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Ahlvik, Lassi

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Will of the living dead — The case for a backward-looking welfare function

Lassi Ahlvik

Department of Economics and Management at the University of Helsinki, Latokartanonkaari 7 P.O. Box 27 00014, Finland

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ABSTRACT

Many people have preferences over choices taking place after their lifetime. I show that a backward-looking welfare function, keeping preferences of the dead alive, is Pareto-improving and can be sustained as a subgame-perfect equilibrium of the intergenerational game.

1. Introduction

> *"It is obvious that tradition is only democracy extended through time. It is trusting to a consensus of common human voices rather than to some isolated or arbitrary record. [...] It is the democracy of the dead."*
>
> [-Gilbert.K. Chesterton (1908) in *Orthodoxy*]

People commonly have preferences over choices taking place after their own lifetime, including the fate of their estate, family members or the state of the environment. This study attempts to analyze the role of such posthumous preferences: should they cease to exist when a person dies, or should they carry over and play some role in future decision making? Both alternatives seem somewhat unsatisfactory. On the one hand, it feels unintuitive to take posthumous preferences into consideration, because decisions made after one's death are unobservable to them. On the other hand, if posthumous preferences are forgotten as soon as an agent dies, they are rendered completely irrelevant — all decisions are made as if those preferences did not exist, no matter how strong they were.

There are several societal and economic settings where posthumous preferences play a role. Last wills are rarely overturned in courts, defamation of the dead is illegal in several U.S. states (Iryami, 1998) and funeral insurance, unlike standard life insurance, provides a way to commit to specific posthumous consumption (Berg, 2018). Individuals sometimes alter their behavior out of respect for their ancestors, and this may be even recognized as ethical behavior (Hammond, 1988).

In this study I propose a rationale for these existing practices. I analyze an infinitely repeated game, where agents hold stationary preferences over posthumous events and their welfare cannot change after death. Each generation would like to affect the choices of their successors, but death means the end of their ability to do so directly. My main result is that, as an indirect way of achieving this, generations can agree on a backward-looking welfare function where past generations are treated *as if* their preferences were still alive. I show that this cooperation can be sustained as a subgame-perfect equilibrium of the intergenerational game, because attempts to deviate lead to the collapse of this tradition harming the long-term benefits of the deviating generation.

2. Model

2.1. Set-up

Time is discrete with time periods $t \in \mathbb{Z}$. Each period, or generation, is represented by an identical agent and no two agents are alive contemporaneously. The consumption in each period t involves a bundle of two goods, $c_t \in \mathbb{R}$ and $z_t \in \mathbb{R}$. Each generation has a fixed budget, B, such that: $c_\tau + z_\tau = B$ for all τ,

E-mail address: lassi.ahlvik@helsinki.fi.

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and agents cannot commit to future choices (c_τ, z_τ) for $\tau > t$. The payoff of an agent alive at t is expressed by the following welfare function:

$$W_t = v(c_t, z_t) + \theta_1 u^1(c'_{t+1}, z'_{t+1}) + \cdots + \theta_N u^N(c'_{t+N}, z'_{t+N}) \quad (1)$$

Each agent has preferences over their own consumption bundle (c_t, z_t) captured by an increasing and concave utility function v, and also for choices that are made after their own lifetime (c_τ, z_τ), $\tau > t$, captured by an increasing and concave function u^τ, where θ_τ is the weight that generation t assigns on $t+\tau$.[1] Future consumption cannot be observed, and therefore u^τ is a function of expected choices (c'_τ, z'_τ). Agents have rational expectations of future choices; that is, in equilibrium $c'_\tau = c_\tau$ and $z'_\tau = z_\tau$. This implies that an unexpected, off-equilibrium choice at time t does not affect the welfare of generation $t-1$ or earlier generations. Welfare of the dead cannot change.

In the non-cooperative equilibrium all generations choose (c_t, z_t) maximizing their own welfare, W_t. It is straightforward to show that the optimal condition satisfies:

Proposition 1 (*Stationary Equilibrium*)**.** *When all agents' strategies are independent of the history, each agent sets $c_t = c^N$ and $z_t = z^N$ such that*

$$v_c(c^N, z^N) = v_z(c^N, z^N), \quad (2)$$

where subindices denote derivatives, and $c^N + z^N = B$.

