Inequality and Population Change

Gustaf Arrhenius
Department of Philosophy, Stockholm University
Swedish Collegium of Advanced Studies
Collège d'Etudes Mondiales
Gustaf.Arrhenius@philosophy.su.se
Draft 121108

I. Introduction

We usually examine our considered intuitions regarding inequality by comparing populations of the same size. Likewise, the standard measures of inequality and its badness have been developed on the basis of such comparisons alone. Many real world policies, however, will affect the size of a population, especially in the long run. For example, many health policies are very likely to prevent deaths and affect procreation decisions. Trivially, policies directly aimed at increasing or curbing population growth affect the population size. In addition, if we are interested in measuring the development of global inequality during the last thirty years or so, we have to take into account the great population expansion in countries such as India and China. Hence, we need to consider how to extend measures of inequality to different number cases, that is, how to take into account the complication that population numbers are often unequal between the compared alternatives. Moreover, it turns out that examining different number case is a fruitful way of probing our ideas about egalitarian concerns. It reveals as yet unnoticed complexities and problems in current conceptualizations of the value of equality and points to a new understanding of this value, or so I'll argue. Considering such cases will reveal that the notion of equality is even more complex than Larry Temkin has already shown in his influential work on the value of inequality.[1]

Consider the following example:

[1] See Temkin (1993, 2012a, forthcoming).

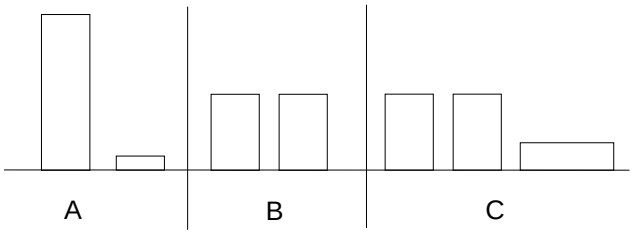


Diagram 1

The diagram above shows three populations: A, B, and C. The width of each block represents the number of people, and the height represents their lifetime welfare. These populations could consist of all the past, present and future lives, or all the present and future lives, or all the lives during some shorter time span in the future such as the next generation, or all the lives that are causally affected by, or consequences of a certain action or series of actions, and so forth. All the lives in the above diagram have positive welfare, or, as we also could put it, have lives worth living.[2] We shall also assume that all the people in the diagrams deserve their welfare equally much.

Population A consists of one group of people with very high welfare and a same-sized group with very low positive welfare. B is a perfectly equal population with the same number of people, total, and average welfare as A. C consists of the B-people and an extra group of people with lower positive welfare than the B-people.

One might ask how we should we rank these populations in terms of moral goodness or desirability, that is, how these populations are ordered by the relation "is at least as good as, all things considered". I take it that most of us would agree that B is better than A.[3] These two

---

[2] We shall say that a life has *neutral welfare* if and only if it is equally good for the person living it as a neutral welfare component, and that a life has *positive* (*negative*) welfare if and only if it has higher (lower) welfare than a life with neutral welfare. A welfare component is neutral relative to a certain life x iff x with this component has the same welfare as x without this component. A hedonist, for example, would typically say that an experience which is neither pleasurable nor painful is neutral in value for a person and as such doesn't increase or decrease the person's welfare. The above definition can of course be combined with other welfarist axiologies, such as desire and objective list theories (see below for a discussion of the "currency" of egalitarian justice). For a discussion of alternative definitions of a neutral life, many of which would also work fine in the present context, see Arrhenius (2000a, 2012, ch. 2 and 9). See also Broome (1999, 2004), and Parfit (1984, p. 357-8 and appendix G). Notice that we actually don't need an analysis of a neutral welfare in the present context but rather just a criterion, and the criterion can vary with different theories of welfare.

[3] I'm assuming here that we can compare populations such as A and B without any further information. Some theorists would deny this since they think an outcome can only be better or worse if it is better or worse for somebody, which might not be the case if A and B consist of different people. To apply these so-called "person affecting views", we also need to know the identities of the individuals in the compared populations. I've discussed these approaches at length elsewhere (Arrhenius 2000a, 2003, 2009b, 2012) and showed that, at best, they don't help much in solving problems in different number cases, so I won't dwell on them further here. For the purpose of the present paper, I'll assume that we can compare the value of populations without knowledge of the specific identities of the individuals in the compared populations (this approach is sometimes called, misleadingly in my view, the "impersonal view").

populations are equally large and have the same total and average welfare. The only difference is that there is inequality in A whereas B is perfectly equal. Hence, A is worse than B since it is worse in regards to equality, or so one might reasonably argue.[4]

It might not be as clear how we should rank population B and C. The number of best off people is the same in these two populations. The only difference between these two populations is that in C, there is a number of "extra" people whose lives are of poor quality but worth living. Could the existence of these extra lives which are worth living make C worse than B? Some would say yes since the C-population is worse in regards to equality: There is perfect equality in B but inequality in C, and this inequality counts against C.[5] Others would deny this. As Derek Parfit puts it in a discussion of a similar case, "[s]ince the inequality in [C] is produced by Mere Addition [as is the case in diagram 1], this inequality does not make [C] worse than B".[6] Moreover, there is a higher total of welfare in C, so even if we grant that C is worse with respect to equality, could this really outweigh the goodness of the extra welfare in C?

I've discussed the role of equality in the evaluation of populations of different sizes with respect to their all things considered goodness elsewhere and this is not the main topic of the present paper.[7] Rather, following in the tracks of Larry Temkin's influential work on inequality, I'm interested in the more limited topic of rankings of populations with regard to the value of equality alone, that is, how they can be ordered by the relation "is at least as good as with respect to egalitarian concerns".[8] It is then a further question how such a ranking would play in to the all things considered rankings of populations where we also have to consider other aspects such as the total wellbeing in a population. For example, whereas it seems clear that population B is better than A since B is better as regards to equality and equally good in respect to welfare, it is, as we pointed out above, unclear whether the badness of the inequality in C outweigh the goodness of the extra welfare so as to make C worse than B.

---

4 Prioritarians would agree that B is better than A but for a reason that doesn't turn on equality but rather that the gain for the worst off outweighs the loss for the best off.

5 C is also worse than B with respect to average wellbeing. However, Average Utilitarianism has a number of very counterintuitive implications in different number cases so we can safely put it to the side. See, e.g., Arrhenius (2000ab, 2012), and Parfit (1984), section 143.

