastructure Australia (2008a, p. 5, 36) recommends the risk free rate should be based upon a long-term government debt instrument (issued by the relevant government) and then the CAPM model be used to price risk, using a market risk premium of 6 per cent to value the market risk transferred to the private sector.

[24] Department of Health and Ageing and enHealth Council (2003, p. 2).

[25] Victorian Competition and Efficiency Commission (2007, p. 2).

[26] See Victorian Department of Treasury and Finance (2007, p. 5-16) and Partnerships Victoria (2003, p. 8).

5 per cent real.[27] The Tasmanian Treasury recommends the long-term Commonwealth bond rate plus 1 per cent as 'the long term cost of funds to the Government'.[28]

One overview of the literature concludes that 'those looking for guidance on the choice of a discount rate could find justification for a rate at or near zero, as high as 20% and any and all values in between.'[29]

Clearly there is no professional consensus on what discount rate should be used. The appropriate response to the uncertainty about the appropriate discount rate is to conduct sensitivity analysis with it. For example, this paper advocates calculating the net present value of the project with varying discount rates, say 3, 8 and 10 per cent real.

It may be that the project is so bad (or good) that varying the discount rate does not affect evaluation outcomes. For example, if the project results in a stream of net costs each period, it will have a negative net present value at any discount rate.

When a project gives rise to a string of negative and positive net benefits over time, the issue is whether the it is worth bearing the negative flows (costs) in order to reap the positive flows (benefits) at other time periods.

If the sensitivity analysis reveals that the choice of discount rate is important (changes the sign of the project's net present value or its ranking against alternative projects), then more consideration should be given to the choice of an appropriate rate. The purpose of this paper is to provide guidance on how to choose the rate.

Careful consideration of observed data and of the theoretical literature can help set the appropriate discount rate, clarify what judgements or circumstances might warrant selection of higher or lower discount rates and narrow the range of disagreement. The first step is to recognise that cost-benefit analysis uses the yardstick of efficiency.

2.2 Cost-benefit analysis and the efficiency criterion

Cost-benefit analysis focuses on the efficiency effects of a change: the net dollar value of the gains and losses for all people the change affects. It is based on willingness to pay: how many dollars individuals would, if necessary, pay to obtain

27 South Australian Department of Treasury and Finance (2007, p. 57).

28 Department of Treasury and Finance Tasmania (1996, p. 16).

29 Portney and Weyant (1999, p. 4).

(or avoid) a change, measures how much it is worth to them. The amount could be positive or negative, depending on whether the change makes them better or worse off. Summing these amounts across all affected people gives the community's total willingness to pay for the change. If the sum is positive, the benefits exceed the costs and the change would increase efficiency.

In standard efficiency-based cost-benefit analysis, the costs and benefits to all people are added without regard to the individuals to whom they accrue: a one dollar gain to one person cancels a one dollar loss to another person. This 'dollar is a dollar' assumption separates resource allocation from distribution effects — or efficiency from equity effects. That does not mean distributional considerations are unimportant or should be neglected. It means that they should be brought into account as a separate part of the overall analysis of the policy proposal in question — which may be more important than the resource allocation assessment, but should be distinct from it. This separation of efficiency and equity is useful because, in practice, a general consensus about the weight that should be attached to the welfare of different groups is elusive. By contrast, the efficiency or resource allocation effects of a policy has a clear meaning and can, in principle, be objectively measured. Dollar values can be estimated from observed behaviour.

While efficiency is an important goal of public policy and should be given due weight, it is only one consideration. Working out the efficiency effects is not to say that they should determine the whether the project should go ahead, but it is one factor that is worth knowing and should inform the decision. A policy could fail an efficiency test and a government might still judge it worth doing (for example, if it particularly valued the distribution of benefits and costs that it entailed, and thought that impact could be better delivered by the project than by other means such as the tax and transfer systems). Ultimately, it is up to governments, rather than technical analysts, to decide the trade-off between efficiency and other objectives, such as equity. Ideally, these other objectives should be made explicit. A cost-benefit analysis can help to inform the decision and clarify the trade-offs when comparing alternative policy proposals, such as how much income may need to be sacrificed to achieve other objectives.

The cost and benefit estimates should involve a comprehensive and systematic evaluation of all the impacts of a project, accounting for all the effects on all the people in society: not just the immediate or direct effects, not just financial effects, and not just the consequences for one group. All the effects of a policy proposal that are considered desirable by those affected are benefits, all undesirable effects are costs. Cost-benefit analysis requires analysts to identify explicitly the ways in which the proposal makes individuals better or worse off. The relevant costs and benefits are not limited to financial or pecuniary benefits, but are all social benefits including cultural, environmental and other non-market losses and gains. Sometimes non-monetary benefits are difficult to identify and evaluate, but they should not be ignored.

