Ranking Intergenerational Distributions

Frikk Nesje (University of Copenhagen) – in collaboration with Moritz A. Drupp (University of Hamburg) and Paolo G. Piacquadio (University of St. Gallen)

Background

The mitigation of long-term climate change damages is the most important issue of our time. Such policies are indispensable to preserve and sustain the well-being of future generations. At the same time, climate policies require constraining existing economic activities and impose a short-term cost on current generations. Unavoidably, to decide and design public policies, policy makers need to aggregate the conflicting interests of different generations and, thereby, resolve the intergenerational conflict behind climate policies.

Policy guidance requires an assessment of alternative policies and, therefore, requires evaluation criteria for such assessment. The state-of-the-art evaluation criteria compare the paths of per capita consumptions over time associated with different policies. Concretely, policy makers calculate the potential impacts of unmitigated climate change damages on each generations' consumption. The decision of whether to implement climate policy involves comparing this consumption path to each generations' consumptions when climate change damages are mitigated at a cost today.

For each consumption path, the evaluation criteria add up these consumptions over time, discount future consumptions, and express some aversion to inequality. Then the consumption path associated with the largest numerical value is assigned the highest rank. The optimal climate policy follows from this rank. However, these criteria are highly controversial:

- It is unclear which evaluation criteria for climate policies that best represents people's preferences. Since attitudes towards discounting and inequality are constrained by the additive structure of the evaluation, existing evaluation criteria seem unable to capture people's views.
- The optimal climate policy is extremely sensitive to specific evaluation criteria. In the current approach, any ranking of policies can be reversed by a change in the discounting future consumptions or inequality aversion, even for very severe climate change damages.

Contribution

With this project, we will identify the evaluation criteria reflecting people's preferences. The generality of the approach will allow us to respect and elicit novel ethical views. Guided by theory, the use of lab-experiments will ensure precise estimate of the evaluation criteria. Our results will have direct implication for the discounting guidelines of the Ministry of Finance and enrich the debate on optimal climate change policies.

Specifically, we ask:

- Which evaluation criteria best represent people's preferences?
- Is the additive structure of the evaluation too demanding to represent people's preferences?
- What is the relationship between aversion to inequality and discounting?

Our contribution will inform not only policies to mitigate climate change damages but all long-term public projects with maturities spanning several generations. Examples also include environmental and biodiversity protection, nuclear decommissioning, enhancing infrastructure and coastal defenses, and long-term healthcare management.

We will develop a theory and lab-experiment that identify the evaluation criteria from how people rank paths of per capita consumptions associated with different policies. To do so, we only require that consumption paths differ in the constant consumption of the current and the future generations. For climate policy, this means that we compare the consumption paths with and without climate change damages: (A, B, B, B, …) and (C, D, D, D, …). Here, A > C captures the short-term cost of current action and B < D the benefit of avoided climate

damages in the future. We aim to identify the evaluation criteria for any consumption of the current generation and non-constant consumption of future generations from repeated choices over such pairs of consumption paths.

While the evaluation criteria can take any form, they critically follow from a series of very simple, binary choices. This is very promising for estimation opportunities in lab-experiments that respect people's preferences and novel ethical views. We can precisely estimate the evaluation criteria based on people's preferences as revealed through choice experiments at the Laboratory for Experimental Economics.

The project aims to make the following contributions as compared to the state of the art in the literature:

Social discounting. The literature has so far dealt with particular evaluation criteria, namely the Discounted Utilitarianism social welfare function (the precise formulation of the motivating example with its additive strucutre), and calibration of this based on introspection, experiments, surveys, revealed evidence from tax schedules and savings decisions (e.g., Arrow et al. 1996; Giglio et al., 2015; Drupp, et al., 2018; Nordhaus, 2019; Millner and Heal, 2022). Our approach is different. Instead of assuming particular evaluation criteria, we instead plan to identify and estimate it.

