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# On the Influence of Risk Aversion and Time Preference on Optimal Policy and Welfare

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When assessing optimal policies in the context of global warming there are plenty of uncertainties that influence the result. A framework in which optimal policies can be found while simultaneously including future learning about the uncertain parameters is the cost benefit analysis. However, cost benefit analysis has serious issues with the valuation of human life and equality between countries of different development, as well as with the dismal theorem. Furthermore, the damage function is extremely uncertain. My research applies a new framework, cost risk analysis (CRA), to an integrated assessment model (IAM) to find the economic values of learning about climate sensitivity. CRA uses an often discussed target of staying below 2°C warming with a probability of 66% (IPCC: "likely") to calibrate the intrinsic risk of decision makers that support the 2°C guard rail. In this way, I can calculate economic values of new information about the climate sensitivity. Furthermore, I investigate how the value depends on other uncertain parameters such as risk aversion and discount rate.
Interesting for the global IAM community is to know if normative parameters affect the optimal policy and if so, by how much. Even if the change in optimal emissions is large, the effect on welfare might be small. The shape of the optimum can suggest for what kind of analysis the normative parameters are of importance. I investigate the welfare changes and the policy changes of combinations of two normative parameters, constant relative risk aversion (CRRA) and pure rate of time preference (PRTP). For decreasing CRRA the change in optimal policy and the induced change in welfare is substantial, around 10% certainty- and balance growth equivalent (CBGE). I also show that the value of perfect information about climate sensitivity is greatly dependent on the normative parameters, i.e. a factor 10 in typical ranges of CRRA and PRTP.
In the model I assume uncertainty in the climate sensitivity and conduct probabilistic integrated analysis with the model MIND-L. I sample a distribution at equal intervals of 5% quantiles. The second uncertainty that is handled is in normative parameters. This is done by a sensitivity study varying constant relative risk aversion (CRRA) from 0.75 to 5 in six steps and pure rate of time preference (PRTP) from 0.5% to 4% in four steps. I calculate the loss of welfare if a choice of normative parameters turns out to be incorrect.
The main conclusions are twofold: (a) normative parameters can have a very strong impact on welfare and (b) any study relying on such parameters should test the sensitivity towards them.