The impacts should be quantified for each time period over the life of the policy proposal. When does a flow of costs and benefits that accrue in different time periods increase efficiency?

2.3 Defining the social discount rate

The social discount rate extends the efficiency criterion to the case where costs and benefits occur over time. If the social discount rate is used to calculate the net present value of a project's social costs and benefits over time, a positive net present value indicates the project increases efficiency or raises wealth: it produces enough benefits to fully compensate individuals for the forgone benefits of the resources it displaces from alternative uses.

The present value of a stream of payments is called its capital value. When capital is traded in capital markets, the price paid for the rights to a stream of payments provides a market valuation of its net present value. Examples of capital markets include: the housing market (the value of the house is the present value of future housing services); the share market (the value of a company's shares is the present value of future dividends); and the bond market (the value of a bond is the present value of its stream of principal and interest payments). Much capital is not traded in any market, including the capital created by many government projects. Cost-benefit analysis tries to estimate the capital value of government projects. If the present value is positive, the project adds to wealth.

The efficiency-based approach to the social discount rate, which dates back at least to Harberger (1969), boils down to determining the opportunity cost of capital used in the project: what benefits to society would the funds have returned if left in the private sector. This 'opportunity cost' is the appropriate discount rate to determine a project's capital value.

But even focusing on an efficiency based social discount rate leaves plenty of room for disagreement. Complications include the effects of capital taxes, capital market imperfections and uncertainty. It turns out that the social discount rate depends on parameters that little is known about or that are difficult to estimate, and reasonable people can make different judgments about them. The theory is far ahead of our empirical knowledge. Recommendations about the social discount rate should be practical and account for our ignorance.

But the first line of disagreement is about what the social discount rate should be measuring. Some label the efficiency-based social discount rate derived from opportunity cost as the descriptive approach, and instead argue for a prescriptive approach,[30] especially when considering policies that affect future generations. One reason for the increasing use of lower discount rates is the explicit or implicit use of the prescriptive approach.[31]

The descriptive versus prescriptive debate has also been described as the positivists versus the ethicists.[32] Users of each approach apply the label 'social discount rate' and often it is not clear which has been adopted. Indeed, the Weitzman survey reported on page 12 did not specify which type of social discount rate those surveyed were to recommend.

2.4 The prescriptive approach

The prescriptive or normative approach directly specifies a discount rate that society 'should' use to discount future consumption flows, based on ethical principles (sometimes literally appealing to the ideas of philosophers). It mixes efficiency and equity considerations, and is often advocated when projects affect future generations.

Specifying the rate at which society is willing to trade present for future consumption is bound to be controversial. 'Society' is not a decision maker (not even the government controls the whole of society). Inevitably, the analyst imposes a specific discount rate (or the parameters that determine it). Yet economists have no particular expertise about how the future should count.

It is not surprising that there is little agreement about the appropriate prescriptive approach. What is ethical depends on value judgements and there is no way to reconcile the different value judgements that people may possess. Equity issues involve trading off the welfare of one group against another's (for example, the present generation's against future generations') and there is no general consensus about the weight that should be attached to the welfare of different groups. The prescriptive approach makes the discount rate a matter of opinion, and provides no basis for determining which opinion is correct.

---

[30] Terminology suggested by Arrow et al. (1995) and see Portney and Weyant (1999, p. 4).

[31] For example, the HM Treasury (2003); Stern (2007) and Garnaut (2008) explicitly adopt a prescriptive approach.

[32] See Weisbach and Sunstein (2008, p. 4).

The implications of the choice of discount rate for equity are not clear. The poor tend to have high discount rates, so using an average discount rate, especially a low one, could make them worse off. For example, if energy efficient appliances pay off at a low discount rate, a policy to force all consumers to use energy efficient appliances would make people with high discount rates worse off.[33] Adjusting the discount rate in project evaluation is not an effective way to achieve equity objectives.

Others criticise high discount rates as being bad for the environment.[34] But a low discount rate could make policies that damage the environment more attractive. Viscusi gives an example of where a higher discount rate made dams less attractive, deterring efforts to build them, which prevented environmental damage.[35]

2.5 Inter-generational issues

Discounting costs and benefits received in the far future involves valuing the effects of policies on future generations, raising ethical issues. For example, the current generation can adopt policies which harm future generations — not only a different group of people, but one that is not around to defend its interests.

