World Development Perspectives 42 (2026) 100781

Contents lists available at ScienceDirect

World Development Perspectives

journal homepage: www.sciencedirect.com/journal/world-development-perspectives

Assessing inclusive well-being to leave no one behind

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ARTICLE INFO

Edited by R. Maconachie

Keywords:
Well-being
Shared prosperity
Inclusive growth
Inequality
Counting approach
Multidimensional poverty

ABSTRACT

The world has continued to seek prosperity by reducing poverty and improving well-being, but it is vital to examine whether this improvement is inclusive. In this paper, we use a quantile-based assessment of trends based on absolute changes that allows robust examination of the inclusiveness of multidimensional well-being changes. We decompose the overall change in inclusive well-being levels into two components: (1) the *change* in the overall average and (2) the *inclusivity premium* capturing the extent to which the change in well-being benefits the poorer quantiles. Employing a multidimensional measure of well-being that is closely linked to the flagship global Multidimensional Poverty Index (MPI), we examine the inclusiveness of multidimensional well-being changes for 75 developing countries across six geographic regions. We observe robust improvements in well-being levels for most countries, but only around three-fifths of these countries overall have positive robust inclusivity premiums, and fewer than one-third in sub-Saharan Africa. Our examination of the relationship between inclusivity premium in multidimensional well-being and the World Bank's shared prosperity premium in monetary space does not yield any monotonic relationship across countries. Furthermore, despite the close link between our inclusive well-being measure and the global MPI, an absolute reduction in the global MPI for a country does not necessarily imply that the corresponding well-being improvement for the country is inclusive. Our proposed framework could play an important role in jointly monitoring the Sustainable Development Goals' targets of reducing inequality within countries and reducing poverty in multiple dimensions.

1. Introduction

The world has witnessed significant reductions in monetary and multidimensional poverty and also interest in innovations that draw upon multidimensional indicators of well-being. Indeed, the Beyond GDP initiative of the United Nations, which seeks additional innovative metrics for measuring well-being, explicitly considers building on multidimensional poverty indices among others (United Nations, 2022).[1] To fulfil the United Nations' pledge to leave no one behind, it also stresses that well-being improvements (and development overall) need to be inclusive; that is, evenly shared by all, with greater improvements among poorer people. Various targets related to inclusion have been set in the Sustainable Development Goals (SDGs) agenda. For instance, SDG target 10.1 on 'reduc[ing] inequality within and among countries' requires progressively achieving and sustaining 'income growth of the bottom 40% of the population at a rate higher than the national average'.[2] However, poverty and well-being have been acknowledged – by academics and policymakers alike – to be multi-faceted and to have many interlinked dimensions (see Atkinson and Bourguignon, 1982; Sen, 1999; Narayan et al., 2000; Stiglitz et al., 2009; Alkire and Foster, 2011). Justifiably, SDG target 1.2 requires reducing 'poverty in all its dimensions according to national definitions', in addition to reducing extreme (monetary) poverty (SDG target 1.1). In this paper, we attempt to integrate the twin goals of multidimensional well-being and equity that could be useful assessing inclusiveness of distributional changes.

Our contribution to the literature is two-fold. First, we propose and justify a practical, intuitive and integrated quantile-based normative

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[1] The High-Level Committee on Programmes (HLCP) Core Group on Beyond GDP (United Nations, 2022, point 120.iv, p.32) suggests that initiatives build upon current 'multidimensional indices of poverty, vulnerability (and) human development'.

[2] The target is analogous to how the World Bank tracks shared prosperity by comparing the average income growth rates of the poorest 40% of each country's population to the overall average income growth rate (World Bank, 2018), where the overall prosperity assessed by the growth in average income per capita is considered 'inclusive' whenever the income growth rate of the poorest 40% is no slower than the country's overall growth rate.

https://doi.org/10.1016/j.wdp.2026.100781
Received 22 January 2025; Received in revised form 9 February 2026; Accepted 2 April 2026
Available online 9 April 2026

framework for capturing and tracking the inclusiveness of well-being changes over time using readily available and repeated cross-sectional datasets. Our approach involves segmenting a distribution of individual performances (which we refer to as *adequacies*) into a fixed number of quantiles and then analyse the inclusiveness of well-being changes by comparing the quantile-wise changes in average adequacies across periods. Second, we build a globally comparable empirical multidimensional well-being measure for developing countries upon the well-known global Multidimensional Poverty Index (MPI) related to SDG target 1.2 in line with United Nations (2022). The closely linked well-being measure allows us to showcase the valuable information our proposed framework can add over and above the global MPI trends. Our approach also complements the monetary focus of SDG target 10.1 (i.e., growth of the bottom 40% of the population) by capturing the inclusiveness of the progress in non-monetary multidimensional well-being.

To ascertain whether well-being changes are inclusive between two periods, we first present the overall well-being level of each period as a *quantile-weighted sum* of average adequacy levels across all quantiles, where the selection of the normative quantile-weights are justified by certain axiomatic properties. The quantile-weights are non-negative, sum up to one and each poorer quintile is assigned at least as large weight as every less-poor quintile. Conveniently, the overall well-being *change* between two periods is then presented as a *quantile-weighted sum* of absolute *changes* in quantile averages, and likewise the change in each poorer quintile is assigned at least as large weight as every change in less-poor quintile. To capture the extent of inclusiveness of well-being changes, we conveniently decompose the overall change in well-being into two components: (1) a change in the overall average adequacy; and (2) an extent of inclusiveness (i.e., the extent of pro-poorness of the average change) referred to as the *inclusivity premium*. A positive value of the inclusivity premium signifies that the overall improvement in well-being has been inclusive to relatively poorer quantiles (i.e., distributional improvement), and a higher value of inclusivity premium signifies a larger absolute change in average adequacies among poorer quintiles compared to the absolute change in the overall average adequacy. Notably, while the SDGs have focused upon the bottom 40% as a homogeneous group,[3] our proposed framework permits the evaluation of inclusivity by different quantiles and associated quantile-weights.[4]

We analyse the inclusiveness of well-being changes in 75 developing countries using our empirical measure of multidimensional well-being, which uses the same set of dimensions, indicators and weights as the global MPI and the same datasets. In the global MPI framework, a person living in a household is considered to be *deprived* in an indicator if their achievement fails to meet the deprivation cutoff for that indicator. A *deprivation score* for each person is obtained by taking a weighted sum of the indicators in which they are deprived, where the weights sum to 1. In this paper, we consider the complement of the deprivation score to be an *attainment score*, which captures a person's breadth of non-deprived indicators. A higher attainment score, which we refer to as an *adequacy level*, corresponds to higher well-being. Unlike the global MPI, which identifies and focuses on poor people only, here we use the entire distribution of attainment scores without using a poverty cut-off.[5] For our analysis, we divide the entire distribution of attainment scores within each country and for each period into five quintiles.[6]

We find that 73 of the 75 countries satisfactorily register statistically significant increases in well-being levels, but only 56 countries appear to register statistically significantly positive inclusivity premiums. The three poorer quintiles together in these 56 countries have registered faster improvements than the overall average adequacy in absolute terms. For example, a comparison between Malawi and Côte d'Ivoire reveals that both countries register similar annual absolute improvements in well-being, but we observe a positive inclusivity premium for Malawi and, in contrast, a negative inclusivity premium for Côte d'Ivoire. Nearly one-quarter (19) of all the countries in our study either register statistically significantly negative inclusivity premiums – meaning poorer quintiles in these countries register slower improvements than the overall average (11) – or inclusivity premiums are not statistically significantly different from zero (8).