6 Parfit (1984), p. 425.

7 Arrhenius (2009a, 2012).

8 See Temkin (1993, 2012, forthcoming).

One should distinguish this undertaking from the project of ranking populations in terms of the primarily descriptive relation "is at least as (un)equal as".[9] This is a very worthwhile project if we are, for instance, interested in investigating causal relationships between inequality and, say, health, crime, social cohesion, people's sense of self-respect, economic growth, and the like.[10] We shall consider some aspects of descriptive measures of inequality in the first part of the paper whereas the latter part will be focused on the evaluative question. As we shall see below, descriptive and evaluative measures of inequality are likely to come apart. For example, whereas a reasonable evaluative measure is likely to give greater weight to differences of welfare at low levels as compared to differences at high levels (that is, a population of two people at level (95, 100) is better than a population of two people at level (5, 10) with respect to egalitarian concerns), this might be harder to justify in a descriptive measure (albeit not impossible).[11] I also would like to point out that some of the measures of inequality that we shall discuss below have been primarily proposed as descriptive measures, or so it appears, whereas we shall investigate also as measures of the value of inequality.

One might be sceptical about our ability to rank populations by the relation "is at least as good as with respect to egalitarian concerns" rather than by the relation "is at least as good as all things considered". One might suspect that other value considerations will distort our judgements or that we cannot really make sense of the former ordering in contrast to the latter (compare with the discussion of the ranking of B and C above). This is a fair worry but I think we can make sense of such an ordering and bracket other value considerations. For example, we can ask ourselves what our well-informed preference from a moral perspective would be if we only cared about equality (of some sort).

More importantly, one might object that to understand the relation "is at least as good as with respect to egalitarian concerns", we already need to have a grip on the descriptive relation "is at least as (un)equal as". Since egalitarian concerns must supervene on some kind

---

[9] I say "primarily" since, as pointed out by Sven Danielsson (see Rabinowicz 2003, fn. 7), depending on the currency of inequality this relation might be partly evaluative because the currency might involve an evaluation. For example, to say that Nir has higher welfare than Ole in outcome X is an evaluation to the effect that Nir is *better off* than Ole in X.

[10] See Wilkinson & Pickett (2009) for an impressive study of the strong correlation between a country's level of economic inequality and its bad social outcomes.

[11] For further cases illustrating the difference between descriptive and evaluative measures, see Rabinowicz (2003), p. 63-6. Rabinowicz writes that "[m]aking larger distances weigh more might be justified as an expression of an evaluative standpoint, but hardly otherwise". However, even from a descriptive standpoint one could claim, I surmise, that the same difference contributes less to inequality at high levels as compared to low levels. One could claim, for example, that proportions matter: it matters whether I have only half or 95% of your wellbeing. This could be captured by measuring inequality by the difference in welfare divided with the average welfare of the compared lives. Hence, when individual welfare increases, the inequality diminishes even with a fixed welfare difference.

of relations of inequality among people, we need to know about them to be able to know what an egalitarian should be concerned about. This I think is a valid point which I do worry about but I think one can grant the point and still claim that we don't need to develop complete ranking of populations in terms of "is at least as (un)equal as" before we undertake the project of ranking populations in terms of the relation "is at least as good as with respect to egalitarian concerns". What we do need to consider is which objects are the basic building stones in such a ranking, and these might very well overlap with those involved in a descriptive ranking but we might put them together in different ways and give them different weights. Actually, I think this also holds for different descriptive relations of inequality of interest. Depending on the purpose for which we would like to use a descriptive measure, different ways of weighing together different egalitarian aspects will be fitting.

Still, one might ask what the point is of considering population change and different number cases from an egalitarian perspective. I think there are at least three reasons to consider such cases. Firstly, as the discussion above indicates, it might shed new light on the vexed topic of population ethics and our duties to future generations. Secondly, if we would like to measure the development of inequality over time, we have to take into account that the size of the compared populations might have changed. For example, when one tries to measure the development of global inequality during the last thirty years or so, one has to take into account the great population expansion in countries such as India and China. Thirdly, it might be a fruitful way of probing our ideas about inequality and egalitarian concerns and might reveal as yet unnoticed complexities and problems in our current measures of inequality and conceptualization of the value of equality, and suggest new ways of formulating it. This is indeed what I believe and it will be the main thrust of this paper.

An apt comparison is with average and total utilitarianism before population ethics took off. In respect to populations of the same size, average and total utilitarianism are extensionally equivalent. Since the former only presupposes measurement of welfare on an interval scale whereas the latter presupposes a ratio scale, most utilitarians (at least in economics) were of the former kind. However, in respect to populations of different size, these two theories have very different implications and those of average utilitarianism are so counterintuitive that the average utilitarian is close to extinct these days. Likewise, I think that considering population change and different number cases will reveal that the notion of equality is even more complex than Larry Temkin has already shown in his influential work on

inequality.[12] Moreover, it will show that there might be good reasons to reconsider what an egalitarian should be concerned about, or so I'll suggest.

Before turning to these questions, let me say a bit more about what kind of equality we shall discuss in this paper. Equality clearly plays a fundamental role in moral and political reasoning. Views about equality can differ immensely, however, depending on a number of factors: What kind of equality one is seeking (political, legal, moral, and so forth); the "currency" of equality (welfare, opportunity, rights, and so forth); among what kind of objects equality is supposed to hold (citizens, human beings, sentient beings, possible beings, groups, and so forth). It goes without saying that a full treatment of this subject is far beyond the reach of the present paper. We shall mainly consider one kind of equality: equality of welfare among people. However, the concept of welfare used here is a broad one. For the present discussion, it doesn't matter whether welfare is understood along the lines of experientialist, desire, or objective list theories.[13] Hence, many of the views presented in the debate on the currency of egalitarian justice as alternatives to welfare, for example Rawls' influential list of primary goods, will fall under the heading of welfare as the term is used in this paper.[14]

II. Total and Average Pairwise Welfare Differences

Here's an intuitive measure of the inequality in a population:

> *Total Pairwise Inequality (TPI)*: The sum of the absolute value of all welfare differences for all distinct pairs of individuals in the population.

Consider for example a population A consisting of three person p_1, p_2, p_3 with welfare 10, 20, and 20 respectively, that is A = <10, 20, 20>. According to TPI, we shall consider the absolute value of the welfare differences of all distinctive pairs of individuals in the population, that is, (p_1, p_2), (p_1, p_3), and (p_2, p_3), The measure of the inequality in A is thus:

$$TPI(\mathrm{A}) = |\,10\text{-}20\,| + |\,10\text{-}20\,| + |\,20\text{-}20\,| = 20$$

---

[12] See Temkin (1993, 2012, xxxx).