Does the opportunity cost logic that underlies the descriptive approach apply to costs and benefits received in the distant future, decades or even centuries away, to be received mainly by people not alive yet? For example, would it be worth spending $100 million now to avert a catastrophe that would cause $50 billion of damage in 100 years? If the discount rate were 8 per cent it would not — the future damage has a present value of $23 million, less than the cost of averting it.[36] The rate of return on the expenditure is less than 8 per cent.

Some people call this the 'tyranny of discounting' and claim discounting is biased against long-term projects.[37] It is, but there is no artificial bias. It merely reflects the power of compounding the benefits of alternative current investments over long periods.

---

33 The Productivity Commission (2005) found this.

34 See for example Ackerman and Heinzerling (2002).

35 See Viscusi (2007, pp. 215-216).

36 To relate to table 1.1, $1000 in 100 years has a present value of $0.45 = $1000/1.08^{100}$ with a discount rate of 8 per cent. $50 billion, therefore, has a present value of $50*0.45 million or $23 million.

37 See, for example, Allsop (1995, p. 375) and Pearce et al. (2003, p. 123).

The logic of rejecting the catastrophe prevention is that if society received a rate of return of 8 per cent on money in the private sector, $100 million dollars would grow to $220 billion in 100 years, more than enough to compensate for the catastrophe.

Alternatively, the present generation could invest $23 million, which gives $50 billion in 100 years, enough to deal with the catastrophe and have $77 million left over for themselves.

> The conclusion, following this logic, is that it is not sensible to invest in any project unless it has a return at least equal to the return available elsewhere. … The long time period does not change the method of analysis; it only makes the issue more important. We should, therefore, discount projects at the otherwise available return — the market rate of return. Only projects that pass discounted cost-benefit analysis should be undertaken. Any other choice throws away resources, which is not good for future generations.[38]

The discount rate should reflect the yields on the alternative use of funds: the return on private investment or the marginal return on capital. A negative net present value with this discount rate means the project is inefficient — the loss to the present generation is greater than the gain to the future generation. It could mean that the future generation is worse off. There is an alternative policy that can make all generations better off.[39]

But for dollars invested today to make it through to 100 years time, the intervening generations must keep investing. The appropriate discount rate does depend on future generations' expected re-investment. The intervening generations could be more, equally or less altruistic to the future than the current generation — but assuming they would continue to care about their children in the same way the current generation does, appears reasonable. The historical evidence is that each generation has continued to invest and improve the next generation's standard of living.

An intervening generation could terminate or offset any investment project, including the catastrophe prevention. Unless there is a reason to believe that transfers to the future from one project are less easily misdirected than transfers from others, the chance that an intervening generation will break the chain of investment does not favour adopting low return projects.

---

38 Weisbach and Sunstein (2008, p. 14).

39 The future generation receive the benefits from the government project. They lose the benefits from the higher return private investment that the projects crowds out. It is likely the larger portion of capital used in projects comes at the expense of private investment. Further, future generations may bear the burden of any reduction in current consumption (see appendix B for details).

In fact not discounting, or using a very low discount rate, leads to a 'tyranny of the future generations'. Not discounting means a benefit to any future generation counts as much as the same benefit now — it is the same as adopting a zero discount rate. A dollar to someone one hundred years from now, or even a thousand years from now, counts as much as a dollar to someone today. That could require the current generation to impoverish itself. For example, a policy that costs $100 million now, but gives $1 million benefit to each future generation — would be undertaken with a zero discount rate because there are a potentially infinite number of future generations. Indeed, a zero discount rate implies that even a policy which costs $100 million now and gives just $1 to each future generation should be adopted. Without discounting, so long as investment has a positive rate of return, the current generation should reduce its consumption to invest for the benefit of future generations.

Further, using a low, or no, discount rate may harm future generations. First, if the current generation adopts low return projects at the expense of investments with higher returns, it can make future generations worse off. Second, if a low discount rate requires the current generation to sacrifice its welfare to make future generations better off, the same argument applies to each generation. Each generation becomes worse off in order to help generations still further in the future.[40]

2.6 Why the efficiency standard is relevant for inter-generational project evaluation

When a project affects the well–being of different generations in the present and future, standard efficiency–based cost-benefit analysis 1) converts future utility into dollars; 2) discounts them at the market return on capital to transform the future dollars into present dollars; and then 3) converts present utility into dollars to compare. Steps 1 and 3 involve standard cost–benefit principles and are within the same time period. Step 2 transforms dollars between time periods. That is, in standard cost-benefit analysis the appropriate discount rate for inter-generational applications is determined in exactly the same way as within a generation: '… a dollar invested, in whatever manner, over a period of time does not know or care whether it is an intra-generational dollar (part of someone's lifecycle savings) or an inter-generational dollar'.[41] The appropriate way to convert future dollars into

[40] Pearce et al. (2003, p. 125).