Geographic analyses show that 17 of the 19 countries that lack inclusive changes in well-being are in sub-Saharan Africa. Interestingly, we observe non-linear relationships between our inclusivity premium and the World Bank's shared prosperity premium (World Bank, 2018) as well as with changes in the global MPI across countries, demonstrating that our proposed framework can provide novel insights over and above these existing measures. Our robustness analyses show that the changes in well-being are robust with respect to plausible alternative quantile-weights for 72 countries, but the inclusivity premiums (positive and negative) are robust for only 50 countries. The other 25 countries do not pass the inclusivity premium robustness test, of which 17 are from sub-Saharan Africa. Overall, only 43 of the 56 countries with positive inclusivity premiums register *robustly positive* inclusivity premiums.

The rest of the paper is organized as follows. The second section discusses our proposed approach for assessing absolute changes in inclusive well-being. The third section presents the empirical well-being measure for assessing inclusiveness and outlines the data. The fourth section analyses the inclusiveness of well-being changes across countries. The fifth section compares our inclusivity premiums to the World Bank's shared prosperity premium (relative and monetary) and to changes in the global MPI. The final section provides concluding remarks.

2. An approach for assessing inclusive well-being

Assessments involving non-monetary variables are different from their monetary counterparts in two important ways. First, most social indicators (unidimensional or multidimensional) cannot register *unbounded* increases akin to their monetary counterparts – hence *relative* changes over time tend to become mechanically smaller as averages approach the upper bounds.[7] Second, many social indicators capturing well-being and deprivation are either presented in terms of *adequacies* (i.e., performance level) or in terms of *shortfalls* (i.e., the lack thereof). It seems intuitive that these evaluations should be invariant (i.e., consistent) to whether one uses adequacies or shortfalls, but relative changes lead to inconsistent comparisons in such situations. We thus pursue an

[3] In all the comparisons where we count countries it would be appropriate to publish the share of population; for reasons of space, in this paper we focus only on numbers of countries but, recognizing the population differences and the equal value of all human lives, would suggest that future studies should also report the share of population covered.

[4] Beegle et al. (2014) argue that simply focusing on the average of the bottom 40% may shift focus away from the poorest people in lower middle-income countries, if the poorest people form only a small subset of the 40%.

[5] Unlike the United National Development Programme's (UNDP) Human Development Index and the Inequality-Adjusted Human Development Index, our counting-based multidimensional well-being measurement framework captures the joint distribution of attainments at the household level, aggregating first across dimensions then across people.

[6] Our empirical illustration is based on existing surveys, applies the extensively used global MPI framework and uses a particular number of quantiles, but our framework can be easily adapted to a different set of indicators and quantiles.

[7] Such concerns have also been raised for specific indicators of health and human development by Wagstaff (2005) and Prados de la Escosura (2021), respectively. A proposal for inequality measurement with bounded variables has been recently made by Permanyer et al. (2025).

approach based on *absolute changes* to ensure *consistency* of evaluation.[8]

While scrutinizing changes in well-being and poverty, most studies use one of the two prominent methods: *dominance approaches* or *distribution-sensitive indices*. Dominance approaches compare the entire distributions of a variable across two periods (see Aaberge et al., 2019; Azpitarte et al., 2020) and allow robust comparisons of changes irrespective of the choices of parameters and the functional forms of measures. However, if two distributions overlap, no conclusion regarding changes can be inferred and even when two distributions can be robustly ranked, no magnitude of these changes are reported. Studies using distribution-sensitive indices, in contrast, compute indices and compare them to assess changes.[9] Comparisons based on these indices are insightful, but eventually one may need to examine different parts of the distribution that are responsible for the overall changes.

We instead pursue a quantile-based approach in this paper that involves segmenting the entire distribution into a fixed number of quantiles and then analysing inclusiveness by comparing these quantiles across two periods. Quantile-based approaches have been deployed since the 1970s. Chenery et al. (1974, p.39) proposed a welfare measure as a weighted sum of the income growth rates of five quintiles to capture the pro-poorness of the overall growth. The World Bank adopted a quantile-based approach to gauge shared prosperity, focusing on the income growth of the bottom 40% (Basu, 2013; Ferreira et al., 2020).[10] The well-established growth incidence curve to study pro-poor growth is founded on quantile-based comparisons (Ravallion and Chen, 2003).[11]

Let us provide a brief formal presentation of the approach. Suppose well-being in a hypothetical society is assessed by an indicator whose values – referred to as *adequacy levels* – are bounded between a lower bound of L and an upper bound of U. The adequacy levels of the society's population in two periods are summarized by the cumulative distribution functions (CDFs) F_1 and F_2. Each distribution can be divided into Q quantiles, where each quantile has uniform population share $(1/Q)$. The first quantile is the poorest quantile and the Q^{th} quantile is the least-poor quantile. We denote the average adequacy levels within the q^{th} quantile of two distributions F_1 and F_2 by $\mu_q(F_1)$ and $\mu_q(F_2)$ and the overall average adequacy levels within F_1 and F_2 by $\mu(F_1)$ and $\mu(F_2)$, such that $\mu(F_1) = \frac{1}{Q}\sum_{q=1}^{Q}\mu_q(F_1)$ and $\mu(F_2) = \frac{1}{Q}\sum_{q=1}^{Q}\mu_q(F_2)$.

A well-being measure, denoted by W, corresponding to distribution F_i (for $i = 1, 2$) is obtained from the quantile-wise averages using the following additively decomposable measure:

$$W(F_i;\omega) = \sum_{q=1}^{Q}\omega_q\mu_q(F_i); \tag{1}$$

where $\omega = (\omega_1, \cdots, \omega_Q)$ is the Q-dimensional quantile-weight vector and ω_q is the quantile weight assigned to the q^{th} quantile average. Let us denote the absolute *change in the* q^{th} *quantile average* between distributions F_1 and F_2 by $\Delta_q(F_1, F_2) = \mu_q(F_2) - \mu_q(F_1)$ for all q and the *change in the overall average* by $\overline{\Delta}(F_1, F_2) = \mu(F_2) - \mu(F_1)$. The well-being measure in Eq. (1) can then be used to measure the absolute change in well-being between two periods, denoted by $\Delta(F_1, F_2; \omega)$ as:

$$\Delta(F_1, F_2;\omega) = W(F_2;\omega) - W(F_1;\omega) = \sum_{q=1}^{Q}\omega_q\Delta_q(F_1, F_2). \tag{2}$$

The change in well-being measure in Eq. (2) is the quantile-weighted sum of changes in quantile-wise averages. Consider the special case where all quantile weights are equal and denote $\overline{\omega}$ as the Q-dimensional *equal* quantile-weight vector, such that $\overline{\omega}_q = 1/Q$ for all q. Then, $W(F_i; \overline{\omega}) = \mu(F_i)$ or the well-being measure is equal to *overall average adequacy level* within F_i and the change in well-being is simply equal to the difference in the overall average between F_1 and F_2, that is, $\Delta(F_1, F_2; \overline{\omega}) = \overline{\Delta}(F_1, F_2)$.[12]

We expect the change in well-being measure in Eq. (2) to satisfy three intuitive properties. The first property requires that the overall well-being should not fall when there is no deterioration in any quantile-wise averages (monotonicity). The second property requires that whenever there is an equal change in all quantile averages, then the same change should apply to the overall change (translation homogeneity). The third property requires that, with everything else unchanged, an improvement in the average within a *poorer* quantile should not lead to a lower well-being improvement than an *equal* amount of improvement in a *less-poor* quantile (weak priority).

If the change in well-being measure satisfies these three properties, then the quantile weights are (i) non-negative (i.e., $\omega_q \geq 0$ for all q); (ii) they sum up to one (i.e., $\sum_{q=1}^{Q}\omega_q = 1$); and (iii) the quantile weights assigned to poorer quantiles are no lower than the quantile weights assigned to the less-poor quantiles (i.e., $\omega_{q'} \geq \omega_{q''}$ for all pairs $\{q', q'' | q' < q''\}$). Formal axiomatic foundation and derivation of the restrictions on quantile-weights are available in Appendix A.