[13] For experientialist theories, see e.g., Sumner (1996), Feldman (1997, 2004), and Tännsjö (1998). For desire theories, see e.g., Barry (1989), Bykvist (1998), Griffin (1986), and Hare (1981). For objective list theories, see e.g., Braybrooke (1987), Hurka (1993), Rawls (1971), and Sen (1980, 1992, 1993).

[14] For this debate, see Rawls (1971), Sen (1980, 1992, 1993), Dworkin (1981a, 1981b, 2000), Cohen (1989, 1993), Arneson (1989), and Nielsen (1996). Rawls developed his list of primary goods as a part of his theory of justice, however, and not as a theory of welfare. He also claims that "… good is the satisfaction of rational desire" (1971, p. 93). Cf. Sumner (1996), p. 57.

TPI is a conceptually straightforward and an intuitive starting point since it seems appropriate that both the number and the size of inequalities matter. TPI also seems to capture what Temkin has in mind when he describes his "Individual Complaint Theory" (ICT) as the combination of his "Additive Principle of Equality" (AP) and "Relative to All Those Better Off View of Complaints" (ATBO) principle:[15]

> "… [T]he ultimate intuition underlying egalitarianism is that it is bad … for some to be worse off than others through no fault of their own. … [T]he additive principle reflects the view that if it is really bad for one person to be worse off through no fault of his own, it should be even worse for two people to be in such a position. Similarly, the relative to all those better off view of complaints reflects the view that if it is bad to be worse off than one person through no fault of your own, it should be even worse to be worse off than two. …. After all, to paraphrase the basic insight of the utilitarians, more of the bad is worse than less of the bad…"[16]

Similarly, Wlodek Rabinowicz has proposed a measure of the "amount of inequality" in a population which is exactly along the lines of TPI, although he only sees it as a descriptive non-evaluative measure of the amount of inequality in a population.[17]

Clearly, TPI is quite a simple theory and as an evaluative measure, we might reasonably want to adjust it so as to take into account that, for example, differences at low levels matter more than differences at high levels. However, let's instead turn to another simple measure proposed by Rabinowicz:[18]

> *Average Per Pair Inequality (APPI)*: The sum of the absolute value of all welfare differences for all distinct pairs of individuals in the population divided by the number of such pairs.

---

15 For more on these principles, see Temkin (1993), ch. 2. I take Temkin's talk about "complaints" just to be a heuristic device that shouldn't be taken literally.

16 Temkin (1993), pp. 200, 201.

17 Rabinowicz (2003), p. 62.

18 Rabinowicz (2003), pp. 61-2.

APPI is simply TPI divided by the number of distinct pairs of individuals in the population ½n(n-1), that is *APPI* = *TPI* / ½n(n-1). Consider again population A = <10, 20, 20>. Since the number of distinct pairs of individuals in this population is three, we get the following measure of the inequality in A:

APPI(A)= (| 10-20 | +| 10-20 | + | 20-20 |)/3 = 20/3.

Rabinowicz refers to APPI as a measure of "degrees of inequality". This I think is a misleading terminology. We can talk about the degree of total pairwise inequality and the degree of average per pair inequality, etc. (compare with the degree of total or average utility) but "degrees of inequality" sounds like it is about how unequal a population is taking all relevant aspects of inequality into account. More interestingly, one might ask why we should be interested in the average per pair inequality, why should we normalise with respect to the total number of distinct pairs of individuals in the population? A more natural normalizations, one might think, is to divide with the number of people in the population to get the average share of inequality per person:

> *Average Per Capita Inequality (APCI)*: The sum of the absolute value of all welfare differences for all distinct pairs of individuals in the population divided by the number of individuals.

We might find this measure conceptually clearer than APPI and that the difference between TPI and APCI is analogous to the difference between total and average utility.

Let's lastly turn to the most popular standard measure of inequality, the Gini coefficient:

$$Gini\text{: } \frac{1}{2n^2\hat{y}}\sum_{i=1}^{n}\sum_{j=1}^{n}|y_i - y_j|$$

Gini takes all the possible pairs n^2 in the population, including the identity pair (e.g., (p_1, p_1) - the individual is compared with herself) and sums the difference between them twice (e.g., first $|p_1 - p_2|$, then $|p_2 - p_1|$), then divides with the number of all pairs n^2 times two (which includes the number of identity pairs) and the mean $\hat{y}$. As this description brings out, Gini is queer from a conceptual point of view. It is hard to find an intuitive reason why one

should take into account all the ordered pairs of a population including the identity pair. After all, inequality is normally taken to be a about relationship between *different* individuals. Actually, James Foster has suggested a version of the Gini coefficient that "some would consider a more natural measure of inequality". In that version only distinct pairs of individuals are counted, that is, n^2 is replaced with $\frac{1}{2}n(n-1)$ and the resulting measure is, interestingly, a mean normalized version of APPI.[19]

So here we have a number of competing measures of inequality or the value of inequality. Let's try out these measures on a number of cases to see how they differ. Let's first start with a case made famous by Temkin:

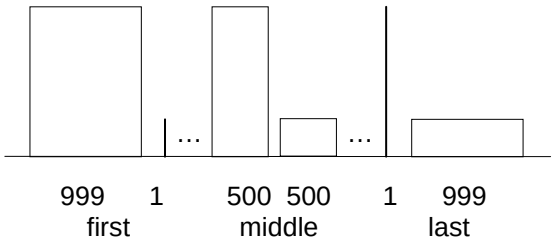


Diagram 2: Temkin's Sequence

In the Sequence, we have a thousand populations, each consisting of a thousand persons. In the first one, we have 999 best off people and one worst off person. The level of welfare of the best of people is the same in all populations, and likewise for the worst of people. As we go down the sequence, however, the number of best off people decreases and the number of worst off people increases. In the middle population, there is an even split between the number of worst and best off people. In the last population, there is one best off person and 999 worst off people.

In terms of Temkin's complaints theory, we can describe the Sequence as first involving one individual with 999 complaints, then 500 individuals with 500 complaints each, and lastly 999 individuals with one complaint. Hence, the badness of the inequality first increases, peaks at middle population, then decreases.

What is the verdict of TPI and APPI? Well, we first have 999 pairs involving an inequality, then 500 x 500 such pairs, and lastly again 999 such pairs. Hence, TPI also implies that inequality first increases, peaks at the middle population, and then decreases so that we have the same situation in regards to inequality in the last population as in the first population.