[41] Kaplow (2006b, p. 3).

current dollars is to discount with the market return on capital because it is the rate at which dollars today can be turned into dollars tomorrow.

In contrast, advocates of the prescriptive approach usually conclude that ethical obligations require discounting costs and benefits that accrue to future generations at a low rate, below the marginal return to capital. That has strong implications. It is implying that the current generation does not save and invest enough for the future and makes a case to reduce private- and public-sector consumption and to increase savings and investment instead. The appropriate response is to increase savings until the rate of return on private capital falls to the advocate's prescribed ethical discount rate. That would make many more potential public and private investments desirable than at a higher discount rate.

The response should not be to accept projects with low rates of return — the high return ones should be adopted first. When evaluating a project, the opportunity cost of invested funds is relevant. Are there better investments that could be made with the capital?

> The market rate of return measures the returns from currently available projects, so as an initial matter, the market rate is a measure of the opportunity costs of this choice. Once again, therefore, we should using discounting at the market rate to choose projects. Project choice and ethical obligations to the future are, to a large extent, separate.
>
> Seen this way, the ethicists' criticism of the positivists' opportunity cost argument is simply irrelevant. It does not matter whether the current market rates of interest are ethically correct because they still represent the opportunity costs of investment.[42]

Put differently, the prescriptive approach implies that the current generation is leaving too little to the future. Even if that is correct,

> it says nothing about the particular choice of projects or policies. If we are going to increase the amount we leave for the future, it is incumbent on us not to do so in a way that wastes resources. Therefore, even if the ethicists' argument is entirely correct, we still must carefully consider the opportunity costs of projects and pick those with the highest return.[43]

If too little is being done for the future, the answer is to increase overall savings and investment rates, not to use below market discount rates and invest in projects with low returns. If an analyst reduces the discount rate when evaluating one particular type of project, it may be adopted over alternative investments with a higher return, which wastes resources.

---

42 Weisbach and Sunstein (2008, p. 25).

43 Weisbach and Sunstein (2008, p. 26).

> Given any level of saving, the interest of future generations is best served by making the highest return on investments in both the public and private sectors. Using a competitive market based rate in evaluating public policy decisions will support that objective.[44]

How much to leave to future generations is an ethical question about how much to transfer. Once some overall allocation between the present generation and a future generation has been selected, then whatever amount that is to be invested on behalf of the future generation should be invested to maximize efficiency —giving the greatest benefit to the future generation from the amount invested. There is no case for wasting resources on low return investments when higher returns are available.

There are many ways to transfer resources from the current to future generations, including by building infrastructure, improving the environment or repaying national debt. The given amount of resources to be transferred to the future should be allocated across the different possible investments so as to equate the marginal return. If one investment had a higher return, funds should be switched to it. As private capital is one possible investment, the marginal return will equal the market return on capital.[45]

At best, the prescriptive approach provides an argument for expanding savings and investment. But whatever the level of savings being allocated, the private return to capital indicates the opportunity cost of government projects.

If the allocation to the future is determined, all intergenerational considerations are about efficiency and projects should be evaluated with the private investment return. Using a below market rate to evaluate public projects could result in worse investments and future generations receiving less.

A policy that discounts benefits to future generations differently from future benefits to the current generation would create time inconsistencies, especially when generations overlap. For example,

> Nuclear waste disposal produces a future benefit of 100 utils, in the year 2020, for a person who will not be born until 2010. Old age insurance produces a future benefit of 110 utils, again in the year 2020, for a person who is alive now and will continue to be alive when the benefits arrive. Which policy is of greater value?
>
> If we treat intragenerational discount rates as exceeding intergenerational discount rates, it becomes possible that nuclear waste disposal has a higher present value, at least if the gap between time preference rates is sufficiently large.[46]

44 Lind (1995, p. 387).

45 Kaplow (2006b, pp. 6-7).

46 Example from Cowen (2001, p. 7).

Yet, when 2010 arrives, old age insurance gives the bigger benefit.

The current generation already transfers resources to future generations in many ways. Examining the efficiency effects of different government projects allows us to maximize the benefit to future generations for a given resource transfer, potentially making all generations better off. Even if it is decided to transfer more resources to future generations, the efficiency of particular methods of doing so is still relevant. If an efficient project was combined with changes in debt levels left to future generations, it could make all generations better off.[47]

These considerations lead to the conclusion that project choice should be based on discounting with an efficiency-based social discount rate. At best the prescriptive approach only addresses the appropriate transfer to future generations, whereas the efficiency approach tells us the best way to make that transfer.[48]

47 Kaplow (2006b, p. 31).

48 Intergenerational issues are considered in more detail in appendix C.