To assess the inclusiveness of well-being changes, we decompose the change in well-being measure Δ in Eq. (2) into two components as follows:

$$\begin{aligned}\Delta(F_1, F_2;\omega) &= \overline{\Delta}(F_1, F_2) + \Delta(F_1, F_2;\omega) - \overline{\Delta}(F_1, F_2)\\ &= \overline{\Delta}(F_1, F_2) + \pi(F_1, F_2;\omega),\end{aligned} \tag{3}$$

where $\pi(F_1, F_2; \omega) = \Delta(F_1, F_2; \omega) - \overline{\Delta}(F_1, F_2)$. The first component on the right-hand side of Eq. (3) is the change in the overall average adequacy levels between two periods. The second component $\pi(F_1, F_2; \omega)$ can be expressed as $\sum_{q=1}^{Q}\omega_q\pi_q$, where $\pi_q = \Delta_q(F_1, F_2) - \overline{\Delta}(F_1, F_2)$. Thus, the inclusivity premium is the quantile-weighted sum of the *differences*

[8] For example, in multidimensional evaluation exercises within the counting framework it is common to use either attainment scores (Ura et al., 2012; Seth and Alkire, 2017; Alkire and Foster, 2019; Dhongde et al., 2019) or deprivation scores (Atkinson, 2003; Alkire and Foster, 2011). In this paper, we consider adequacies and corresponding shortfalls to be cardinally measurable. Concerns and proposals for consistent inequality assessment for adequacies and shortfalls have been raised by Erreygers (2009), Lambert and Zheng (2011), Lasso de la Vega and Aristondo (2012) and Bosmans (2016).

[9] Examples of such indices may be found in Alkire et al. (2015, ch.3) and Aaberge and Brandolini (2015). See Alkire and Foster (2019) for a distribution-sensitive poverty measure, Aaberge et al. (2019) for a class of dual-deprivation measures and Dhongde et al. (2019) for a class of well-being measures.

[10] For further discussions on the World Bank's twin goals on ending extreme (monetary) poverty and promoting shared prosperity, see World Bank (2013) and Cruz et al. (2015). For a recent measure of global prosperity gap by the World Bank, see Sabatino-Gonzalez et al. (2024).

[11] Sakamoto and Mori (2021) used quantile mean comparison of incomes to demonstrate the usefulness of their novel class of stepwise rank-dependent social welfare orderings. We should clarify that there is a key motivational difference between our proposals. A key motivating axiom, in addition to other standard axioms, of Sakamoto and Mori (2021) is *rank-separability* requiring 'social welfare orderings to ignore well-being information about the same well-being in the same ranks between two profiles'. Our key motivation, on the contrary, is driven by the bounded nature of the underlying variable and consistency requirement.

[12] The decomposition of change in well-being measure presented in Eq. (2) is analogous in spirit to the quantile-based rate of increase in welfare measure proposed by Chenery et al. (1974, p.39). However, the rate of increase in welfare is a relative measure and is incapable of providing an exact decomposition as we do in Eq. (2). An equally-weighted average of the quantile-specific growth rates is not equal to the overall growth rate. This type of additive structure to study absolute changes is also seen in the social welfare and social mobility literature. For example, Bossert and Dutta (2019) characterize additive measures to assess absolute changes in social welfare, while Palmisano and Van de Gaer (2016) and Seth and Yalonetzky (2021a) also do so in their assessment of absolute social mobility.

between the changes in the average within the q^{th} quantile compared to the change in the overall average adequacy level.[13] Note that the well-being measure and the associated inclusivity premium depend on the normatively justified quantile weights and so they both rely on value judgments about distributional priorities.

2.1. An illustration

We demonstrate the approach with an example using hypothetical distributional changes, where distributions are divided into four quartiles (Table 1). The 1st quartile represents the poorest quarter of the population; the 2nd quartile represents the second-poorest quarter of the population, and so on. The overall change in well-being is computed as a quartile-weighted sum of changes in four quartiles. Respecting the restrictions on the quartile-weights, suppose we assign the weights of 5/9, 3/9, 1/9 and 0 to four quartiles. We present five different scenarios. In the first four scenarios, the overall average change ($\overline{\Delta}$) is 0.05 but changes in four quartiles are quite different. In the fifth scenario, the change in well-being (Δ) is equal to the change in well-being in the second scenario (i.e., 0.09), but their overall average changes ($\overline{\Delta}$) are different (i.e., 0.04 vis-à-vis 0.05).

In Change Scenario 1, all four quartiles change by 0.05 and so their quartile-weighted sum is also equal to 0.05. The inclusivity premium (π) in this case is equal to zero and poorer quartiles do not experience larger-than-average change. In Change Scenario 2, changes of equal magnitudes occur in the two poorest quartiles, and both experience larger-than-average changes. The associated inclusivity premium is positive and is equal to 0.04. In Change Scenario 3, the entire change occurs in the poorest quartile, and so the inclusivity premium is even higher. In Change Scenario 4, the entire change takes place in the least-poor quartile, which has been assigned a quartile-weight of zero. The overall well-being change is zero, accompanied with a negative inclusivity premium. Finally, let us elaborate how the composition of the overall average change ($\overline{\Delta}$) and the inclusivity premium could be different even with the same change in well-being (Δ) comparing Change Scenarios 2 and 5. When we decompose their well-being changes, the share of the inclusivity premium appears to be higher for Change Scenario 5. The key difference between these two scenarios is that the poorest quartile registers much larger improvement in Change Scenario 5 than that in Change Scenario 2.

Table 1
Inclusive well-being changes and inclusivity premiums in hypothetical distributions.

Quartile (Quartile-weight)	1st (5/9)	2nd (3/9)	3rd (1/9)	4th (0)	Δ	$\overline{\Delta}$	π
Change Scenario 1	0.05	0.05	0.05	0.05	0.05	0.05	0.00
Change Scenario 2	0.1	0.1	0	0	0.09	0.05	0.04
Change Scenario 3	0.2	0	0	0	0.11	0.05	0.06
Change Scenario 4	0	0	0	0.2	0.00	0.05	−0.05
Change Scenario 5	0.15	0.01	0	0	0.09	0.04	0.05

Source: Authors' own computations.

3. An empirical measure of multidimensional well-being

In this paper, we capture well-being by adopting a multidimensional counting approach (Atkinson, 2003; Alkire and Foster, 2011) and we directly connect the measure to the global MPI framework (Alkire et al., 2020a) – consisting of three dimensions and 10 indicators with weights of 1/6 for four indicators and 1/18 for the remainder.[14] Within the global MPI framework, a person living in a household is considered to be *deprived* in an indicator if their achievement fails to meet the deprivation cutoff for that indicator. Customarily, a *deprivation score* for each person is obtained by taking a weighted sum of the indicators in which they are deprived, where weights sum to 1. We consider the *complement* of a deprivation to be an *attainment*, and the complement of the deprivation score, which lies between 0 and 1 and is equal to 1 minus the deprivation score, to be an *attainment score*.[15] The attainment score, which is our adequacy level in this paper, indicates a person's breadth of multiple attainments. A higher attainment score corresponds to higher well-being.[16] For the ease of interpreting small changes, we normalize the attainment scores on a 0–100 scale. A score of zero points signifies the lowest possible well-being and a score of 100 points signifies the largest possible well-being.

To study changes in well-being and inclusiveness, we divide the distribution of attainment scores for each country and for each year into five quintiles (i.e., $Q = 5$): *poorest*, *second poorest*, *middle*, *second richest* and *richest*.[17] We examine inclusiveness of well-being changes in 75 countries over two time periods by using 150 micro datasets (two datasets for each country), where for each country, the indicators have been harmonized across two periods so that a consistent comparison can be performed.[18] These datasets have been used to produce intertemporal multidimensional poverty comparisons (Alkire et al., 2020b). While conducting statistical inferences, we incorporate the sampling design of these household surveys.