---

[19] For the same point, see Rabinowicz (2003), p. 66 and fn. 9. It is also a bit odd to sum the differences between individuals twice although it doesn't matter much since the result is divided with two.

Likewise, APPI and APCI yield the same result since the number of distinct pairs and, trivially, the number of people are constant in same number cases. Gini also agrees that in this case inequality increases up to middle, then decreases.[20]

As pointed out by Rabinowicz, TPI and APPI yields the same ordering in terms of inequality in same number cases since the number of distinct pairs is constant.[21] We can add that this also is true for APCI. In other words, these views are extensionally equivalent in same number cases. To distinguish these views we thus have to turn to different number cases.

III. Proportional Variations in Population Size

Consider the following case:

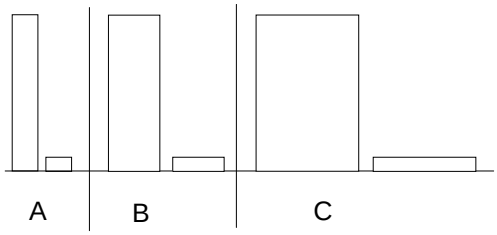


Diagram 3: Proportional Variations

In the above diagram, the best off people have the same level of welfare in the three populations A, B, and C, and likewise for the worst off people. There is, however, a doubling of the population size of the worst and best off groups in B as compared to A, and in C as compared to B. According to what Temkin calls "the Standard View", which is also called "the Population Principle", the above populations do not differ with regards to inequality:

> *The Standard View (SV)*: Proportional population size variations do not affect (the badness of) inequality.[22]

---

[20] Gini doesn't yield this result for smaller populations since then inequality might continue to increase after middle (a bit inexplicably). Moreover, TPI and APPI gives the same ranking of all the involved populations whereas Gini ranks some of the differently, e.g., the last population is ranked as more unequal than the first.

[21] Rabinowicz (2003), p. 74.

[22] See Temkin (1993), p. 191. Temkin's statement of this principle is, however, a bit different from mine: "Proportional variations in the number of better- and worse-off do not affect inequality". My statement is similar to Rabinowicz (2003), p. 75. Dalton (1920), p. 357, might have been the first to formulate this principle (although in terms of income) under the name "the principle of proportionate additions to persons". Foster (1985), pp. 42, 45, calls it "the population principle" and this seems to have become the received label in the economic literature. Rabinowicz (2003), fn. 19, claims that Foster "refers to this view as the requirement of population homogeneity" but Foster doesn't use this label (he uses the label "homogeneity" for a different requirement, see p. 42). He does, however, write that "condition PP [the population principle] also acts as a 'population homogeneity' property" (p. 46).

All standard economic measures of inequality, such as the Gini coefficient, imply SV and it has been taken as an adequacy condition for a measure of inequality. According to TPI and Temkin's ICT, however, proportional increases in population size increase inequality since the number of pairs consisting of unequal individuals increases. In other words, with a proportional increase, there are more worst off people and thus a greater number of complaints. APCI also implies that proportional increases increase inequality, the reason being that the number of unequal pairs increases faster than the number of people.[23]

Intriguingly, APPI has the opposite implication: Proportional increases in population size decrease inequality since the number of pairs of equal individuals increases faster than the number of pairs of unequal individuals. For example, consider population A1 = <10, 20, 20> and A2 = <10, 10, 20, 20, 20, 20>, the latter population being a proportional increase in population size (a doubling) relative to the former. According to APPI, the measures of inequality in these two populations are as follows:

$$APPI(\text{A1}) = (2|10-20| + |20-20|)/3 = 20/3 = 200/30.$$
$$APPI(\text{A2}) = (8|10-20| + |10-10| + 6|20-20|)/15 = 80/15 = 160/30.$$

Hence, APPI ranks A1 as worse with regard to inequality as compared to A2. The reason is that APPI not only takes into account the number of unequal pairs but, in difference from TPI and APCI, is also sensitive to the number of equal pairs in a population since they figure in the denominator. In the change from A1 to A2, the number of unequal pairs increases from 2 to 8, a fourfold increase, whereas the number of equal pairs increases from 1 to 7, a sevenfold increase. Consequently, the fraction of equal pairs relative to all pairs goes up in the move from A1 to A2. The equal pairs are 1/3 of all pairs in A1 but 7/15 (close to half) of all pairs in A2.[24]

So an interesting aspect of APPI is that the number of equal pairs affects the measure of inequality in a situation. As I'll explain below, I think this is a move in the right direction when we consider the badness of inequality although I think APPI gives too much weight to increases in equal pairs, as its implication in the above case illustrates.

---

[23] IN the case described just below, APCI(A1)=20/3 whereas APCI(A2)=80/6=80/3.

[24] For the same point regarding TPI, APPI, and proportional increases in population size, see Rabinowicz (2003), pp. 75-6. There are other measures that violate the Standard View in the same manner as APPI, see Foster (1985), pp. 63f., and Rabinowicz (2003), fn. 21.

What is then the right answer to these two cases of proportional variation? Well, I think SV is false as an adequacy condition for measures of the value of inequality and I also think that APPI gets it wrong in this case (and thus also the standard economic measures taken as measures of the value of inequality). Here, I find the verdict of TPI, APCI, and Temkin's ICT intuitively compelling: A2 is worse than A1 with respect to egalitarian concerns since there is a greater number of worst off people (and thus a greater number of complaints) in A2 as compared to A1, a greater number of people who are worse off through no fault of their own. For the same reason, B and C in the diagram above are worse than A regarding egalitarian concerns. As we shall show below, however, there are other versions of proportional population variations in which our intuitions might lean towards APPI's verdict rather than TPI's.

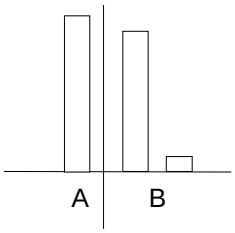
What about descriptive measures of inequality? Is SV an intuitive adequacy condition for such measures? Well, there are some things that we can say uncontroversially about proportional variations: Same proportions of the number of best and worst off, same range, that is, same difference in welfare between the best and worst off, the number of unequal pairs increase with proportional increases and likewise for the number of equal pairs. I'm a bit tempted to say that at least the amount of inequality increases with proportional increases since the number of unequal pairs increases. However, we also have to take into account that the number of equal pairs increases in cases like the one above. Hence, I find it hard to say which population is the more unequal one or whether there is no change in regards to inequality. Rather, here we might have to accept that there is no clear sense in which these populations are more or less unequal and that the only thing we can say is that different aspects of inequality increases, decreases or stays the same. Of course, this means that even for descriptive measure of inequality, SV is not a compelling adequacy condition.

