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The human development index: a response to Klugman, Rodriguez and Choi

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Abstract Each year, the mass media and many governments look keenly at the country rankings by the *Human Development Index* (HDI), as published in the annual *Human Development Reports* (HDR). Klugman, Rodriguez and Choi (KRC) were members of the team that produced the 20th anniversary edition of the HDR (United Nations Development Programme (UNDP), 2010) which introduced a new version of this popular index. However, Ravallion (2010) argued that the new HDI has a number of undesirable features, some shared with the old index and some new. This note responds to the points made by KRC (J Econ Inequality 9(2):249–288, 2011) in their defense of the new HDI.[1]

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1 Troubling tradeoffs?

The HDI is a country-level aggregate of three component indices, based on existing indicators of attainments for health, education and income. Prior to the 2010 HDR, the index had used the arithmetic mean across these components. In 2010 this changed to the geometric mean. The main rationale was to allow for imperfect substitution across the component indices.

Ravallion [4] argued that the tradeoffs embedded in the new HDI—as measured by its marginal rates of substitution (MRS) across its core dimensions of life expectancy, schooling, and income—are troubling on ethical and other grounds. The

[1] KRC also discuss other new indices introduced by the 2010 HDR. One of these is a "Multidimensional Poverty Index" that I have commented on in the last issue of this journal [5].

These are the views of the author and need not reflect those of the World Bank, its Executive Directors, or the countries they represent.

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HDI's implicit monetary values attached to extra life vary from very low levels in poor countries—the lowest value of $0.51 per year is for Zimbabwe—to almost $9,000 per year in the richest countries. The valuation of longevity as a proportion of mean income also rises with mean income, from under 1% for the poorest country to over 10% for the richest.

This steep income gradient in the valuation of extra life seems hard to justify. Rich people will undoubtedly spend more to live longer than poor people, but should one build such extreme inequalities into our assessment of a country's "human development?" Does this send the right signals to the governments of poor countries trying to promote human development?

These troubling tradeoffs stem in no small measure from seemingly arbitrary changes in the formula used for the HDI. The geometric mean is not the only way to allow for imperfect substitution; seven years earlier Chakravarty [1] had proposed a class of generalized HDIs that did so and satisfied a number of seemingly sensible axioms, though the 2010 HDR does not refer this option.[2] Ravallion [4] showed that an alternative index using Chakravarty's aggregation formula had much less steep income gradients in its valuations of longevity and schooling.

There are essentially two elements to KRC's defense of the new HDI against these criticisms: the first is to question the relevance of the HDI's implicit valuations, on the grounds that it is not a complete welfare metric, and the second is to question whether the tradeoffs are really so bad.

On the first, KRC claim that my concerns about the tradeoffs built into the HDI stem from a "basic misunderstanding of the conceptual basis of the HDI." They take particular exception to calling the MRS of the HDI the "value" attached to one variable relative to another, on the grounds that the HDI is not intended to be a comprehensive welfare maximand but rather an "index of capabilities." They interpret my calculations of the MRS as giving "the number of dollars that one would trade-off for an extra year of life *if one were maximizing the HDI*" (my emphasis). Let us examine these arguments more closely.

It is surprising that KRC do not appear to view improving the HDI as a development objective. After all, the countries that do well on the index are congratulated by each new HDR (including the 2010 edition) and specific policy actions to improve the HDI are applauded; examples are given in UNDP [7]. And I have never encountered any instance in past HDRs in which improvements in the HDI were *not* seen as desirable. If the HDI is not seen as a development objective then surely there would be at least one country and one year in the past 20 years when an increase in the HDI was deemed undesirable, or a decrease was deemed desirable.

The internal consistency of KRC's arguments on this point is also questionable. They argue that the HDI has been motivated by a desire to "shift attention away from an overly large focus on economic growth as the objective of development policies." As support for their view that growth has been over-emphasized, they cite the fact

[2]Chakravarty [2] shows that a monotonic transformation of his 2003 index is the *only* functional form for the HDI that satisfies the following axioms: *normalization* (if all components have the same value then that is the value of the HDI), *symmetry* (swapping the values for the components does not change the overall HDI), *linear homogeneity* (multiplying all components by a constant is equivalent to multiplying the HDI by that constant), and *strong separability* (the MRS between any two components is independent of all other components).

that the World Bank has often presented its compilations of country data ranked by GDP per capita.[3] Yet by the same logic one would have to conclude that the HDR's authors also think that the HDI is all that matters, since that is how the HDRs have ranked countries in their own data compilations.