To obtain the measure of well-being from quintile-specific averages (Equation (1), we select a set of quantile-weights that satisfy the restrictions presented in Section 2. For our illustrative exercise, we use a set of rank dependent quantile-weights, which are intuitive and have been frequently used in the measurement of inequality, such as the Gini coefficient, and related income standards, such as the Sen mean (Foster et al., 2013). We assign strictly positive quantile-weights to the three

[13] Detailed derivation of inclusivity premium can be found in Appendix B.

[14] Appendix C summarizes the three dimensions, 10 indicators and their deprivation cutoffs and weights assigned to all indicators. We assume that all recorded attainments and deprivations are meaningful – an assumption that must be verified against each included indicator. For example, the global MPI indicator of solid cooking fuel (wood, charcoal or dung) has a high prevalence among non-poor people in some countries in which there are adequate ventilation and supply systems, so solid fuels are not associated with acute respiratory or eye infections, nor with extensive time spent in fuel collection. Solid cooking fuel still reflects a deprivation if one considers carbon footprint, but its link to poverty may be less direct. Hence indicators used in a full-distribution exercise such as this one must be critically assessed and 'spurious' measured deprivations that are not associated with lowered well-being must be minimized.

[15] That is, the sum of the deprivation score and the attainment score is 1.

[16] Previously, Peichl and Pestel (2013) have used the counting framework to assess affluence in Germany and the USA, where the affluent count can be interpreted as adequacy level. Although the approach can be related to well-being measurement, it does not capture inclusiveness as the poor population is assigned zero weight. Similarly, Makdissi and Yazbeck (2015) have proposed a measure of plutonomy based on top quantiles. This approach differs from our approach on two counts: the approach is relative, and it is developed for monetary indicators.

[17] Owing to the discrete nature of the attainment scores, it is possible that the sample households with the same attainment scores need to be distributed across quintiles. We randomly distributed these attainment scores across quintiles. Practically, we set a particular seed in Stata so that the random distribution across quintiles is unique. Our standard error does not take into account this random selection of quintiles and bootstrapping may be required. The issue of discreteness is analogous to that encountered in statistics; for different proposed solutions see Machado and Silva (2005).

[18] Out of the 75 countries in our analysis, 59 use all 10 indicators, 15 use a combination of nine indicators and one uses eight indicators. Our datasets include 87 Demographic Health Surveys (DHS), 56 Multiple Indicator Cluster Surveys (MICS), two China Family Panel Studies (CFPS), two Jamaica Surveys of Living Conditions (JSLC), two Mexico National Surveys of Health and Nutrition (ENSANUT) and the Peru Demographic and Family Health Survey (ENDES).

poorer quintiles, but we assign zero quantile-weight to the two richest quintiles as the median average attainment scores across 75 countries within these quintiles at the first period are already quite high (i.e., more than 86 points on a 0–100 scale). By assigning zero weight to the top two quintiles, in this paper, we choose to normatively prioritise progress only for the bottom three quintiles. Intuitively, our inclusivity assessment exercise relies on comparing the overall average progress to the progress among the bottom three quintiles. We assign a weight of 5/9 to the poorest quintile, a weight of 3/9 to the second-poorest quintile, and a weight of 1/9 to the middle quintile, and so the quantile-weight vector that we use for our exercise is $\omega^0 = (5/9, 3/9, 1/9, 0, 0)$. Note that the same set of quantile weights is applicable to changes in quintile-wise average attainment scores Δ_q's and to the quantile-wise components of inclusivity premiums π_q's. We present an approach to conduct robustness of inclusive well-being changes and inclusivity premiums with respect to the choice of quantile weights later in Section 6.

The descriptive statistics presented in Appendix D reveal that the national overall average attainment scores in the first period range between 31.9 points in Niger and 95.3 points in Montenegro, whereas the national overall average attainment scores in the second period range between 38.8 points in Niger and 97.1 points in Kazakhstan.[19] Focusing on the absolute changes over time, we observe statistically significant improvements in the national overall average ($\overline{\Delta}$) for 73 countries.[20] For one country (Benin) we observe a statistically significant deterioration in the overall average, and for one other country (Montenegro) we do not observe any statistically significant change. The largest absolute annual improvements in the overall average attainment scores are observed for Mauritania and Sierra Leone – both registering around two points per annum improvements in their overall average attainment scores.[21] Chad, in contrast, has the lowest level of improvement (0.44 points per annum) in the overall average.

4. Have changes in well-being been inclusive?

In this section, we now examine whether the changes in well-being in the 75 developing countries were inclusive. In Table 2, we present the well-being measures (W_1 and W_2) which are quantile-weighted sums of quintile averages (available in Appendix D) and can be seen as *equally distributed equivalent overall average adequacy levels*. The absolute annualized change in the well-being levels for each country across two periods is denoted by Δ. As before, 73 countries register statistically significant increases in well-being with the largest being in Lao PDR, Mauritania, Honduras, Bolivia, and Nicaragua. We decompose the overall change in well-being based on Eq. (3) and report its two components – (i) the change in the national overall average attainment score ($\overline{\Delta}$) and (ii) the inclusivity premium (π).

We observe that inclusivity premiums are statistically significantly negative for 11 countries and that to be not statistically significantly different from zero for eight countries. Thus, for one-quarter of the countries in our sample (19 out of 75), we do not observe a statistically significant positive inclusivity premium. Surprisingly, except for Benin, 18 of these 19 countries register statistically significant improvements in overall average attainment scores ($\overline{\Delta}$) over the respective study periods. Moreover, the majority of these 19 countries are from sub-Saharan Africa. Nearly half of all sub-Saharan African countries (17 out of 35) do not produce positive inclusivity premiums.

Most of the countries in our sample do reflect positive inclusivity premiums, with wide variations. Out of the 56 countries that show statistically significant positive premiums, 22 register premiums larger than 0 points but not larger than 0.25 points, 23 register premiums larger than 0.25 points but not larger than 0.5 points, eight register premiums larger than 0.5 points but not larger than 0.75 points, and only three (Ghana, Lao PDR and Nicaragua) register premiums of over 0.75 points per year. We find that 20 countries register annualized improvements in average attainment scores ($\overline{\Delta}$) of 1.2 points or above and 20 countries register annualized inclusivity premiums of 0.39 and above, but only 10 countries register both milestones.

To visually demonstrate the relationship between the change in the average attainment and the inclusivity premium across countries, Fig. 1 presents the relationship through a scatterplot. The horizontal axis shows the per annum change in overall average attainment score, whereas the vertical axis shows the annualized inclusivity premium. Interestingly, the total change in well-being of a particular country is simply the sum of the two coordinates. For example, for Honduras (HND), the annual change in the average attainment is 1.49 points and the annualized inclusivity premium is 0.73 points. Therefore, the annual change in inclusive well-being for Honduras is 2.22 points (1.49 + 0.73). Fig. 1 shows a lack of a particularly strong relationship between inclusivity premiums and average attainment scores across countries.

Interesting insights may be drawn by looking at comparisons of specific countries. We compare a pair of South Asian countries (India and Nepal) and a pair of sub-Saharan African countries (Malawi and Côte d'Ivoire). Table 3 presents the values of changes for all four countries. Both India and Nepal have a similar level of inclusive well-being in the second period (61.5 points for India and 60.7 points for Nepal, as in Table 2) and similar annual changes in inclusive well-being over their respective study periods (1.91 points p.a. for Nepal and 1.86 points p.a. for India). A decomposition of their inclusive well-being changes shows that India's change in average attainment (1.39 points p.a.) is higher than that of Nepal (1.23 points p.a.), whereas Nepal's inclusivity premium (0.68 points p.a.) is higher than India's (0.47 points p.a.). Therefore, Nepal's progress can be claimed to have had a greater effective improvement in the poorer quintiles, which can be verified by examining the changes in five quintiles (i.e., $\Delta_1, \cdots, \Delta_5$) also included in Table 3. Similarly, both Malawi and Côte d'Ivoire register similar annual absolute changes in well-being over time. However, the inclusivity premium for Malawi is positive signifying inclusive progress, whereas that of Côte d'Ivoire is negative, signifying a lack of inclusiveness.[22] Countries with low or negative inclusive premiums are required to design more inclusive distributional policies.