The non-cooperative choice is solely based on the current generation's preferences captured by function v. Posthumous preferences are rendered irrelevant no matter how strong they are, as u^τ does not show up in Eq. (2). Hypothetically, if generation $t-\tau$ could decide, they would set period t choice based on:

$$u^\tau_c(c_t, z_t) = u^\tau_z(c_t, z_t). \quad (3)$$

There is agreement with the current and past generations only if u^τ is a strictly increasing transformation of v. That is, when $u^\tau = f(v)$ and function f is strictly increasing, Eqs. (2) and (3) align: $u^\tau_c = u^\tau_z \Rightarrow f'(\cdot)v_c = f'(\cdot)v_z \Rightarrow v_c = v_z$.[2]

Next, I define the best symmetric play as the action that each agent would choose if they could pick any constant choice (c, z) for themselves and all the forthcoming generations.

Definition 1. The best-symmetric play is defined as $c = c^B$ and $z = z^B$ satisfying

$$\arg\max_{c,z} \left\{ W_t | c_{t+\tau} = c, z_{t+\tau} = z \text{ for all } \tau \geq 0 \right\}$$

The best symmetric play is constant in time and thereby differs from the solution where each generation could commit to the future choices in Eq. (3). By definition, it is weakly preferred by all generations over the stationary equilibrium, which is also symmetric by Proposition 1. The best symmetric play can be solved by maximizing Eq. (1) such that $c_t = c$, $z_t = z$ and $c+z = B$ holds, leading to:

$$v_c(c, z) + \sum_{\tau=1}^{N} \theta_\tau u^\tau_c(c, z) = v_z(c, z) + \sum_{\tau=1}^{N} \theta_\tau u^\tau_z(c, z). \quad (4)$$

[1] To keep agent's welfare bounded without restricting utility functions, I assume that agents have preferences over finite future periods; however, N can be arbitrarily large. I consider two goods for expositional simplicity, but it is straightforward to extend the model to include more than two goods.

[2] Disagreements between current and past generations arise naturally, for example, in models of cross-dynastic inter-generational altruism (Nesje, 2021), models with backward-looking discounting and altruism (e.g. Galperti and Strulovici 2017, Ray et al. 2021, see Section 3 on how they relate to this work), or if there is a lower rate of time preference for the environment than for man-made goods.

The first-order condition sets the marginal benefit of a permanent increase in c equal to the marginal cost of a permanent reduction in z. Notably, these changes affect generation t through their own actions v but also via their posthumous preferences u^τ if future generations can be expected to choose the same $c'_{t+\tau} = c$ and $z'_{t+\tau} = z$. I show that such expectation is rational, because the best symmetric play can be sustained as an equilibrium.

Proposition 2 (*Best Symmetric Equilibrium*)**.** *The best symmetric equilibrium strategy of the game is:*

$$s(h_t) = \begin{cases} (c_t, z_t) = (c^B, z^B) & \text{if } t = 0 \text{ or } (c_{t-1}, z_{t-1}) = (c^B, z^B) \\ (c_t, z_t) = (c^N, z^N) & \text{if } t > 0 \text{ and } (c_{t-1}, z_{t-1}) \neq (c^B, z^B) \end{cases}$$

where h_t denotes the history of choices up to time t.

The incentive for sustaining the best symmetric equilibrium is the threat that future generations would switch to the non-cooperative equilibrium in case of a deviation. If future generations are known to play (c^N, z^N), then t also wants to choose $c_t = c^N$ and $z_t = z^N$ by Proposition 1. But a permanent deviation from (c^B, z^B) to (c^N, z^N) cannot be a profitable as, by Definition 1, (c^B, z^B) is the symmetric play that maximizes welfare for generation t.

Next I turn to the main result, that is, how to implement the best symmetric equilibrium strategy. My approach is as follows: generations following some equilibrium strategy behave *as if* their choices result from maximization of some "subjective" welfare function. As in Dekel et al. (2007), the subjective preferences $(\hat{W}_t)$ determining behavior may differ from the actual objective pay-off (W_t) in equilibrium. This subjective welfare function, if used by all future generations, leads to the symmetric equilibrium which maximizes the objective payoff welfare of any generation.

Proposition 3 (*Backward-looking Welfare Function*)**.** *The best symmetric play follows if all generations maximize the backward-looking welfare function:*

$$(c^B, z^B) = \arg\max_{c_t, z_t} \hat{W}_t = \sum_{i=0}^{N} W_{t-i}$$

And this can be supported as an equilibrium if, in case of deviation, the following generations switch to the non-cooperative equilibrium:

$$(c^N, z^N) = \arg\max_{c_t, z_t} W_t$$

Proof. Use Eq. (1) for each $t-i$ to write the backward-looking welfare function as:

$$\begin{aligned} \max_{c_t, z_t} \hat{W}_t = & v(c_t, z_t) + \theta_1 u^1(c_{t+1}, z_{t+1}) + \cdots + \theta_N u^N(c_{t+N}, z_{t+N}) + \\ & \left[v(c_{t-1}, z_{t-1}) + \theta_1 u^1(c_t, z_t) + \cdots + \theta_N u^N(c_{t+N-1}, z_{t+N-1}) \right] + \cdots + \\ & \left[v(c_{t-N}, z_{t-N}) + \theta_1 u^1(c_{t-N+1}, z_{t-N+1}) + \cdots + \theta_N u^N(c_t, z_t) \right] \end{aligned}$$