But does it matter whether or not we think of the HDI as a comprehensive development objective? We can agree that the HDI is an incomplete metric of human development yet want to know its tradeoffs. The MRS of any composite index is of interest whether or not that index is maximized, or whether or not it is interpreted as an index of capabilities. Since the HDI is unit-free (normalized to the 0, 1 interval) it is the *relative* weights on its dimensions that matter most. To say that one does not care about the tradeoffs amounts to saying one does not care about the weights, which is surely untenable.

Turning to their second set of responses to my concerns, KRC argue that the income gradient in the HDI's valuations of longevity is purely a consequence of the index's concavity in income—surely a defensible property. It is true that, given concavity in income, the MRS would decline with income even if the weight on longevity was constant. Of course, how much one thinks it *should* decline is an open issue. UNDP [6] and KRC defend their log transformation of income on the grounds that the HDI should be concave in income. Yet logging income is not required for this property: by taking the geometric mean, the new HDI is automatically concave in income. It seems that the creators of the new index wanted extra concavity—essentially logging income twice—but they do not explain why.

However, concavity in income is *not* the only reason why the HDI's MRS has an income gradient. This stems from both a gradient in the HDI's marginal weight on income (higher in poorer countries) and a gradient in its weight on longevity (higher in richer countries). Even without concavity in income, the HDI would attach a monetary value to an extra year of life in rich countries that is many times that in poor countries.

Without explanation, the new HDI lowered the weight on longevity for almost all countries, but more markedly so for poor countries, such that the HDI's marginal weight on an extra year of life now rises steeply with income per capita [4]. Given the analytic properties of the new HDI, a very low weight on longevity in poor countries is virtually inevitable; indeed, in the limit, the weight on longevity (and schooling) goes to zero as income goes to its lowest observed value.[4] That is why the HDI's weight on longevity in Zimbabwe is almost zero, despite being the country with the fourth lowest life expectancy in the world. In fact, the new HDI implies that Zimbabwe has little hope of raising its HDI *except* through economic growth, which is inconsistent with the qualitative message that the HDRs have tried to convey.

In contrast to the new HDI's implicit valuations of longevity, which seem too low, Ravallion [4] argued that it's valuations on schooling seem too high. KRC

[3]It is hardly evident that the choice of the ranking variable for data tabulations is indicative of institutional priorities for development. But that is not the point here.

[4]The lower bounds used in re-scaling each of the three component indices are claimed to represent "survival needs" by KRC and the HDR 2010. The lower bound for national income of $163 per person per year is clearly very low, but it is also clear that people survive at this level (it is the actual income of Liberia in 1995 and Zimbabwe in 2008). If the chosen bound was really a "survival income" then it would need to be lower.

respond that my comparisons of the HDI's valuations of schooling with the rates of return to schooling from earnings regressions are "meaningless" because the market undervalues schooling. However, I did not claim that there should be parity; we may want to attach a higher value to extra schooling than does the market, given the externalities from schooling. But *how much higher* should one reasonably allow? My rough calculations reported in Ravallion [4] suggest that the HDI's monetary valuations of the human development gain from schooling in developing countries are about four times the labor-market returns to schooling. That's a lot of externality! Surely this needs a stronger justification than found in the HDR 2010 or KRC?

There is a fleeting sign in KRC that they may well share some of my concerns. At one point they appear to acknowledge that the steep income gradient in the HDI's valuations of longevity is a problem, but (in defense) argue that their new HDI has not in fact "exacerbated *this problem*" (my emphasis). Their argument is that for a handful of very rich countries, the old HDI had set the monetary value of longevity as infinite—stemming from its (arbitrary) cap on high incomes. They defend the new HDI as at least having a finite tradeoff for all countries. Yes, that is progress. But it remains that the (finite) valuations are very much higher in rich countries than poor ones, and have declined at all income levels.

2 Conclusion

In the light of KRC's paper, it is possibly not too surprising that the HDI embodies the troubling tradeoffs that I have identified, since it seems that the HDI's tradeoffs were never seriously considered by its creators. It is perilous to aggregate multiple dimensions of development into a single composite index without properly revealing, or even considering, the tradeoffs across those dimensions. Hopefully this debate will lead both users and producers of the HDI to think more critically in the future about what tradeoffs the index should assume in specific country settings.

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