IV. Adequacy Conditions

Since SV is neither a compelling adequacy condition for evaluative measures, nor for descriptive ones, one might ask if there is another one that we could use for the evaluation of different measures. An uncontroversial condition of this kind (to the best of my knowledge) for same number case is the Pigou-Dalton condition:

> *Pigou-Dalton*: A transfer of income from a richer to a poorer person decreases (the badness of) inequality so long as that transfer does not reverse the ranking of the two.[25]

This condition is satisfied by all the measures we have considered so far (it is violated by the range measure but so worse for this measure). The question is, can it be applied to different number cases, that is, to cases that involve changes in the population size? If we assume that a person is better off (richer) existing with positive welfare (positive income) rather than not existing at all, then we can apply it. We can then transfer from the better off by creating more people with positive welfare while keeping the total welfare constant. However, this will yield counterintuitive results. Consider the following case:



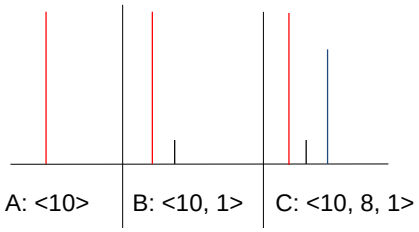
There is the same total welfare in both of the above populations but in B, we have added some people with positive welfare and decreased the welfare of the best off accordingly. Here, the proposed extension of Pigou-Dalton to different number cases implies implausibly that B is more equal than A. Moreover, if we reject the idea that a person is better off (richer) existing with positive welfare (positive income) rather than not existing at all, then Pigou-Dalton isn't applicable to different number cases. Hence, there seem to be no reasonable extension of Pigou-Dalton to different number cases.

Is there another reasonable adequacy condition for inequality measures in different number cases? Let me dare to propose one (since it is a new one, I wouldn't be surprised if there is a counterexample to it…):

> *Mere Additions of Unequal Relations (MAUR)*: Mere additions of unequal relations increase (the badness of) inequality.

---

[25] "A transfer of income from a richer to a poorer person, so long as that transfer does not reverse the ranking of the two, will result in greater equity", Dalton (1920), p. 351.



We have a mere addition of unequal relations when we keep the original population unaffected, add some unequal relations but no equal ones. This is the case in the above diagram. In B we have added one unequal relation relative to A (<10, 1>) and I take it that no one would deny that B is more unequal than A. In C, we have added another person which yields yet two more unequal pairwise relations: <10, 8> and <8, 1>. Hence, MAUR implies that C is more unequal than B which I find intuitively appealing.

TPI clearly satisfy MAUR. However, it is violated by Gini since $G(B) = 0.41$ whereas $G(C)=0.32$. Likewise, APPI(B)=9 whereas APPI(AC)=6. Hence, according to Gini and APPI, B is more unequal than C. So if we find MAUR an attractive adequacy condition for either a measure of inequality or the value of inequality, we should reject Gini and APPI.

IV. Mere Additions of Better off People

Let me now turn to some cases which show that there are reasons to consider a reconceptualization of the value of equality (I shall below only consider the evaluative question and leave the descriptive measures of inequality behind). Consider the following case:

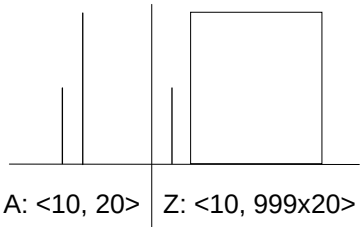


Diagram 4: Mere Additions of Better off People

In A above we have two persons, one with half of the welfare of the other. In Z, we have added another 998 best off people. Z seems intuitively to be better with respect to egalitarian

concerns since Z is very close to perfect equality. A, on the other hand, is a straightforwardly unequal population. Notice that this is not a case of mere additions of unequal relations since we have also added a number of equal relations.

Here's how we can analyse the above intuition. In A, there are no relations of equality but one relation of inequality. In Z, on the other hand, there is a staggering 498 501 relations of equality, which in comparison dwarfs the puny 999 relations of inequality.[26] Hence, I surmise, one might reasonably judge Z as better than A in regard to egalitarian concerns, and a natural way to account for this intuition is to claim that from an egalitarian perspective, we should care not only about relations of inequality but also about relations of equality. Moreover, contrary to the received view, I suggest that equal relations are not just of neutral value because of absence of inequality but have a positive value which sometimes can outweigh the negative value of unequal relations. Egalitarians should thus not only be concerned with the badness of unequal relations but also with the goodness of equal relations.[27]

Interestingly, that Z is better than A in regards to egalitarian concern is implied by the Gini Coefficient (and some other standard economic measures, for example, Relative Mean Deviation).[28] The Gini Coefficient is approximately 0.17 for A and only 0.0005 for Z.

Likewise, APPI ranks Z as better than A with respect to inequality since $APPI(A) = (|10-20|)/2(2-1)/2 = 10$ whereas $APPI(Z) = (999|10-20|)/(1000*999)/2 = 0.02$. The reason for this ranking is the same as we have seen before: The number of pairs of equal individuals increases faster than the number of pairs of unequal individuals.

TPI, on the other hand, implies that Z is worse than A with regard to inequality since in the change from A to Z, the number of unequal relations increases, from 1 to 999. Likewise according to Temkin's ICT since the worst off person has many more complaints in Z as compared to in A, 999 complaints versus 1.

---

[26] Since the number of pairwise relations in a population of size n is $\frac{1}{2}n(n-1)$, we get that the number of equal relations in Z is $999(999-1)/2 = 498501$.

[27] Kawchuk (1996) makes a similar proposal in her excellent MPhil-thesis to which I owe much of the inspiration for the current paper.

[28] See Kawchuk (1996), p. 159. A measure proposed by Derek Parfit is likely to have the same implication. Parfit compares two populations, A+ and Alpha. A+ consists of two groups of people of the same size, one with 100 units of welfare per person, and one with 50 units of welfare per person. Alpha consists of one group of the same size as A+ but with 105 units of welfare per person and a very large group of people with 45 units of welfare per person. He writes: "The inequality in Alpha is in one way worse than the inequality in A+, since the gap between the better-off and the worse-off people is slightly greater. But in another way the inequality is less bad. This is a matter of the relative numbers of, or the *ratio* between, those who are better-off and those who are worse-off. Half of the people in A+ are better off than the other half. This is a worse inequality than a situation in which almost everyone is equally well off, and those who are better off are only a fraction of one per cent. - - - All things considered, the natural inequality in Alpha is not worse than the natural inequality in A+." Parfit (1986), p. 156.

