Discounting, Beyond Utilitarianism by Marc Fleurbaey and Stephane Zuber

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1 Overview

The paper is a highly technical account of intergenerational welfare criteria in the context of population growth. A Prioritarian criterion is extended to take into account equally distributed equivalent utilities and uncertainty over population growth and consumption. This enables risk aversion and inequality aversion to be disentangled in the evaluation of intertemporal welfare in manner different to previous attempts to do so. The latter, it is argued, is a potential problem assocaited with the standard discounted utilitarian framework and the assocaited Ramsey Rule. The Expected Prioritarian Equally Distributed Equivalent (EPEDE) criteria is then evaluated according to some important axioms of intergenerational justice and efficiency, and also in terms of some of the important and problematic results in the analysis of intergenerational welfare and population growth, such as the repugnant theorem of Parfit (1984) and the Very Sadistic Conclusion of Arrhenius. A version of Weitzman's dismal theorem is also analysed.

2 On the contribution of the paper:

I think that this paper makes a good contribution to the literature and in fact provides some substantive direction to empirical work in this area allowing it to move away from the standard Utilitarian framework. The paper is technical and actually quite difficult to follow in places. It is not that the explanations are not coherent, but rather that the concepts are often difficult and there are many different variables considered, both in levels and in terms of growth rates, in terms of individuals and in terms of societal positions. The paper is a substantive piece of work and I get the feeling that I could learn a great deal more if I were to spend more time with it. So, a definite contribution.

On the downside, at the moment I still do not have a good sense of the way in which the many different results presented fit together in terms of an overall narrative. The paper is set up as one that is concerned primarily with population growth, but much of what is discussed here concerns inequality aversion among different individuals, as opposed to risk aversion. I think that the narrative could probably be improved.

Nevertheless, aside from a few points of clarification and the typographical and grammatical comments below, I feel that the paper is more or less ready to be published. It has been a pleasure to read, although it is a technically testing paper.

3 Specific comments

Scene setting: This is an entirely optional point, but for my money it would be worth emphasising why, practically speaking, population change and population growth, is a policy issue for intergenerational decision making. The latest prediction on global population growth is that population will top out at around 10bn in 2050, from which population growth stops. There are two elements of this that are relevant. First, most population growth will take place in developing countries, so there are

spatial issues, and second, growth of population will vary with the time horizon. There is of course uncertainty surrounding such predictions. This scene setting will assist the interpretation in the final sections of the paper.

Explanation of the EPEDE framework:

- In this paper it would be good to explain the sense in which the equation following equation (3) is "Prioritarian". It is not immediately obvious to the casual reader. Footnote 10 is more precise on this matter.

- On page 7 the definition of "a life worth living" is not explicit. This makes the example given of the Very Sadistic Conclusion a little difficult to follow.

- before equation 3 the dependence of $V(u)$ on the population *growth* is not made absolutely clear. It is only at the end of this section that the role of population growth in this criterion is discussed when the changes in the parameters α and β are discussed. Making this clear up front, and the meaning of this dependence, would make this section a lot clearer

- On page 8 the following sentence is not particularly clear: "The function ϕ^{-1} is used to define function E.......". Does this mean simply that E is defined by the choice of ϕ and the inequality aversion that it embodies, or does it mean that ϕ has to be defined in a specific way in order to preserve the risk aversion embodied in the u_i? The sentence can be interpreted in either way. Maybe a simple example would suffice here in a footnote.

The EPEDE criteria: This section provides an analysis of some of the desirable and less desirable axioms that the EPEDE criterion embodies. It is quite remarkable that the EPEDE SWF uniquely satisfies some of the axioms.

This section is interesting but there is no summary of the collection of results, which makes it difficult to come away from this section with an easy interpretation of the pros and cons of this evaluation criteria. For instance, the EPEDE ultimately does not generally do away with the repugnant conclusion or the sadistic one. Only under specific circumstances does this occur and these circumstances, it strikes me, are not specific to the EPEDE. It think that a summary of the relaxation of the various principles that some of the axioms contain, couple with the additional assumptions required for the propositions to hold, would be a useful addition.

The implications for the social discount rate: I enjoyed this section. The explanation of the fact that the social discount rate is some aggregation of the sum of individual person to person discount rates is extremely clear. In fact it highlights further assumptions that are required to move from individuals to generations in social discounting: e.g. the distribution of costs and benefits. This reminds me of a paper by Sen from 1967 ("Isolation, Insurance and the Social Discount Rate"), in which similar such issues are discussed.

I suppose I am surprised that this treatment of intra- and inter generational issues does not position itself in relation to the work by Christian Gollier in his book and elsewhere. I am referring to the work on intra-generational inequality aversion. In addition to this there is a nice working paper by Johannes Emmerling which also provides a treatment of the same topic. The current paper extends this work in some ways, and is more restrictive in others (e.g. in its treatment of consumption uncertainty). This is just a suggestion of course, perhaps it is helpful.

The proof for Proposition 3 should probably be placed in the appendix and the separate terms that this expression has should be labelled in the text for clarity of exposition. The simple examples using simple functional forms are very helpful indeed. But at the bottom of page 23 the last equation reduces simply to η if $\varepsilon = 0$. In what sense does this reflect the Utilitarian criterion?

The impact of some of the discounting terms are not necessarily intuitive (or appealing). Two examples which require further explanation are: i) the fact that larger population growth leads to a higher discount rate (page 25); ii) that individuals alive in states with higher levels of welfare should be discounted less (section 4.2.4).

3.1 Minor comments on this section:

- It will not be clear to the general reader the extent to which this section differs from the previous work whose framework is used here (Fleurbaey and Zuber 2014).

- Page 19: The meaning of the notation $u\left(\mathbf{c}\right)\left(s\right) = u\left(\mathbf{c}\left(s\right)\right)$ is not clear.

4 Minor comments

- There are a few typos and grammatical errors here and there, e.g.:

  1. page 14: penultimate para, last sentence: "Only situations where.....is equivalent to the no population case" should read ""Only situations.....*are* equivalent to the no population case"

  2. page 14: last para, first sentence: "Case 1 may seem more appealing, since largest populations are better" should read "Case 1 may seem more appealing, since *larger* populations are better"

  3. Page 20: para before 4.2, last sentence: "an additional terms" needs to remove "an".

  4. Page 20: Section 4.2.1: line 3 there is a bracket missing in $u\left(\left(c^i\right)\phi^{ti}\right)$. This term also needs some explanation.

  5. Page 25: Section 4.2.4: second sentence "measures" should be "*a measure*"

  6. Page 28: last para: "....Weitzman's result change...." should be "....Weitzman's result *changes*...."

  7. Page 32: para 2: "In this end,...." should read "*To* this end,...."

- On page 4, the term u is not as carefully defined as some of the other quantities in the paper. For instance, in my first reading of the paper I assumed that it was a scalar, partly I suppose because it was defined as a single "alternative". With later readings I realised it is essentially a distribution. It also is explained later that it is a cardinal measure of expected utility.

- After equation 2, the simplification of $\mathbf{u}^t\left(s\right)$ to be consumption is slightly confusing. I wouldn't introduce this here.

- The reference to Dasgupta and Heal (1979) and Arrhenius (2014) need to have a page number reference.