

[clue]:  
how can service providers boost revenue  
through flexible usage-based billing?

[5 words]



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## Deep discount

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**Some of society's most important decisions concern the far distant future. Up to now, economics has failed to shed much light on them**

HOW do you decide whether an investment makes economic sense? The standard answer is easy: the income must be discounted (using the rate of return on a safe alternative investment) so that it can be measured against the costs. If the present value of the benefits exceeds the costs, the investment is a good one.

Few economists would disagree that this is the right way to approach the problem—at least where projects of reasonably short duration, say up to 30 years, are involved. But the method has a troubling implication: projects yielding vast gains in the far distant future are deemed to be virtually worthless.

Suppose a long-term discount rate of 7% (after inflation) is used, as it typically is in cost-benefit analysis. Suppose also that the project's benefits arrive 200 years from now, rather than in 30 years or less. If global GDP grows by 3% a year during those two centuries, the value of the world's output in 2200 will be \$8 quadrillion (a 16-figure number). But in present-value terms, that stupendous sum would be worth just \$10 billion. In other words, it would not make sense for the world to spend any more than \$10 billion (under \$2 a person) today on a measure that would prevent the loss of the planet's entire output 200 years from now.

This demonstration of the power of compound interest—and the nonsense it seems to make of orthodox cost-benefit analysis—comes from "Discounting and Intergenerational Equity", an excellent new collection of papers edited by Paul Portney and John Weyant for Resources for the Future (RFF), a think-tank in Washington, DC. As the editors point out in their introductory essay, there is in fact a rationale for concluding that a \$10.1 billion opportunity today to safeguard global GDP in 2200 is not worth taking—namely, that if the money were invested at 7% instead of being spent on the project, that sum would grow by more than enough to replace the missing GDP in two centuries' time. The trouble is, understanding the rationale does not make the conclusion that it supports seem any less crazy.

Why does a method that seems sound in principle and intuitively plausible for 30-year investments seem so wrong for 200-year investments? The question matters. Choices on environmental policy, notably on measures to reduce the threat of global warming, involve costs today and benefits delayed until the very distant future. How are these choices to be made, if not by means of traditional cost-benefit analysis?

In measuring costs and benefits in the far distant future, two main things seem to intervene and spoil the conventional calculations. One is uncertainty. We know next to nothing about what the state of the world will be in 2200—nothing about people's preferences or values, nothing about available technologies. Also, we cannot be certain—indeed, have no reason to suppose—that if society forgoes the climate-stabilising project today and instead invests the capital on behalf of its distant descendants, the benefits will ever reach them. Intervening generations may plunder the investments that had been made by their ancestors in preference to the environmental project.

The second factor follows from the same point. Calculations involving the distant future involve judgments about the distribution of income as well as judgments about efficiency. In the case of a short-lived investment, people can ask whether "they" would prefer a certain amount of consumption now or a larger amount of consumption at some future date. In the case of the far distant future, the question is how much they are willing to pay in order to raise the welfare of others who are so remote that they can barely be imagined—and who are, notwithstanding that fact, likely to be very much better off materially than people are today.

Some economists take the view that the welfare of future generations should be given the same weight as the welfare of today's. This innocent-sounding stipulation has a big effect. It implies that a much lower discount rate than the one appropriate for short-term projects should be used. The short-term discount rate, in theory, embodies an amount that is paid to compensate people for the mere fact that consumption is delayed—this is called the “utility rate of discount” or “pure impatience” in the literature. Setting this element to zero for the distant-future case greatly reduces the plausible discount rate—on most estimates, to as little as 1%.

Most of the economists contributing to the RFF volume lean towards a compromise, for which a variety of ingenious rationales are offered: use a high discount rate for the first 30 or so years of a project, then a lower rate or rates for more distant periods. Theory aside, this seems to accord well with the way people think. Many studies by economists and psychologists have found that people do in fact discount the distant future at lower rates than they apply to the near future.

Mr Portney and another collaborator, Raymond Kopp, go further. They propose what they call a “mock referendum”. Ask samples of people what they think of a specific policy proposal, described in detail with respects to costs, benefits, and their expected distribution over time and place. The idea is not simply to find out whether the chosen sample would wish to see this policy adopted. Rather, it is to uncover society's pattern of preferences. To do this more effectively, different sub-samples could be given different information (concerning, for instance, the costs that they would have to bear), varied in such a way that the pollsters could deduce the voters' preferences on distribution and discount rates. Using this information, it should be possible to estimate what would happen if any particular variant of the policy really were put to a national vote.

“Why not include in the analytical arsenal”, the authors ask, “a tool that sheds light on valuation, discounting and political acceptability all at the same time?” Why not, indeed? It is a good idea.

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