Social choice and social welfare functions. This literature has so far dealt with how to theoretically derive and justify various social welfare functions and evaluation criteria (e.g., Arrow, 1963; Sen, 1980; d'Aspremont and Gevers, 2002; Asheim, 2010; Piacquadio, 2017). Our approach is different. We advance upon these theoretical foundations by deriving a new and generalized representation of the Discounted Utilitarian social welfare function that consider issues such as the relationship between aversion to inequality and discounting as well as additivity that has not been considered before.

Fairness concepts. This literature has so far dealt with how to reveal or document people's support for specific fairness concepts (e.g., Cappelen et al., 2007; Falk et al., 2018; Bénabou et al., 2020; Hvidberg et al., 2021). Taking an individual instead of social perspective, there is overlap with this literature in behavioral economics. Our approach is different. Instead of considering methods for estimating specific conceptions related to fairness, we develop methods for eliciting evaluation criteria that can be used to rank entire consumption paths.

Impact

We will offer evaluation criteria readily applicable for use in macro and public economics modeling, as well as for calibration of welfare effects in policy simulations. Beyond research, we offer new, readily available ways to derive, compare and decompose evaluation criteria in teaching settings.

On policy, there are guidelines for how to choose the evaluation criteria in place in many countries and international institutions. Many of these build on Discounted Utilitarianism. We show how to extend these evaluation criteria and offer precise estimates of the evaluation criteria based on people's preferences directly relevant for the Danish context. In the Ministry of Finance guidelines, for example, different consumption paths can be thought of as the cash flows of two projects – a project considered for implementation and an alternative, reference scenario. Hence, we aim to derive evaluation criteria directly relevant for the metrics used in the Ministry of Finance discounting guidelines and enrich the debate on optimal climate policy. Our evaluation criteria can also be incorporated in the MAKRO and GREEN REFORM model runs, or be used to interpret model output when represented as consumption paths.

Our past papers have already influenced public guidance on discounting in Germany, Ireland, the Netherlands, New York State, Norway, the UK and the US, as well as the European Union, the Dasgupta Review, the IPCC, the OECD, the Office for National Statistics and Sweden. This shows our ability to reach out to practitioners and ensure impact.

Management and organization

We view this project as the first in a series of projects that engage with the theory and precise estimation of evaluation criteria, given that such identification has not been done before.

Our research project is of the high risk/ high gain type. To reduce the risks we have devised the following contingency plan: Frikk Nesje will derive the theory until November 2022 in close collaboration with Paolo G. Piacquadio. Based on the first theoretical results, we will then start developing the choice experiment by January 2023 in close collaboration with Moritz A. Drupp. This takes time and requires a series of meetings between the collaborators in 2022.

During the first half of 2023, we plan to circulate a write up of the choice experiment to close colleagues to receive feedback. By July 2023, we plan to have the first sessions at the Laboratory for Experimental Economics for piloting purposes. Frikk Nesje will lead this in collaboration with Moritz A. Drupp and Paolo G. Piacquadio. Planning and conducting the lab-experiment require travel activity. There are also costs associated with the pilot.

If the pilot is successful, we will scale up and conduct the full lab-experiment by January 2024. This will likely result in a paper published in a top economic journal submitted by July 2024 after conference presentations. There will also be a research agenda following from it.

If demonstration cannot be proved by July 2023, we plan to use until October 2023 to determine the potential of the project and to seek advice from close colleagues and experts in the field that we have previously co-authored with on how to adjust the lab-experiment for data collection. If successful, this will likely result in a well published paper. Otherwise, we aim for publishing the most promising results. Tabulated data will be made available at the time of publication. Toward the end of the project, we will organize a workshop with stakeholders to ensure outreach and impact.

The budget consists of a teaching buy for developing the theory and lab-experiment. It further includes costs related to piloting and conducting the lab-experiment as well as costs of travels, conference attendance, submission and outreach.

