

A Soul's View of the Optimal Population Problem

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How Many People Should There Be?

Many policy choices are about how many people there should be (e.g., World Bank family planning programs; one-child policy in China; cash subsidies for babies in Singapore).

There is wide disagreement about the optimal rate of world population growth.

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Natalism

Natalism (also called **pronatalism** or the **pro-birth** position) is a belief that promotes the reproduction of human life.^[3] The term comes from the Latin adjective for "birth", *nātālis*.

Natalism promotes child-bearing and parenthood as desirable for social reasons and to ensure the continuance of humanity. Natalism in public policy typically seeks to create financial and social incentives for populations to reproduce, such as providing tax incentives that reward having and supporting children. Those who adhere to more strict interpretations of natalism may seek to limit access to abortion and contraception, as well. The opposite of natalism is antinatalism.

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Voluntary Human Extinction Movement

The **Voluntary Human Extinction Movement** (VHEMT^[A]) is an environmental movement that calls for all people to abstain from reproduction to cause the gradual voluntary extinction of humankind. VHEMT supports human extinction primarily because, in the group's view, it would prevent environmental degradation. The group states that a decrease in the human population would prevent a significant amount of human-caused suffering. The extinctions of non-human species and the scarcity of resources required by humans are frequently cited by the group as evidence of the harm caused by human overpopulation.

Voluntary Human Extinction Movement



Why Questions on Optimal Population Growth are Difficult

To decide how many people there should be, we have to compare allocations with different population sizes.

Some people are around in some allocations, but not in others.

Have to take a stand on the welfare implications of never having been born.

How can we do that ???

Ad-Hoc Assumptions Do Not Work Well

Average Utilitarianism:

- ▶ Choose population size to maximize average welfare.
- ▶ Implicitly, equate utility of not being born to average utility.
- ▶ Unattractive properties, and optimal population may be tiny.

Total Utilitarianism:

- ▶ Maximize sum of people's utilities in the economy.
- ▶ Implicitly, equate utility of not being born to zero utility.
- ▶ Can result in the “repugnant conclusion.”

Two Ways to Get Welfare Criteria in Economics

Empathy behind the veil of ignorance:

- ▶ Imagine not knowing who you will be before being born.
- ▶ Optimal allocation is what seems optimal from that initial perspective.
- ▶ Relies on introspection and empathy.

Axioms:

- ▶ Specify axioms welfare criterion should satisfy (Pareto, anonymity, ...).
- ▶ See where that takes you.

Difficulties when Population is Variable

Hard to use empathy to think about utility of never having been born; no one currently alive has had that experience.

Can get welfare criteria using axiomatic approach, but usually still have to make assumptions on utility of never having been born.

(e.g.: Critical Level Utilitarianism).

What to do?

Reincarnation

To use empathy and the veil of ignorance, need a view of the world where being alive and not are not mutually exclusive.

Such a view of the world exists (and is held by many people): reincarnation!

If you believe in reincarnation, population ethics are not about whether to exist or not, but whether to exist more or less often.

This tradeoff is accessible to introspection.



Soul-Based Welfare

Aim: Examine the population problem from the perspective of souls who go through multiple incarnations.

- ▶ Lower population corresponds to longer wait between incarnations.

Important: Using soul-based welfare does not require actually believing in reincarnation.

- ▶ Just like the veil of ignorance, reincarnation is a thought experiment that can make the necessary welfare comparisons accessible.
- ▶ Neither the veil of ignorance nor reincarnation are real (I think): both are metaphors that help us to think about welfare.

What We Find

Close link between soul-based welfare and the question of the optimal social discount rate.

The criteria that we find the most appealing imply critical levels that depend on the economic environment.

No final answers here, but a new perspective and new tool to help with social welfare evaluations.

A Setup with a Tradeoff between Population and Individual Welfare

A stationary world with a fixed number of souls S .

I types of people.

$2I$ commodities at each date:

$$\{x_1, \dots, x_I, x_{I+1}, \dots, x_{2I}\}$$

x_i : A soul's probability of being born as type i ($0 \leq x_i \leq 1$).

x_{i+1} : lifetime utility of type i .

$\sum_{i=1}^I x_i \equiv q$: A soul's probability of incarnation at each date.

qS : World population at each date.

Soul-Based Welfare

Commodity space $L = \{x \in ([0, 1]^l \times \mathbb{R}^l) \mid \sum_{i=1}^l x_i \leq 1\}$.

Feasible set: $X \subset L$. Reflects the constraints imposed by technology (e.g., tradeoff between population and individual welfare because of limited natural resources).

Utility of the representative soul:

$$u : X \rightarrow \mathbb{R}.$$

Soul-Based Utilitarianism: Choose $x \in X$ to maximize utility of the representative soul.

Assumptions on Soul-Based Welfare

The function $u : X \mapsto \mathbb{R}$ satisfies:

- ▶ Souls' utility is increasing in an individual's utility x_{i+1} if the probability of being embodied as that individual x_i is positive.
- ▶ If all possible lives are neutral, the soul's utility is zero: If $x_{i+1} = 0 \forall i \in [0, I]$, then $u(x) = 0$.