Although APPI and the Gini Coefficient yield the right result in the above case, a version of it will bring out a problem with these approaches. As we saw earlier, APPI gives too much weight to equal relations. Actually, the same holds true for the Gini Coefficient. Consider the following sequence version of Mere Additions of Better off People:

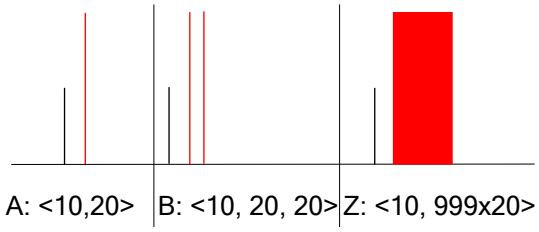


Diagram 5: Mere Additions of Better off People Sequence

According to both APPI and the Gini Coefficient, B is better than A with respect to inequality since $APPI(A)=10$ and $GC(A) \approx 0.17$ whereas $APPI(B) \approx 6.67$ and $GC(B) \approx 0.13$ (Z is better than both A and B with respect to inequality, see above). This ranking of A and B might strike one as a bit odd. In A there is one relation of inequality and no relations of equality whereas in B there are two relations of inequality and one relation of equality. To judge B as better than A regarding egalitarian concerns is tantamount to judging that the positive value of one relation of equality outweighs the negative value of one relation of inequality. Moreover, this holds irrespective of how small the difference is between the best and worst off in A and B. This gives too much weight to relations of equality relative to relations of inequality, methinks. Rather, in the move from A to B we may well judge that things have gotten worse with respect to egalitarian concerns since the doubling of the relations of inequality (making the aggregated complaints greater) outweighs the positive effect of creating just one relation of equality.

Hence, in regards to APPI and the Gini Coefficient on the one hand, and TPI and Temkin's ICT on the other hand, we seem to be caught between Scylla and Charybdis: Either we get the wrong result in regards to Proportional Variations (APPI) and the Mere Additions of Better off People Sequence (APPI and Gini Coefficient) or we get the wrong result in regards to the Mere Additions of Better off People (TPI and Temkin's ICT) case. Can we do better?

V. Giving Positive Value to Relations of Equality

What the Mere Addition of Better off People cases brings out quite clearly, I think, is that as egalitarians we should care not only about relations of inequality but also about relations of equality. The idea is that the more people that are unequal, the worse in regards to egalitarian concerns, other things being equal; *and* the more people that are equal, the better in regards to egalitarian concerns, other things being equal. Hence, the egalitarian value of a population is a function both of pairwise relations of inequality (negative) and relations of equality (positive). Let's call this view Positive Egalitarianism:

> *Positive Egalitarianism*: The egalitarian value of a population is a strictly decreasing function of pairwise relations of inequality and a strictly increasing function of pairwise relations of equality.[29]

This formulation leaves a lot of possibilities open as regards how to aggregate the value of equal and unequal relations. For example, the aggregation function for the negative value of unequal relations might be strictly linear whereas the function for the positive value of equal relations might be a strictly increasing concave function with an upper limit. Nevertheless, with this approach, we can capture the intuitions regarding the cases discussed above.

Consider first Temkin's Sequence (Diagram 2). What happens in this case according to Positive Egalitarianism? Well, there are more relations of equality in "first" and "last" as compared to "middle" (498 501 as compared to 249 500). Moreover, there are fewer relations of inequality in "first" and "last" as compared to "middle". Thus, as we get closer to "middle", there is both an increase in unequal relations and a decrease in equal relations. Hence, like TPI and ICT, Positive Egalitarianism implies that the sequence first gets worse, then better in regards to egalitarian concerns since the egalitarian value first decreases, reaches its lowest value at "middle", and then starts increasing again.

Consider now the case of Proportional Variations (Diagram 3). Recall that according to TPI and ICT, proportional increases in population size always increase the badness of inequality whereas according to APPI, proportional increases always decrease the badness of inequality. Although we agreed with TPIA and ICT in connection with the particular case depicted in Diagram 3, neither of these answers are satisfactory as general principles since

[29] I think this principle is plausible at least as long as we are dealing with positive welfare levels. It might be that relations of equality involving negative welfare shouldn't be assigned a positive value. I'll say a bit more about this in the last section.

whether proportional increases are good or bad from an egalitarian point of view should depend on the structure of the case. If there are few relations of inequality, then it should be possible that the badness of these relations is outweighed by the goodness of the increase in the number of equal relations. Moreover, if the inequalities are very small, then it should be possible that the badness of these is outweighed by a sufficiently great increase in the number of equal relations. In other cases, the badness of the increase in the unequal relations might outweigh the goodness of the increase in equal relations. Consider for example the following version of Proportional Variations:

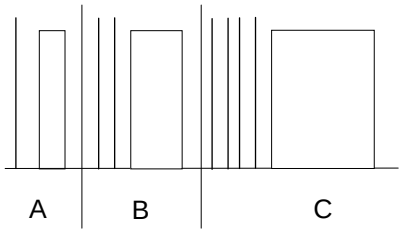


Diagram 6: Proportional Variations with Few and Small Inequalities

In this case, the inequality in welfare between the best off and worst of is very small and there is a small number of best off people as compared to the number of worst off people. Hence, there is a greater increase in the number of equal relations as compared to the number of unequal ones when we move from A to B and from B to C. Still, TPI and ICT imply B and C are worse than A in regards to egalitarian concerns. Contrariwise, this is a case of Proportional Variations of which it is reasonable to claim that the goodness of the increase in equal relations outweighs the smaller increase in slightly unequal relations.[30]

In difference from TPI and ICT, Positive Egalitarianism can capture this structural dependence of the egalitarian value of proportional size increases since both the numbers of relations of inequality and equality increase with such increases. Depending on the weight we give to relations of inequality and equality we can get the result that sometimes proportional increases make the situation worse, sometimes better, and sometimes no difference, in regards to egalitarian concerns.

Lastly, consider the Mere Additions of Better off People Sequence (Diagram 5). In this case, APPI and the Gini Coefficient implied that B and Z are better than A with respect to inequality. As we said, it is reasonable to judge that Z is better than A as regards egalitarian concerns since in A there is one relation of inequality and no relations of equality whereas in Z there are 999 relations of inequality but a whopping 498 501 relations of equality. Positive

[30] Another possible explanation, which I shall return to in the last section, is that slightly unequal relations don't have negative value.

