



Is global social welfare increasing? A critical-level enquiry



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ABSTRACT

We assess whether global social welfare has improved in the last decades despite (or because of) the substantial increase in global population. We use for this purpose a relatively unknown but simple and attractive social evaluation approach called *critical-level generalized utilitarianism* (CLGU). CLGU posits that social welfare increases with population size if and only if the new lives come with a level of living standards higher than that of a *critical level*. Despite its attractiveness, CLGU poses a number of practical difficulties that may explain why the literature has left it largely unexplored. We address these difficulties by developing new procedures for making partial CLGU orderings. The headline result is that we can robustly conclude that world welfare has increased between 1990 and 2005 if we judge that lives with *per capita* yearly consumption of more than \$1,248 necessarily increase social welfare; the same conclusion applies to Sub-Saharan Africa if and only if we are willing to make that same judgment for lives with *any level of per capita* yearly consumption above \$147. Otherwise, some of the admissible CLGU functions will judge the last two decades' increase in global population size to have lowered global social welfare.

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1. Introduction

It took roughly 250,000 years for humanity to reach 250 million individuals – *viz.*, at around 1 AD. It took another 1800 years for the global population to reach 1 billion. Between 1800 and 1960, that level grew to 3 billion. The estimated global population size reached 7 billion at the turn of 2011–2012 (see [United Nations, 2011](#)); current 2020 projections of the size of humanity stand at about 7.6 billion. These increases in global population sizes have been a frequent source of concern. Such concerns feed mainly on the Malthusian preoccupation that large populations can put unsustainable pressure on limited natural resources and fixed assets such as land (see for instance [Ehrlich and Ehrlich, 1990](#); [Cohen, 1995](#); [Dasgupta, 2010](#) and [Eastin et al., 2011](#)), although it has been conversely argued that population growth can also serve as a vehicle for economic development by stimulating human ingenuity and technological progress and improving the effectiveness of the provision of public goods (see for instance [Klasen and Nestmann, 2006](#) for numerous references to the literature and [Nerlove et al., 1986](#) for a model of the overall trade-off).

While it is certainly useful to analyze population growth and living standards from a *causal* perspective (as has often been done: see [Cassen, 1994](#) and [Birdsall et al., 2003](#) for a review), it would seem equally important to assess the joint *normative* effect of demographic growth and living standards on the *value* of societies. It is indeed such a normative assessment that should presumably guide demographic and development policies. A normative assessment of the joint impact of population sizes and living standards on societies raises fundamental ethical issues, however, and those issues have been somewhat neglected in the recent debates on global trends in welfare and poverty. It is our main objective in this paper to address them in a simple, original and (we believe) persuasive normative setting.

There are two major existing normative measures of the impact of population growth and living standards on social welfare. Both of them incorporate an implicit trade-off between the “quantity” and the “quality” of lives (the quality of lives being measured by their well-being, their utility, or their living standard – as in the case of our empirical application below). They derive from the standard social evaluation approaches consisting of total and average utilitarianism.

Total (or *classical*) utilitarianism is the oldest form of utilitarianism. It values society's welfare by the sum of utilities and thus sets the government's objective function to the “greatest happiness of the greatest number” (in the words of the total utilitarians, see [Burns and](#)

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Hart, 2000, p. 393). The implications of total utilitarianism are clear: the quantity of lives can compensate for their quality. It has been convincingly argued, however, that this can lead to a “repugnant” trade-off, a term used in Parfit (1984)’s famous “repugnant conclusion”. Parfit considers as a repugnant implication of total utilitarianism the fact that any sufficiently large population, even with a very low level of average utility, could be deemed preferable to any other smaller population with a relatively high level of average utility¹:

“For any possible population of at least ten billion people, all with a very high quality of life, there must be some much larger imaginable population whose existence, if other things are equal, would be better, even though its members have lives who are barely worth living.” (Parfit, 1984, p. 388).

A revised version of utilitarianism that avoids the repugnant conclusion is average utilitarianism. Edgeworth (1925) attributes it to John Stuart Mill, who indeed chose it to justify limits to population sizes,² although Say, Sismondi and Wickcell were probably earlier users of an average principle in the discussion of an optimal population size (see Guillaumont, 1964; Sumner, 1978 and Blackorby and Donaldson, 1984). Average utilitarianism, however, also has “repugnant” implications. A policy designed on average utilitarianism will seek to maximize average utility, regardless of how small population size may result. A population with only a few individuals may be preferred to an arbitrarily larger one with almost the same average well-being.³ The death of a person with below-average utility (as in the case of a relatively poor person) will increase social welfare (see Cowen, 1989; Broome, 1992a and Kanbur and Mukherjee, 2007). The replication of a population with no effect on average utility would also be a matter of social indifference.

Average utilitarianism can also lead to important (and sometimes disturbing) population policy implications. Take for instance China’s 1979 implementation of the one-child policy, which has probably contributed to the remarkable increase in China’s average living standards over the last three decades (see Hasan, 2010; Bussolo et al., 2010 for references and some evidence). The one-child policy has, however, caused an important reduction in population growth and contributed to levels of (sometimes forced) abortions of the order of 10 million per year.⁴ Such effects on population size would, however, not be accounted for (at least directly) by average utilitarianism.⁵

Choosing one of these two measures of social evaluation is certainly difficult, and cannot be expected to generate consensus. We can,

¹ See Arrhenius (2011) for a discussion of how considerations of weaker formulations of the repugnant conclusion also generate difficulties when comparing populations of different sizes.