Assumptions imply **Weak Pareto Criterion** and **Priority for Lives Worth Living**.

Discounting

Soul-based welfare is about weighing prospect of being incarnated more or less often against welfare in a given incarnation.

To give content to this tradeoff, have to take a stand on discounting.

Embodiment-Dependent Discounting

Souls might discount differently depending on whether they are embodied or not.

With embodiment-dependent discounting, soul utility is:

$$u = \sum_{t=0}^{\infty} \prod_{j=0}^{t-1} d[q] \sum_{i=0}^l x_i x_{i+1} = \frac{1}{1 - d[q]} \sum_{i=0}^l x_i x_{i+1},$$

where d is a continuous function which maps $[0, 1]$ onto $(0, 1)$.

“Time passes quickly between incarnations.”

Embodiment-Dependent Discounting

Nested as special cases:

- ▶ **Total Utilitarianism:** $d[q] = \bar{d}$ with $0 < \bar{d} < 1$. Critical level is zero.
- ▶ **Average Utilitarianism:** $d[q] = 1 - \gamma q$ with $0 < \gamma < 1$. Critical level is average utility.

With milder dependence of discounting in incarnation, avoid both extremes.

Embodiment-Dependent Discounting and Social Choice Axioms

Some criteria that embodiment-dependent discounting may violate:

- ▶ Independence of utility level of people who have same utility in two allocations.
- ▶ Negative expansion principle.
- ▶ Anonymity (with respect to birthdate).

Unlike critical-level utilitarianism, soul-based utilitarianism satisfies priority for lives worth living.

Utility-Dependent Discounting

Souls might discount different depending on how enjoyable incarnations are.

With utility-dependent discounting, soul utility is:

$$u = \sum_{t=0}^{\infty} \prod_{j=0}^{t-1} d[q, \bar{x}] \sum_{i=0}^I x_i x_{i+1}.$$

Here $d[q, \bar{x}]$ is a continuous function which maps $[0, 1] \times \mathbb{R}$ onto $(0, 1)$.

Utility-Dependent Discounting

Example:

“Time passes quickly when you are having fun:”

$$d[q, \bar{x}] = \frac{\tilde{x}}{1 + \tilde{x}} \bar{d} + \frac{1}{1 + \tilde{x}} (1 - \gamma q)$$

with $0 < \bar{d} < 1$, $0 < \gamma < 1$, and where $\tilde{x} = \max\{0, \bar{x}\}$.

Utility-Dependent Discounting

To meet negative expansion principle, can modify this to only take account of lives above neutrality:

$$d[q, \bar{x}] = \frac{\hat{x}}{1 + \hat{x}} \bar{d} + \frac{1}{1 + \hat{x}} (1 - \gamma q)$$

with $0 < \bar{d} < 1$, $0 < \gamma < 1$, and where:

$$\hat{x} = \frac{\sum_{i=0}^I x_i \max\{0, x_{i+1}\}}{\sum_{i=0}^I x_i I\{x_{i+1} > 0\}}.$$

A Specific Example

One type, population P , probability of embodiment $q = P/S$.

Individual utility:

$$\bar{x} = x_{I+1} = U(c) = c^{1-\sigma}/(1-\sigma) \text{ with } \sigma \in (0, 1).$$

Soul utility:

$$u = \sum_{t=0}^{\infty} \prod_{j=0}^{t-1} d[q] \quad q\bar{x} = \frac{q}{1-d[q]} U(c) = \frac{P/S}{1-d[P/S]} U(c).$$

Production with fixed factor L : $Y = AL^{\nu}P^{1-\nu}$. Consumption then is:

$$c = Y/P = AL^{\nu}P^{-\nu}.$$

Total Utilitarianism

With constant discount factor $d[P/S] = \bar{d}$, social welfare function is:

$$V = \frac{P/S}{(1 - \bar{d})(1 - \sigma)} (AL^\nu P^{-\nu})^{1-\sigma}.$$

Increasing in P !

Maximum population size, minimal consumption, get the repugnant conclusion.

Average Utilitarianism

With discount factor $d[P/S] = 1 - \gamma P/S$ with $0 < \gamma < 1$, social welfare function is:

$$V = \frac{1}{\gamma(1 - \sigma)} (AL^\nu P^{-\nu})^{1-\sigma}$$

Decreasing in P !

$P = 0$, consumption approaches infinity, wait time for incarnation approaches infinity .