5. Robustness of the empirical analysis

For our empirical analysis, we have used the quantile-weight vector $\omega^0 = (5/9, 3/9, 1/9, 0, 0)$, but there may be numerous other alternative quantile-weight vectors that assign zero weights to the two richest quintiles and yet satisfy the restriction $\omega_1 \geq \omega_2 \geq \omega_3 \geq 0$. Checking robustness with respect to all alternative quantile-weight vectors may appear to be a colossal task, but following the approach for testing robustness proposed by Seth and McGillivray (2018, Proposition 1) we are only required to compare well-being changes and inclusivity premiums at the following three quantile-weight vectors to test robustness: $\omega^1 = (1, 0, 0, 0, 0)$, $\omega^2 = (1/2, 1/2, 0, 0, 0)$ and $\omega^3 = (1/3, 1/3, 1/3, 0, 0)$.

[19] Appendix D presents the national overall average attainment scores (i.e., $\mu(F_1)$ and $\mu(F_2)$) and the average attainment scores within five quintiles for 75 countries over two periods as well as their annualized absolute changes (i.e., $\overline{\Delta}$ and $\Delta_1, \cdots, \Delta_5$), which are the absolute changes between two periods divided by the differences of two survey years.

[20] We use a critical value of $\alpha = 10\%$ for statistical significance throughout this paper.

[21] The value of the global MPI for Mauritania was subsequently revised due to a recoding of Koranic schools to better align it with other countries' classifications; we use the 2020 value.

[22] We checked the statistical significance of the differences between the changes in annual average attainment scores and the annual shared prosperity premiums, and the changes in annual bound-adjusted inclusive well-being across countries.

Table 2
Annualized change in inclusive well-being and its decomposition.

Country	Region	Year		Well-being				Decomposition			
		1st	2nd	W_1	W_2	Δ		$\overline{\Delta}$		π	
Egypt	ARS	2008	2014	78.5	82.6	0.68	***	0.32	***	0.36	***
Iraq	ARS	2011	2018	73.9	79.0	0.73	***	0.44	***	0.30	***
State of Palestine	ARS	2010	2014	87.1	89.1	0.50	***	0.26	***	0.24	***
Sudan	ARS	2010	2014	37.7	41.6	0.97	***	0.81	***	0.16	***
Yemen	ARS	2006	2013	51.4	58.5	1.01	***	0.79	***	0.22	***
Cambodia	EAP	2010	2014	49.5	55.6	1.52	***	1.26	***	0.26	***
China	EAP	2010	2014	71.3	77.1	1.45	***	0.97	***	0.48	***
Indonesia	EAP	2012	2017	79.8	86.3	1.30	***	0.70	***	0.60	***
Lao PDR	EAP	2011–12	2017	48.0	62.5	2.64	***	1.66	***	0.98	***
Philippines	EAP	2013	2017	76.6	80.0	0.86	***	0.57	***	0.29	***
Thailand	EAP	2012	2015–16	85.9	87.6	0.48	***	0.27	***	0.21	***
Timor-Leste	EAP	2009–10	2016	38.6	52.1	2.07	***	1.69	***	0.38	***
Vietnam	EAP	2010–11	2014	78.8	80.3	0.44	***	0.29	***	0.15	**
Albania	ECA	2008–9	2017–18	85.3	89.1	0.42	***	0.19	***	0.23	***
Bosnia and Herzegovina	ECA	2006	2011–12	84.8	89.1	0.77	***	0.17	***	0.60	***
Kazakhstan	ECA	2010–11	2015	87.9	92.3	0.97	***	0.47	***	0.50	***
Kyrgyzstan	ECA	2005–6	2014	75.3	82.1	0.80	***	0.53	***	0.27	***
Macedonia	ECA	2005–6	2011	82.8	90.0	1.32	***	0.59	***	0.72	***
Moldova	ECA	2005	2012	88.1	89.6	0.21	***	0.06	***	0.15	***
Mongolia	ECA	2010	2013	66.6	70.8	1.39	***	1.29	***	0.10	*
Montenegro	ECA	2005–6	2013	88.5	89.4	0.12		−0.01		0.14	**
Tajikistan	ECA	2012	2017	71.0	75.7	0.93	***	0.65	***	0.28	***
Turkmenistan	ECA	2006	2015–16	81.7	88.4	0.70	***	0.41	***	0.29	***
Belize	LAC	2011	2015–16	79.9	82.3	0.52	***	0.23	***	0.29	***
Bolivia	LAC	2003	2008	54.2	65.0	2.17	***	1.78	***	0.39	***
Colombia	LAC	2010	2015–16	82.5	84.8	0.41	***	0.19	***	0.22	***
Dominican Republic	LAC	2007	2014	78.1	86.1	1.14	***	0.72	***	0.42	***
Guyana	LAC	2009	2014	81.6	85.9	0.85	***	0.43	***	0.42	***
Haiti	LAC	2012	2016–17	48.3	52.2	0.87	***	0.77	***	0.11	**
Honduras	LAC	2005–6	2011–12	50.7	64.1	2.22	***	1.49	***	0.73	***
Jamaica	LAC	2010	2014	81.2	82.4	0.30	**	0.12	**	0.18	*
Mexico	LAC	2012	2016	82.9	84.1	0.29	***	0.12	***	0.17	***
Nicaragua	LAC	2001	2011–12	46.8	68.9	2.11	***	1.33	***	0.78	***
Peru	LAC	2012	2018	73.2	78.9	0.95	***	0.55	***	0.41	***
Suriname	LAC	2006	2010	76.9	81.9	1.26	***	0.51	***	0.75	***
Afghanistan	SAS	2010–11	2015–16	29.3	35.2	1.18	***	1.44	***	−0.27	***
Bangladesh	SAS	2014	2019	54.9	64.9	2.00	***	1.33	***	0.66	***
India	SAS	2005–6	2015–16	43.0	61.5	1.86	***	1.39	***	0.47	***
Nepal	SAS	2011	2016	51.2	60.7	1.91	***	1.23	***	0.68	***
Pakistan	SAS	2012–13	2017–18	46.0	49.7	0.75	***	0.70	***	0.05	
Benin	SSA	2014	2017–18	36.7	35.5	−0.33	***	−0.34	***	0.01	
Burkina Faso	SSA	2006	2010	15.2	17.8	0.65	***	0.81	***	−0.16	***
Burundi	SSA	2010	2016–17	31.4	34.7	0.51	***	0.64	***	−0.13	***
Cameroon	SSA	2011	2014	42.4	44.1	0.59	***	0.51	***	0.08	
Central African Republic	SSA	2000	2010	20.2	26.8	0.67	***	0.76	***	−0.09	***
Chad	SSA	2010	2014–15	17.3	19.7	0.53	***	0.44	***	0.09	**
Congo, DR	SSA	2007	2013–14	31.7	37.4	0.89	***	0.62	***	0.27	***
Côte d'Ivoire	SSA	2011–12	2016	40.4	46.7	1.38	***	1.53	***	−0.14	**
Eswatini	SSA	2010	2014	60.4	67.1	1.68	***	1.26	***	0.42	***
Ethiopia	SSA	2011	2016	24.4	28.4	0.81	***	0.92	***	−0.11	***
Gabon	SSA	2000	2012	57.7	69.5	0.99	***	0.64	***	0.35	***
Gambia	SSA	2005–6	2013	32.1	43.4	1.51	***	1.15	***	0.36	***
Ghana	SSA	2011	2014	56.6	61.9	1.75	***	0.91	***	0.85	***
Guinea	SSA	2012	2018	28.8	34.0	0.87	***	0.83	***	0.04	
Kenya	SSA	2008–9	2014	49.0	54.6	1.02	***	0.79	***	0.23	***
Lesotho	SSA	2009	2014	51.1	57.7	1.32	***	1.20	***	0.12	***
Liberia	SSA	2007	2013	30.7	41.0	1.72	***	1.73	***	0.00	
Madagascar	SSA	2008–9	2018	31.9	35.5	0.38	***	0.50	***	−0.12	***
Malawi	SSA	2010	2015–16	42.1	49.5	1.35	***	1.19	***	0.16	***
Mali	SSA	2006	2015	27.1	32.0	0.54	***	0.74	***	−0.20	***
Mauritania	SSA	2011	2015	34.5	44.6	2.53	***	2.04	***	0.48	***
Mozambique	SSA	2003	2011	25.4	33.3	0.99	***	1.21	***	−0.21	***
Namibia	SSA	2006–7	2013	51.6	57.1	0.85	***	0.63	***	0.21	***
Niger	SSA	2006	2012	13.6	19.7	1.02	***	1.15	***	−0.13	***
Nigeria	SSA	2013	2018	38.8	42.1	0.67	***	0.53	***	0.13	***
Republic of Congo	SSA	2005	2014–15	47.5	61.7	1.49	***	1.36	***	0.13	***
Rwanda	SSA	2010	2014–15	40.7	48.4	1.72	***	1.56	***	0.16	***
São Tomé and Príncipe	SSA	2008–9	2014	54.7	66.1	2.08	***	1.61	***	0.46	***
Senegal	SSA	2005	2017	30.2	41.3	0.93	***	0.63	***	0.29	***
Sierra Leone	SSA	2013	2017	33.8	42.2	2.09	***	2.12	***	−0.03	
Tanzania	SSA	2010	2015–16	41.4	44.8	0.62	***	0.77	***	−0.15	***
Togo	SSA	2010	2013–14	38.0	39.1	0.30	**	0.32	***	−0.01	
Uganda	SSA	2011	2016	40.1	45.5	1.07	***	1.09	***	−0.02	