Egalitarianism can of course capture this intuition since it also gives positive value to equal relations.

However, as we pointed out above, it doesn't seem reasonable that the doubling of relations of inequality in B relative to A is outweighed by the addition of one relation of equality. Hence, B is worse than A with regard to egalitarian concerns and APPI and the Gini Coefficient get it wrong in this case. Positive Egalitarianism, on the other hand, can accommodate this intuition. By assigning the right relative weights to the value of unequal and equal relations, Positive Egalitarianism will imply that first the situation get worse and then better with regards to egalitarian concerns, as with the Temkin's sequence. For example, it is sufficient to give a slightly more negative value to one relation of inequality as compared to one relation of equality to reach this result in regards to A and B.

Another positive feature of Positive Egalitarianism is that it might help us handle a devastating objection that Temkin has directed against his own proposal:

> *The Repellant Conclusion*: For any world F, let F's population be as large (though finite) as one likes, and let the gaps between F's better- and worse-off be as extreme as one likes, there will be some unequal world, G, whose population is "sufficiently" large such that no matter how small G's gaps between the better- and worse-off might be G's inequality will be worse than F's (even if everyone in G is better off than everyone in F).[31]

The Repellant Conclusion follows from TPI and ICT since the value of a sufficient number of small pairwise inequalities can add up to more than any number of great pairwise inequalities. However, it doesn't follow if we also give positive value to equal relations since population G will be very much bigger than F and thus there will be vastly greater number of equal relations in G as compared to F, and the positive value of these relations can overtake the negative value of the small inequalities.[32]

---

[31] Temkin (1993), p. 218.

[32] As Björn Eriksson pointed out to me, a version of the Repellant Conclusion cannot be avoided in this manner. Assume that there are very small inequalities among the worse off in G. Then there won't be a greater number of equal relations in G as compared to F. However, this case points to the approach regarding small inequalities that I hint at in the last section.

VI. Two Putative Objections

Let me end with two putative objections to Positive Egalitarianism. Consider the following populations:

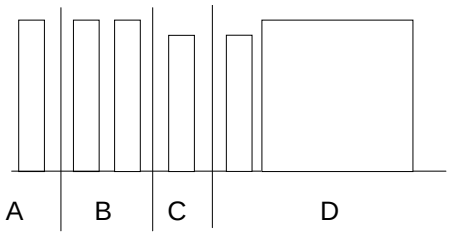


Diagram 7: All Populations are Equal but Some are More Equal than Others

Positive Egalitarianism implies that B is better than A with respect to egalitarian concerns since B has more equal relations and there is otherwise no difference between these populations. One might find this bizarre since both A and B are perfectly equal populations. It might seem akin to claiming that although both A and B are perfectly equal populations, B is more equal than A.

There is, however, nothing like that going on here. Positive Egalitarianism doesn't imply that B is more equal than A or that there is more or worse inequality in A as compared to B. Positive Egalitarianism just implies that B is better than A in regards to what egalitarians should be concerned about. And if I'm right in that egalitarians should care about the number of equal relations in a population, then there is nothing surprising about B being better than A in regards to egalitarian concerns. With this account of egalitarian concerns, there is no longer any perfect population from an egalitarian perspective since a population can always be made better in this respect by adding people and thereby creating more equal relations.

Positive Egalitarianism might also imply that D is better than C with respect to egalitarian concerns since the positive value of the great increase in the number of equal relations might outweigh the negative value of the smaller increase in unequal relations. This might seem absurd since C is perfectly equal and D is unequal. How can an egalitarian prefer an unequal population over a perfectly equal one?

Again, however, Positive Egalitarianism doesn't imply that D is more equal than C or that there is more or worse inequality in C as compared to D but only that D is better in regards to egalitarian concerns. If we care about the number of equal relations, then the goodness of a big increase in the number equal relations might sometimes outweigh a smaller increase in the number of unequal relations. Surprising as this first might seem, it follows that

we even from an egalitarian perspective should sometimes prefer an unequal population over a perfectly equal one.

Another way to put this point is that this is a conflict between different conceptions of egalitarian concerns: patterned inequality, on one hand, and the number of unequal and equal relationship on the other hand. As Temkin has long claimed, equality is an extraordinarily complex notion and some notions point in different directions. This is another example of such a conflict between different accounts of what is of moral importance from an egalitarian perspective.

VII. Summary and Discussion

It is commonly assumed among egalitarians that equality and inequality affect the goodness of outcomes only because inequalities give raise to complaints from the worse off, and are thus unfair toward those people. However, as we have seen in the context of population change, the positive value of equality might also matters. Considering populations of different sizes gives us good reasons to reconsider what an egalitarian should be concerned about since the account of the value of inequality developed for same number cases have counterintuitive implications in several different number cases. I suggested a new way of conceptualizing egalitarian concerns which seems to capture our intuitions regarding the value of equality and the disvalue of inequality better, or so I argued. According to this view, which I called Positive Egalitarianism, the egalitarian value of a population is both a function of relations of inequality and relations of equality. More exactly, the egalitarian value of a population is a strictly decreasing function of pairwise relations of inequality and a strictly increasing function of pairwise relations of equality.

Positive Egalitarianism can systemize our intuitions in a number of test cases and have interesting and sometimes surprising implications. It should be pointed out, however, that we have just provided a sketch of a theory and there are lots of problems and questions that remain. For example, we have neither given a precise specification of the weight of the positive value of equal relations relative to the negative value of unequal relations, nor a function for aggregating these considerations to a measure of the egalitarian value of a population.

Another issue is that we have only discussed Positive Egalitarianism in connection with positive welfare levels. One might perhaps be less inclined to assign positive value to relations of equality that involves negative welfare levels. Moreover, if one does assign some small positive value to such relations of equality, then one would have to accept an implication akin

to the leveling down objection:[33] Adding people with negative welfare to a population might make it in one respect better, although not all things considered better, since it might increase the value of equality in the population. More importantly, as this discussion indicates, how valuable equal relations are might arguably depend on the level of welfare involved.

Lastly, we also need to consider what we should do with small differences in welfare, small inequalities that can equally well be described as "rough equality". Is it only perfectly equal relations that have positive value or is this also true of roughly equal relations? A promising approach that I think needs serious consideration is that inequality has a negative value when the inequality is sufficiently big but when it gets smaller, we have rough equality which is of neutral value, and when the welfare difference gets even smaller, it has positive value which increases the closer we get to strict equality. So, for example, <5, 10> might have negative value from an egalitarian perspective; <8, 10> neutral value since we have reached rough equality; <9, 10> positive value since we are getting close to perfect equality; and lastly <10, 10> has maximal positive value regarding egalitarian concerns.