The optimal choice of (c_t, z_t) satisfies the first-order condition:

$$\begin{aligned} & v_c(c_t, z_t) + \theta_1 u^1_c(c_t, z_t) + \cdots + \theta_N u^N_c(c_t, z_t) \\ & = v_z(c_t, z_t) + \theta_1 u^1_z(c_t, z_t) + \cdots + \theta_N u^N_z(c_t, z_t) \end{aligned}$$

which coincides with Eq. (4) and, by Proposition 2, forms a subgame-perfect Nash equilibrium of the game. □

Taking the past generations' preferences into account in our decision making may seem counterintuitive as their welfare is fixed at death. The key point is that our welfare will increase if we can expect that our posthumous preferences are incorporated into future decision making. Proposition 3 shows that these expectations are rational, because policies maximizing the backward-looking welfare function constitutes a subgame-perfect

Nash equilibrium of the intergenerational game. In other words, adopting the backward-looking "tradition", or a custom of respecting the will of the dead, is a way to select the Pareto-dominant equilibrium.

3. Discussion and conclusions

Humans tend to have preferences over events taking place outside their own life span (Scheffler, 2013). When people die, should these preferences die with them or carry over to future decision making? In this paper, I show that both options form subgame-perfect equilibria of the intergenerational game, and the latter Pareto-dominates the former. Posthumous decisions cannot be influenced directly, but a backward-looking welfare function, keeping past preferences as part of future decision making, offers an indirect way to affect future choices.

A number of previous papers have discussed and analyzed backward-looking preferences (Kimball 1987, Hori and Kanaya 1989, Bergstrom 1999, Fels and Zeckhauser 2008, Galperti and Strulovici 2017). These papers employ a concept coined as eternity solution: *"each individual may possibly be so obedient that he may care how his parents would respond to his and his descendants' future consumption plans if they were alive'* (Hori and Kanaya 1989, p.244). My model can provide a foundation for such a welfare representation.[3] Bernheim (1989) analyzes an overlapping generations model where an intertemporal social planner has enforcement power but suffers from dynamic inconsistency. While he shows that the ability to commit to honor past preferences can help to overcome the time-inconsistency problem, I discard the concept of intertemporal planner altogether and use the backward-looking welfare function to set up a norm that can be supported as an equilibrium.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

Berg, E., 2018. Funeral insurance: An inter-generational commitment device? J. Afr. Econ. 27 (3), 321–346.
Bergstrom, T.C., 1999. Systems of benevolent utility functions. J. Public Econ. Theory 1 (1), 71–100.
Bernheim, B.D., 1989. Intergenerational altruism, dynastic equilibria and social welfare. Rev. Econom. Stud. 56 (1), 119–128.
Dekel, E., Ely, J.C., Yilankaya, O., 2007. Evolution of preferences. Rev. Econom. Stud. 74 (3), 685–704.
Fels, S., Zeckhauser, R., 2008. Perfect and total altruism across the generations. J. Risk Uncertain. 37 (2), 187–197.
Galperti, S., Strulovici, B., 2017. A theory of intergenerational altruism. Econometrica 85 (4), 1175–1218.
Hammond, P.J., 1988. Consequentialist demographic norms and parenting rights. Soc. Choice Welf. 5 (2), 127–145.
Hori, H., Kanaya, S., 1989. Utility functionals with nonpaternalistic intergenerational altruism. J. Econom. Theory 49 (2), 241–265.
Iryami, R., 1998. Give the dead their day in court: Implying a private cause of action for defamation of the dead from criminal libel statutes. Fordham Intell. Prop. Media Ent. LJ 9, 1083.
Kimball, M.S., 1987. Making sense of two-sided altruism. J. Monetary Econ. 20 (2), 301–326.
Nesje, F., 2021. Cross-Dynastic Intergenerational Altruism. Working Paper.
Ray, D., Vellodi, N., Wang, R., 2021. Backward Discounting. Working Paper.
Scheffler, S., 2013. Death and the Afterlife. Oxford University Press.

[3] There is one major difference: in my model the weight assigned to past agents' welfare is only instrumental and therefore it avoids the "hall-of-mirrors" -effect, where changes in welfare of different generations reciprocally affect each other in a complex manner (Bergstrom, 1999).