(*continued on next page*)

Table 2 (*continued*)

Country	Region	Year		Well-being				Decomposition			
		1st	2nd	W_1	W_2	Δ		$\overline{\Delta}$		π	
Zambia	SSA	2007	2013–14	38.6	45.9	1.13	***	0.87	***	0.26	***
Zimbabwe	SSA	2010–11	2015	56.4	59.1	0.61	***	0.49	***	0.12	***

Source: Authors' computations.

Notes: Statistical significance: ***: $p < 0.01$, **: $p < 0.05$, *: $p < 0.1$. $W_1 = W(F_1; \omega^0)$ is the well-being measure in period 1; $W_2 = W(F_2; \omega^0)$ is the well-being measure in period 2; and Δ is the annualized absolute change. Recall that by construction $\Delta = \overline{\Delta} + \pi$, following Eq. (3). Region abbreviations: ARS: Arab States; EAP: East Asia and the Pacific; ECA: Europe and Central Asia; LAC: Latin America and Caribbean; SAS: South Asia; SSA: sub-Saharan Africa.

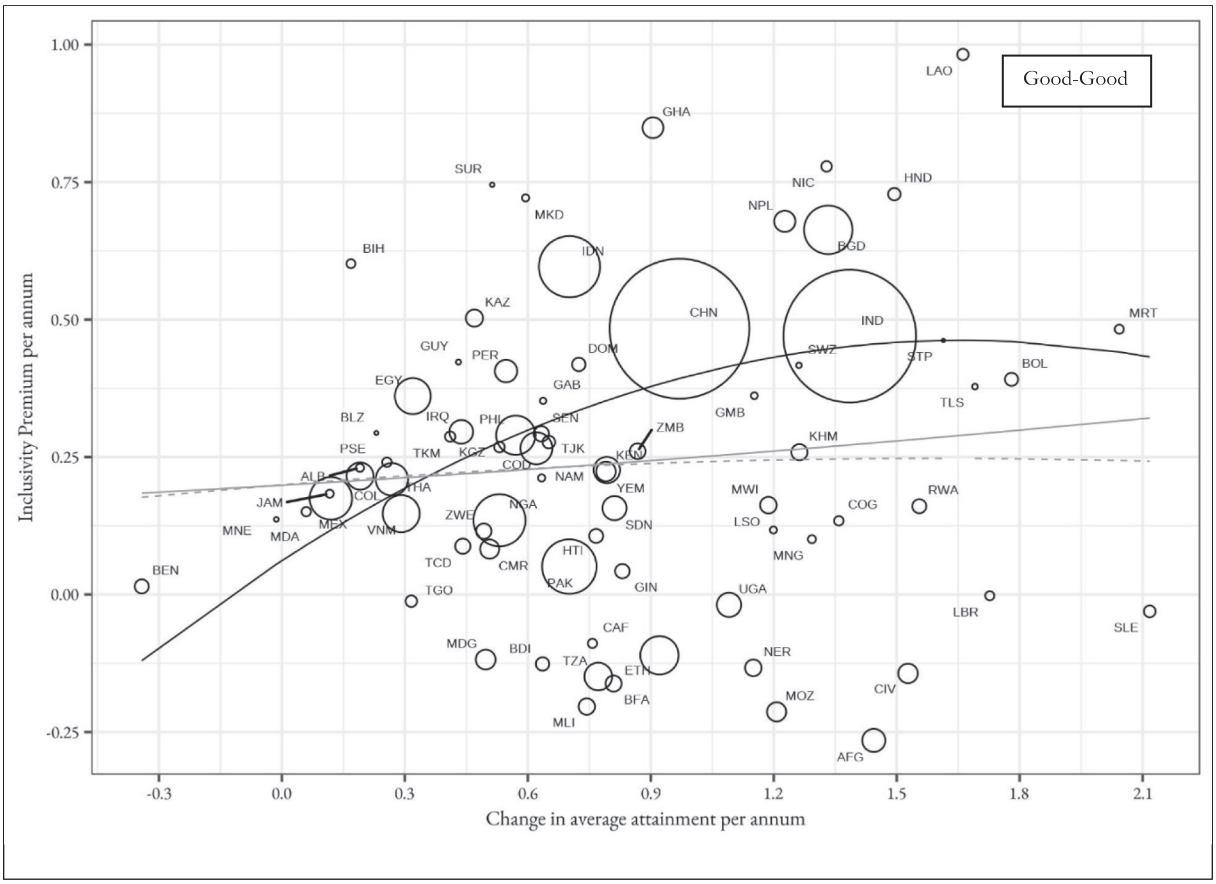

Fig. 1. Annualized changes in average attainment and inclusivity premium. Notes: The solid black population weighted trend line corresponds to 75 countries. The solid grey population unweighted trend line corresponds to 75 countries. The dashed grey population unweighted trend line corresponds to 74 countries, with Lao PDR excluded. The size of each bubble reflects the average population size of the country across both periods. Country abbreviations: AFG: Afghanistan; ALB: Albania; BDI: Burundi; BEN: Benin; BFA: Burkina Faso; BGD: Bangladesh; BIH: Bosnia and Herzegovina; BLZ: Belize; BOL: Bolivia; CAF: Central African Republic: CHN: China; CIV: Côte d'Ivoire; CMR: Cameroon; COD: Congo, DR; COG: Republic of Congo; COL: Colombia; DOM: Dominican Republic; EGY: Egypt; ETH: Ethiopia; GAB: Gabon; GHA: Ghana; GIN: Guinea; GMB: Gambia; GUY: Guyana; HND: Honduras; HTI: Haiti; IDN: Indonesia; IND: India; IRQ: Iraq; JAM: Jamaica; KAZ: Kazakhstan; KEN: Kenya; KGZ: Kyrgyzstan; KHM: Cambodia; LAO: Lao PDR; LBR: Liberia; LSO: Lesotho; MDA: Moldova; MDG: Madagascar; MEX: Mexico; MKD: Macedonia; MLI: Mali; MNE: Montenegro; MNG: Mongolia; MOZ: Mozambique; MRT: Mauritania; MWI: Malawi; NAM: Namibia; NER: Niger; NGA: Nigeria; NIC: Nicaragua; NPL: Nepal; PAK: Pakistan; PER: Peru; PHL: Philippines; PSE: State of Palestine; RWA: Rwanda; SDN: Sudan; SEN: Senegal; SLE: Sierra Leone; STP: São Tomé and Príncipe; SUR: Suriname; SWZ: Eswatini; TCD: Chad; TGO: Togo; THA: Thailand; TJK: Tajikistan; TKM: Turkmenistan; TLS: Timor-Leste; TZA: Tanzania; UGA: Uganda; VNM: Vietnam; YEM: Yemen; ZMB: Zambia; ZWE: Zimbabwe. .
Source: Authors' computations based on the micro-datasets produced by Alkire et al. (2020a)

Intuitively, ω^1 requires comparing only for the poorest quintile, whereas ω^2 and ω^3 require comparing the two poorest quintiles and the three poorest quintiles, respectively.[23] The approach proposed by Seth and McGillivray (2018) can be applied for robustness tests for any finite number of dimensions and thus the approach can be easily applied whenever positive quantile-weights are assigned to more than three quantiles. The theoretical foundation of the robustness test is outlined in Appendix E.

We report the well-being levels and inclusivity premiums for ω^1, ω^2 and ω^3 in Appendix F, where the final two columns report whether the changes in well-being levels and the inclusivity premiums are robust or

[23] The quantile weights in ω^2 are analogous to the World Bank's shared prosperity analysis, where the income growth among the bottom 40% of the population is compared to the overall income growth.

Table 3
Comparisons of changes: India vs Nepal and Malawi vs Côte d'Ivoire.

	Δ_1		Δ_2		Δ_3		Δ_4		Δ_5		Δ		$\overline{\Delta}$		π	
India	1.99	***	1.75	***	1.51	***	1.25	***	0.43	***	1.86	***	1.39	***	0.47	***
Nepal	2.23	***	1.57	***	1.31	***	0.72	***	0.31	***	1.91	***	1.23	***	0.68	***
Côte d'Ivoire	1.28	***	1.36	***	1.96	***	1.92	***	1.12	***	1.38	***	1.53	***	−0.14	**
Malawi	1.50	***	1.08	***	1.41	***	1.01	***	0.94	***	1.35	***	1.19	***	0.16	***

Source: Authors' computations based on the data in Table 2.
Notes: Statistical significance: ***: $p < 0.01$, **: $p < 0.05$, *: $p < 0.1$. Δ_i is the change in average attainment score in the i^{th} quintile; Δ is the change in overall well-being; $\overline{\Delta}$ is the change in the overall average attainment score and π is the inclusivity premium.

not for all 75 countries, respectively. We refer to an increase (or decrease) in well-being as being robust if we observe statistically significant increases (or decreases) for all three quantile-weight vectors. Out of the 75 countries, we observe the changes in well-being to be robust for 72 countries, including Benin.

Unlike the changes in well-being, only around two-thirds of all inclusivity premiums (for 50 countries) are robust with respect to alternative quantile-weight vectors, while the other 25 countries do not pass the robustness test. Of the 56 countries registering positive inclusivity premiums, 43 are robust and 13 are not robust. Similarly, of the 11 countries registering negative inclusivity premiums, seven are robust and four are not robust. Of the 25 countries that do not pass the robustness tests of inclusivity premium, 17 are from sub-Saharan Africa. Thus, inclusivity premiums are not robust for nearly half of the sub-Saharan African countries.