That the project relates to a number of relevant literatures that we have contributed to, helps reduce this risk (e.g., Asheim and Nesje, 2016; Drupp et al., 2018; Drupp and Hänsel, 2021; Groom et al., 2022; Hänsel et al., 2020; Nesje, 2022; Piacquadio, 2017; Piacquadio, 2020). This research is published in top economic journals and has received a number of awards, including but not limited to the CESifo Distinguished Affiliate Award (twice), H.M. The King's Gold Medal, Best Dissertation Award from the European Association of Environmental and Resource Economists, Faculty Prize for Best Dissertation at Kiel University, and Fridtjof Nansen Award for Excellence in Science (Young Researcher Category) by the Norwegian Academy of Science and Letters.

References

Arrow, K. J. (1963). *Social Choice and Individual Values.* Yale University Press.

Arrow, K. J., Cline, W. R., Maler, KG., Munasinghe, M., Squitieri, R., & Stiglitz, J. E. (1996). Intertemporal equity, discounting, and economic efficiency. *Climate Change 1995: Economic and Social Dimensions of Climate Change.*

Asheim, G. B. (2010). Intergenerational equity. *Annual Review of Economics*, 2(1), 197-222.

Asheim, G. B., & **Nesje, F.** (2016). Destructive intergenerational altruism. *Journal of the Association of Environmental and Resource Economists*, *3*(4), 957-984.

Bénabou, R., Falk, A., Henkel, L., & Tirole, J. (2020). Eliciting moral preferences: Theory and experiment. *Mimeo.*

Cappelen, A. W., Hole, A. D., Sørensen, E. Ø., & Tungodden, B. (2007). The pluralism of fairness ideals: An experimental approach. *American Economic Review*, 97(3), 818-827.

d'Aspremont, C., & Gevers, L. (2002). Social welfare functionals and interpersonal comparability. *Handbook of Social Choice and Welfare*, 1, 459-541.

Drupp, M. A., Freeman, M. C., Groom, B., & **Nesje, F.** (2018). Discounting disentangled. *American Economic Journal: Economic Policy*, *10*(4), 109-34.

Drupp, M. A., & Hänsel, M. C. (2021). Relative prices and climate policy: How the scarcity of nonmarket goods drives policy evaluation. *American Economic Journal: Economic Policy*, *13*(1), 168-201.

Falk, A., Becker, A., Dohmen, T., Enke, B., Huffman, D., & Sunde, U. (2018). Global evidence on economic preferences. *Quarterly Journal of Economics*, 133(4), 1645-1692.

Giglio, S., Maggiori, M., & Stroebel, J. (2015). Very long-run discount rates. *Quarterly Journal of Economics*, 130(1), 1-53.

Groom, B., **Drupp, M. A.**, Freeman, M. C., & **Nesje, F.** (2022). The future, now: A review of social discounting. *Annual Review of Resource Economics*, forthcoming.

Hänsel, M. C., **Drupp, M. A.**, Johansson, D. J., **Nesje, F.**, Azar, C., Freeman, M. C., Groom, B. & Sterner, T. (2020). Climate economics support for the UN climate targets. *Nature Climate Change*, *10*(8), 781-789.

Hvidberg, K. B., Kreiner, C., & Stantcheva, S. (2021). Social position and fairness views. *National Bureau of Economic Research No. 28099.*

Millner, A., & Heal, G. (2021). Choosing the future: Markets, ethics, and rapprochement in social discounting. *NBER Working Paper No. 28653.*

Nesje, F. (2022). Cross-dynastic intergenerational altruism. *CESifo Working Paper No. 9626.*

Nordhaus, W. (2019). Climate change: The ultimate challenge for economics. *American Economic Review*, *109*(6), 1991-2014.

Piacquadio, P. G. (2017). A fairness justification of utilitarianism. *Econometrica*, *85*(4), 1261-1276.

Piacquadio, P. G. (2020). The ethics of intergenerational risk. *Journal of Economic Theory*, *186*, 104999.

Sen, A. (1980). *Equality of what?* Tanner Lecture on Human Values 1979.