² “It is no accident that the average theory was devised strictly to handle questions of population” (Sumner, 1978, p. 99).

³ “An alternative with a population of any size in which each person is equally well off is ranked as worse than an alternative in which a single person experiences a trivially higher utility level” (Blackorby et al., 2005, p. 143). Also consider the following recently estimated impact of AIDS on the distribution of income in Côte d’Ivoire: “We find that although the size of the economy in terms of total household income is reduced by about 6% after 15 years, average household income per capita, household income inequality and poverty remain almost unchanged” (Cogneau and Grimm, 2008, p. 688). According to average utilitarianism, AIDS would then have had no effect on Côte d’Ivoire’s social welfare.

⁴ See <http://www.tldm.org/News13/13MillionAbortionsPerYearInChina.htm>. One outcome of this trade-off between the quantity and the quality of lives is that abortions of female fetuses are more common in China and elsewhere, largely explained by the perceived higher (private) cost/benefit ratio of raising a daughter – see Sen (2001) for a discussion. Klasen and Wink (2003) estimate for instance the number of “missing women” in the 1990s at nearly 41 million for China and 31 million for India.

⁵ Policies aimed at producing the “greatest happiness” can be deemed ethically unacceptable for reasons of procedural justice (justice of means), as opposed to reasons of consequential justice (justice of outcomes, such as the achievement of greater average or total utility) – see for instance Rawls (1971). The judgements of procedural justice and consequential justice may also overlap, as in the case of forced contraception, infanticides, abortion and forced migration. We focus in this paper solely on assessments of consequential justice.

however, address the underlying fundamental trade-offs between the quantity and the quality of lives that these measures capture through the *critical-level generalized utilitarianism* (CLGU) framework proposed by Blackorby and Donaldson (1984). This framework has the advantage of being both an alternative and a generalization of the above more traditional social evaluation frameworks – see page 5 for more details on this.

CLGU functions are defined as the aggregation of the differences between individual welfare (or utility) and the welfare of someone with an income level equal to a *critical level*. The critical level is the minimum income needed for someone to add to social welfare. CLGU can thus serve to assess the impact on social welfare of adding a new life to an existing population. CLGU functions can also be expressed as the product of population size and the difference between average welfare and welfare at the critical level. CLGU thus provides an explicit framework for trading off average welfare and population size. Choosing a relatively high value of the critical level results in optimally smaller populations; choosing a lower value results in optimally larger populations.

Despite its attractiveness, CLGU poses important practical difficulties, which have impeded its application and explained in large part its relative lack of popularity. The most salient of these are the choice of an individual welfare aggregation function and the assignment of a value to the critical level. It is indeed difficult to agree on one precise form of a CLGU function. It is also difficult to agree on the appropriate value of the critical level. The level has to be high enough to avoid the repugnant conclusion; the level also has to be low enough not to rule out additions of lives that are worth living. In a world of heterogeneous normative preferences and opinions, it is naturally difficult to envisage a wide consensus on something as fundamentally un-consensual as the precise *value of living*.

Our first main objective in this paper is hence to address these difficulties by deriving procedures for making partial social orderings over classes of CLGU functions. These orderings are designed to be robust to choices of individual welfare functions (within certain classes of such functions) and to ranges of the critical level.

In addition to being useful themselves, these orderings resonate very well with an important aspect of recent debates on the evolution of global poverty. Consider for instance the following extract from Angus (Deaton, 2010) presidential address to the American Economic Association (using a poverty line of \$1.25 per person per day in 2005 international dollars):

“[The figures] show the well-known reduction in the global headcount ratio, from 51.9 percent of the world’s population in 1981 to 25.2 percent in 2005. In spite of growth in the world’s population, the number of people in this kind of poverty has fallen by more than half a billion in the last quarter century. Much of this success comes from China, in the East Asia and Pacific region. The headcount ratio in Sub-Saharan Africa has fallen only slowly, and there are 176 million more Africans in poverty in 2005 than in 1981. South Asia, dominated by India, is part success and part failure, and the Bank – and the government of India – estimate that, in spite of a falling headcount ratio, there has been a small increase in the numbers of Indians in poverty since 1981, in spite of India’s relatively rapid growth in per capita GDP in recent years, and its relatively slow rate of population growth.” (Deaton, 2010, p. 8)

Opposite movements of absolute and relative numbers of the poor emerge often in poverty comparisons. And when the numbers move in the same direction, they often do so at very different rates. This leads to a natural question: “If the absolute number of poor people goes up, but the fraction of people in poverty comes down, has poverty gone up or gone down?” (Kanbur, 2005, p. 228 and Mukherjee, 2008, p. 97; see also Chakravarty et al., 2006 and Pogge, 2005). Whether we should consider *absolute* (total population) indices or *proportional* (relative to total population size) indices to measure poverty would

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