6. Comparison of inclusivity premium to other well-known measures

We now elaborate how the inclusivity premium empirically compares with two well-known measures: (i) the shared prosperity premium (SPP) produced by the World Bank and (ii) the global MPI produced by OPHI and UNDP. We first explore how the SPP (the difference between the average income growth among the bottom 40% of the population and the overall average income growth) compares with the inclusivity premium across countries associated with the multidimensional well-being measure. The SPP is positive whenever the average income growth (i.e., relative change) among the poorest 40% of the population is larger than the overall average income growth (i.e., inclusive), and negative whenever growth among the poorest 40% is slower (i.e., non-inclusive).

We have secured SPP data from the World Bank's global database on shared prosperity for only 28 of the 75 countries.[24] We use the 23 of these 28 countries for which the differences between the first and last periods of the surveys for computing SPPs and those for the surveys for computing inclusivity premiums were three years or less. Fig. 2 presents the relationship between SPPs and inclusivity premiums using a simple scatterplot. We observe an overall inverted-U shaped relationship between these two measures, not, as we might have expected, an upward sloping relationship. Higher SPPs are therefore not necessarily associated with higher inclusivity premiums. Countries such as Pakistan, Sierra Leone, Tanzania and Uganda show unsatisfactory performance by both measures, whereas countries such as China and Indonesia perform moderately according to both measures. There are several instances, however, where a group of countries perform impressively by one measure but not by the other measure. For instance, Ghana and Lao PDR perform impressively in terms of inclusivity premiums but their SPPs are negative, whereas Malawi and Philippines register very high SPPs but their inclusivity premiums are less impressive.

Our approach to requiring faster absolute changes among poorer quantiles in the context of a bounded variable may appear more demanding than the shared prosperity requirement of relative changes for monetary variables. However, we observe empirically in Fig. 3 that of the 23 countries a much larger number of countries have positive inclusivity premiums than those having positive shared prosperity premiums.

We next compare the inclusivity premiums with the changes in the global MPI values. Given that our inclusive well-being measure is based on the full distribution of attainments and uses the same set of indicators and parameters as the global MPI (which focuses only on persons identified as poor), it is crucial to examine whether our inclusive well-being framework provides any additional insight into the changes in the MPIs. Fig. 3 presents the relationship between inclusivity premiums and absolute changes in the MPIs across 75 countries. As with the SPP, the relationship is inverted-U shaped.[25] Countries such as Burkina Faso (BFA), Mali (MLI), Mozambique (MOZ) and Niger (NER) register statistically significant MPI reductions but statistically significantly negative inclusivity premiums. In contrast, countries such as Bangladesh (BDG), Nepal (NPL) and Honduras (HND) register both statistically significant MPI reductions and statistically significantly positive inclusivity premiums. There are also instances, particularly in low-MPI countries, such as Colombia (COL) and Thailand (THA), where the absolute MPI reductions are small and inclusivity premiums are much larger.

To form a deeper understanding of their relationship, we examine two countries – Tanzania and Zambia, both having similar MPIs in their respective initial periods (0.342 in 2010 for Tanzania and 0.349 in 2007 for Zambia) and similar levels of annual absolute reductions (−0.011 between 2010 and 2016 for Tanzania and −0.012 between 2007 and 2014 for Zambia). Tanzania's MPI headcount ratio is also similar to Zambia's in the initial period, and they both show comparable annual reductions. Note that the MPI headcount ratio of a country is the proportion of multidimensionally poor people in that country, whereas the MPI of a country is the product of the MPI headcount ratio and the average deprivation score that the multidimensionally poor people in the country experience (Alkire and Foster, 2011). When we look at the inclusivity premiums, however, Tanzania has a statistically significantly negative inclusivity premium of −0.15, whereas Zambia has a statistically significantly positive inclusivity premium of 0.26.