Soul Utilitarianism with Embodiment-Dependent Discounting

With discount factor $d[P/S] = \beta - \gamma(P/S)$, social welfare function is:

$$u = \frac{P/S}{(1 - \beta + \gamma P/S)(1 - \sigma)} (AL^\nu P^{-\nu})^{1-\sigma}$$

Optimal population level:

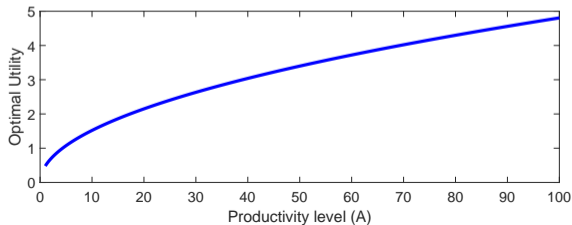
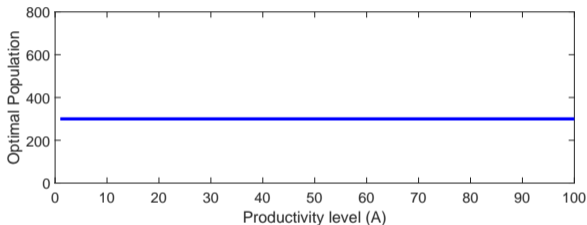
$$P = S \frac{(1 - \beta)(1 - \nu(1 - \sigma))}{(1 - \sigma)\gamma\nu}.$$

Individual welfare varies with productivity, population does not.

Soul Utilitarianism with Embodiment-Dependent Discounting

Social optimum for different productivity levels:

($L = 1$, $\sigma = \nu = 0.5$, $\beta = 0.99$, $\gamma = 0.1$, $S = 1000$)



Soul Utilitarianism with Utility-Dependent Discounting

Consider the utility-dependent discount factor:

$$d[q, \bar{x}] = \frac{\tilde{x}}{1 + \tilde{x}} \bar{d} + \frac{1}{1 + \tilde{x}} (1 - \gamma q).$$

Approaches average utilitarianism for low utility levels, total utilitarianism for high utility levels.

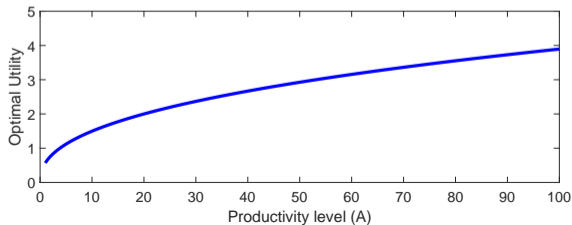
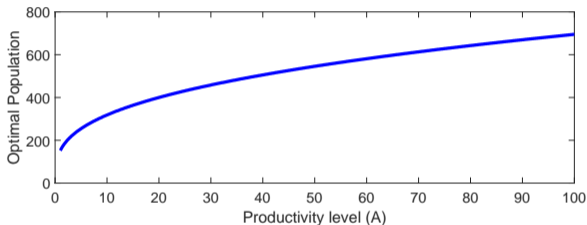
Captures the notion that time passes quickly when you are having fun.

Criterion yields smooth variation of both population and individual welfare with productivity.

Soul Utilitarianism with Utility-Dependent Discounting

Social optimum for different productivity levels:

($L = 1$, $\sigma = \nu = 0.5$, $\beta = 0.99$, $\gamma = 0.1$, $S = 1000$, $\bar{d} = 0.99$)



Critical Level Utilitarianism

Critical level utilitarianism with critical level ω yields social welfare function:

$$V^{CU} = P \left((AL^\nu P^{-\nu})^{1-\sigma} - \omega \right)$$

Can avoid repugnant conclusion by setting $\omega > 0$.

Optimal population and individual welfare:

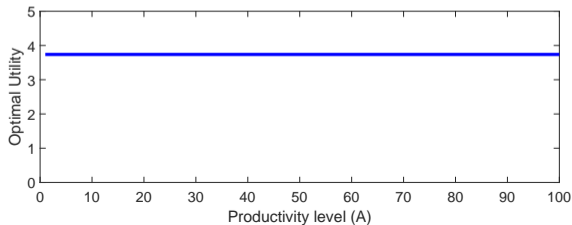
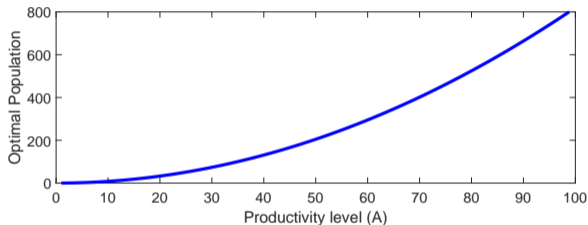
$$P = A^{\frac{1}{\nu}} L \left(\frac{1 - \nu(1 - \sigma)}{\omega(1 - \sigma)} \right)^{\frac{1}{\nu(1 - \sigma)}},$$
$$U(c) = \frac{\omega(1 - \sigma)}{1 - \nu(1 - \sigma)}.$$

Population varies with productivity, individual welfare does not.

Critical Level Utilitarianism

Social optimum for different productivity levels:

($L = 1$, $\sigma = \nu = 0.5$, $\beta = 0.99$, $\gamma = 0.1$, $\omega = 1.1$)



Conclusion

Soul-based welfare provides new perspective on population problem.

Puts spotlight on discounting of future generations' welfare.

Can generate welfare criteria where both population size and individual welfare respond to economic environment in an intuitive way.