As Temkin has shown, inequality is an extraordinarily complex notion. If I'm right in my suggestion that egalitarians should also value equal relations positively, then what an egalitarian should be concerned about is an even more complex notion than inequality since there is yet another aspect that we need to take into account.[34]

---

[33] According to the levelling down objection, one cannot make a situation better *in any respect* by just decreasing welfare of the better off (to the same level as the worse off). Many conceptions of the value of equality, like the ones discussed here, have this implication, but I don't find the objection very persuasive (it would be a different matter if a theory implied that is was all things considered better to level down).

[34] I would like to thank Krister Bykvist, Björn Eriksson, Nir Eyal, Tom Hurka, Jonas Olson, Wlodek Rabinowicz, Larry Temkin, Stéphane Zuber, the audience at the Brocher Summer Academy in Global Population-level Bioethics, 12 - 16 July, 2010; and the higher seminar at the Dept. of Philosophy, Stockholm University, for their very helpful comments. Thanks also to CERSES, CNRS, and IEA-Paris for being such generous hosts during some of the time when this paper were written Financial support from the Bank of Sweden Tercentenary Foundation and the Swedish Collegium for Advanced Study is gratefully acknowledged.

References

Arneson, R., 'Equality of Opportunity for Welfare', *Philosophical Studies* 56, pp. 77-93, 1989.

Arrhenius, G., *Future Generations: A Challenge for Moral Theory*, Uppsala: University Printers, 2000a (also available at http://people.su.se/~guarr/).

——— 'An Impossibility Theorem for Welfarist Axiologies', *Economics and Philosophy* 16, 2000b.

——— 'The Person Affecting Restriction, Comparativism, and the Moral Status of Potential People', *Ethical Perspectives*, no. 3-4, 2003.

——— 'Egalitarianism and Population Change' in A. Gosseries & L. Meyer (eds.) *Intergenerational Justice*, pp. 325-348, Oxford UP, 2009a.

——— 'Can the Person Affecting Restriction Solve the Problems in Population Ethics?', in Roberts & Wasserman (eds.) *Harming Future Persons*, Ashgate, 2009b.

——— *Population Ethics*, Oxford: Oxford University Press, forthcoming.

Barry, B., 'Utilitarianism and Preference Change', *Utilitas*, Vol 1., pp. 278-282, 1989.

Braybrooke, D., *Meeting Needs*, Princeton: Princeton University Press, 1987.

Broome, J., *Ethics out of Economics*, Cambridge: Cambridge University Press, 1999.

——— *Weighing Lives*, Oxford: Oxford University Press, 2004.

Bykvist, K., *Changing Preferences: A Study in Preferentialism*, Uppsala: University Printers, 1998.

Cohen, G. A., 'On the Currency of Egalitarian Justice', *Ethics* 99, 1989.

——— 'Equality of What? On Welfare, Goods and Capabilities', in M. Nussbaum & A. Sen (eds.), *The Quality of Life*, Oxford: Clarendon Press, 1993.

Dalton, H., 'The Measurement of the Inequality of Incomes', *The Economic Journal*, Vol. 30, No. 119, pp. 348-361, Sep., 1920.

Dworkin, R., 'What is Equality? Part 1: Equality of Welfare', *Philosophy and Public Affairs* 10, no. 3, 1981a.

——— 'What is Equality? Part 2: Equality of Resources', *Philosophy and Public Affairs* 10, no. 4, 1981b.

——— *Sovereign Virtue: The Theory and Practice of Equality*, Cambridge, Mass.: Harvard University Press, 2000.

Feldman, F., *Utilitarianism, Hedonism, and Desert: Essays in Moral Philosophy*, Cambridge: Cambridge University Press, 1997.

——— *Pleasure and the Good Life: On the Nature, Varieties, and Plausibility of Hedonism*, Oxford: Oxford University Press, 2004.

Foster, J. E., 'Inequality Measurement', in H. Peyton Young (ed.) *Fair Allocation*, Proceedings of Symposia in Applied Mathematics, vol. 33, American Mathematical Society, Providence, Rhode Island, pp. 31-69, 1985.

Griffin, J., *Well-Being: Its Meaning, Measurement, and Moral Importance*, Oxford: Clarendon Press, [1990] 1986.

Hare, R. M., *Moral Thinking: Its Levels, Method, and Point*, Oxford: Clarendon Press, 1981.

Hurka, T., *Perfectionism*, New York: Oxford University Press, 1993.

Kawchuk, R., *(In)Equality*, MPhil-thesis, Dept. of Philosophy, University of Calgary, 1996.

Nielsen, K., 'Radical Egalitarianism Revisited: On Going Beyond the Difference Principle' *Windsor Yearbook of Access to Justice* 15, pp. 121-48, 1996.

Norheim O. F., (ed.) *Measurement and Ethical Evaluation of Health Inequalities*, forthcoming, Oxford: Oxford University Press)

Parfit, D., *Reasons and Persons*, Oxford: Clarendon Press [1991] 1984.

——— "Overpopulation and the Quality of Life", pp. 145-64 in P. Singer (ed.), *Applied Ethics*, Oxford University Press, 1986.

Rabinowicz, W., 'The Size of Inequality and Its Badness – Some Reflections around Temkin's Inequality', *Theoria* 69, 2003.
Rawls, J., *A Theory of Justice*, Cambridge, Mass.: Harvard University Press, 1971.
Sen, A., 'Equality of What?' in S. McMurrin (ed.), *The Tanner Lecture on Human Values*, Cambridge: Cambridge University Press, 1980.
——— *Inequality Reexamined*, Cambridge, Mass.: Cambridge University Press, 1992.
——— 'Capability and Well-Being', in M. Nussbaum & A. Sen (eds.) *The Quality of Life*, Oxford: Clarendon Press, 1993.
Sumner, L. W., *Welfare, Happiness, and Ethics*, Oxford: Clarendon Press, 1996.
Tännsjö, T., *Hedonistic Utilitarianism*, Edinburgh: Edinburgh University Press, 1998.
Temkin, L. S., *Inequality*, Oxford: Oxford University Press, 1993.
——— *Rethinking the Good*, Oxford: Oxford University Press, 2012.
——— XXXX, in Norheim (ed.), forthcoming.
Wilkinson, R. G., & Pickett, K., *The Spirit Level: Why Greater Equality Makes Societies Stronger*, New York, NY: Bloomsbury Press, 2009.