

## Comments on “Should we discount the far-distant future at its lowest possible rate?” by Christian Gollier

Should we discount the far-distant future at its lowest possible rate? Martin Weitzman (1998) thought so, constructing a comparatively simple and persuasive argument for why uncertainty (and persistence) in the interest rate implies a term structure of social discount rates that is declining asymptotically to the lowest possible rate. Largely on the back of this, and some efforts to estimate time-declining discount rates empirically, the national governments of France and the UK have adopted discount rates for long-run costs and benefits ( $t > 30$  years) that are lower than in the short run.

But in 2004 Christian Gollier highlighted a problem: the Weitzman result apparently depends on applying the expected net *present* value (ENPV) criterion. If, by contrast, one applies the expected net *future* value criterion (ENFV), interest-rate uncertainty gives a term structure of social discount rates that increases asymptotically to the highest possible rate (Gollier, 2004).

Hepburn and Groom (2007) proposed one explanation for the paradox, namely that the certainty-equivalent social discount rate does fall with the passage of time, but it increases as the “evaluation date” for the investment moves further into the future (ENPV and ENFV being special cases of this generalised notion of an evaluation date). In a model with a risk-neutral planner, this explains the paradox pretty convincingly, but leaves us with another unsatisfactory conclusion, namely that the evaluation date is arbitrary and thus one cannot objectively decide between ENPV and ENFV.

Here, Gollier reconciles the paradox in another way, showing the two criteria to be equivalent, to both lead to a term structure of social discount rates that tends to the lowest possible rate (iff. shocks to growth are persistent), and relating both to the Ramsey formula for the risk-free social discount rate. All of this is surely very helpful.

You would be forgiven for asking how two competing explanations can co-exist. The answer would seem to lie in this paper adopting a framework in which the representative agent is risk averse and optimizes consumption. The combination of these two features means that the agent is indifferent about how to allocate consumption risk across time, which makes the evaluation date irrelevant. The paradox was identified for a risk-neutral planner. Thus the decision problems are somewhat different.

So we have seemingly arrived at a juncture where the key question is; whose framework does one think more appropriate? This will, of course, depend on the purpose of the modelling. There are at least several criteria here, including generality, realism etc. and further debate on this question is to be welcomed.

One question:

- Would these results hold in a more general model where the representative agent smoothes consumption over time, but is not necessarily risk averse at any given point in time? The Weitzman/Gollier paradox was raised in a risk-free setting, and answering this question would give us more traction on whether it is optimality or risk aversion or both that is required to resolve it.

## References

Gollier, C. (2004). "Maximizing the expected net future value as an alternative strategy to gamma discounting." *Finance Research Letters* 1: 85-89.

Hepburn, C. J. and B. Groom (2007). "Gamma discounting and expected net future value." *Journal of Environmental Economics and Management* 53: 99-109.

Weitzman, M. (1998). "Why the far distant future should be discounted at its lowest possible rate." *Journal of Environmental Economics and Management* 36: 201-208.