Fig. 4 presents the quintile-wise changes in average attainment scores for both countries in two panels using bar diagrams. The height of the lighter-shaded bar denotes the average attainment within each quintile for the first period, whereas the height of the darker-shaded bar denotes the average attainment within each quintile for the second period. The difference between the darker-shaded bar and the lighter-shaded bar denotes the improvement in average attainment within each quintile. Note that an attainment score is the complement of a deprivation score by our definition, and therefore the magnitude of

[24] Appendix G reports the overall income growth rates, income growth rates of the poorest 40% of the population, and SPPs.

[25] Appendix G reports the MPI values and MPI headcount ratios for all 75 countries.

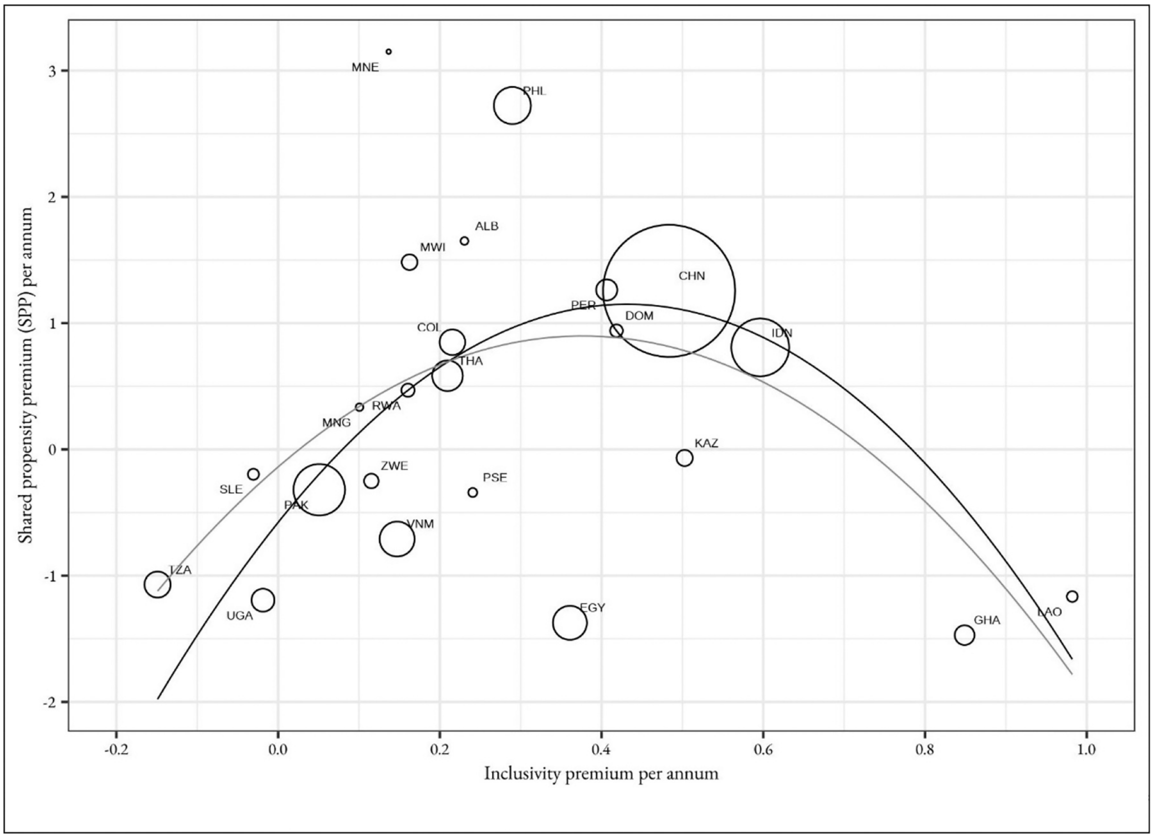

Fig. 2. Shared prosperity premiums (monetary, relative) and inclusivity premiums (multidimensional, absolute) across 23 countries. Notes: Both the solid black population weighted trend line and the solid grey population unweighted trend line correspond to 25 countries. The size of each bubble reflects the average population size of the country across both periods. Countries for SPP: Albania (ALB, 2014–17), China (CHN, 2013–16), Colombia (COL, 2014–19), Dominican Republic (DOM, 2011–16), Egypt (EGY, 2012–17), Ghana (GHA, 2012–16), Indonesia (IDN, 2015–19), Kazakhstan (KAZ, 2013–18), Lao PDR (LAO, 2012–18), Malawi (MWI, 2010–16), Mongolia (MNG, 2011–18), Montenegro (MNE, 2012–16), Pakistan (PAK, 2013–18), Peru (PER, 2014–19), Philippines (PHL, 2015–18), Rwanda (RWA, 2013–16), Sierra Leone (SLE, 2011–18), State of Palestine (PSE, 2011–16), Tanzania (TZA, 2011–18), Thailand (THA, 2015–19), Uganda (UGA, 2012–16), Vietnam (VNM, 2014–18) and Zimbabwe (ZWE, 2011–17). .
Source: Authors' computations for inclusivity premiums. SPP figures were accessed from World Bank (n.d.) in December 2021

absolute improvement in the average attainment score within a quintile is equivalent to the magnitude of the corresponding absolute reduction in the average deprivation score within that quintile.

Hence, the MPIs and corresponding headcount ratios have improved by similar magnitudes for both Tanzania and Zambia, but we observe a key difference in inclusivity between the two countries. For Tanzania, improvements in average attainment scores in poorer quintiles have been less than the improvements in richer quintiles, but for Zambia, improvements have been larger for poorer quintiles. Therefore, Zambia's improvement in well-being has been inclusive, but Tanzania's improvement in well-being has not. Clearly, our framework adds valuable information over and above the overall global MPI trends.

7. Conclusions

In this paper, we first propose a quantile-based approach to diagnose whether the overall progress in well-being is inclusive of poorer people, where well-being is measured using multiple dichotomous indicators of well-being that are non-monetary in nature and summed into an overall deprivation or attainment score that is naturally bounded. If trends are assessed to be inclusive (or not), further analyses can be carried out to ascertain their provenance in policy as well as the particular indicator changes or populations where progress was the strongest. Our key aim is to capture distributional improvements using readily available repeated cross-sectional datasets rather than estimating treatment effects or probing which policies might have generated such improvements. To ensure consistent assessment of well-being changes as well as inclusiveness across attainment and deprivation scores, we examine absolute changes in well-being, where the well-being measure is a quantile-weighted sum of quantile average attainment scores. We break down the overall change in well-being into two components: change in the average attainment and an inclusivity premium that captures the extent to which the overall change in well-being is shared by poorer groups.

For the empirical assessment, we draw upon the well-known counting framework that has been widely adopted for multidimensional poverty measurement. The measure of well-being we use is the complement of the global MPI. Out of the 75 developing countries in our analysis, we observed statistically significant robust increases in inclusive well-being for 71 countries. However, our analysis of inclusivity premium does not reflect such a rosy picture. For only three-quarters of all countries (56 out of 75), progress in average attainment has been inclusive for the poorer. For the other 19 countries, the inclusivity premiums are either negative or not statistically significantly different from zero. Out of the 56 countries with statistically significantly positive inclusivity premiums, only 43 are robust to alternative quantile-weight vectors.

Of the 75 countries in our analysis, 35 countries are from sub-Saharan Africa and only 18 of them have statistically significantly positive inclusivity premiums and 11 of them are robust. Thus, fewer than one-third of all countries in sub-Saharan Africa show robust positive inclusiveness and seven sub-Saharan African countries – Burkina Faso, Burundi, Madagascar, Mali, Mozambique, Niger and Tanzania – register

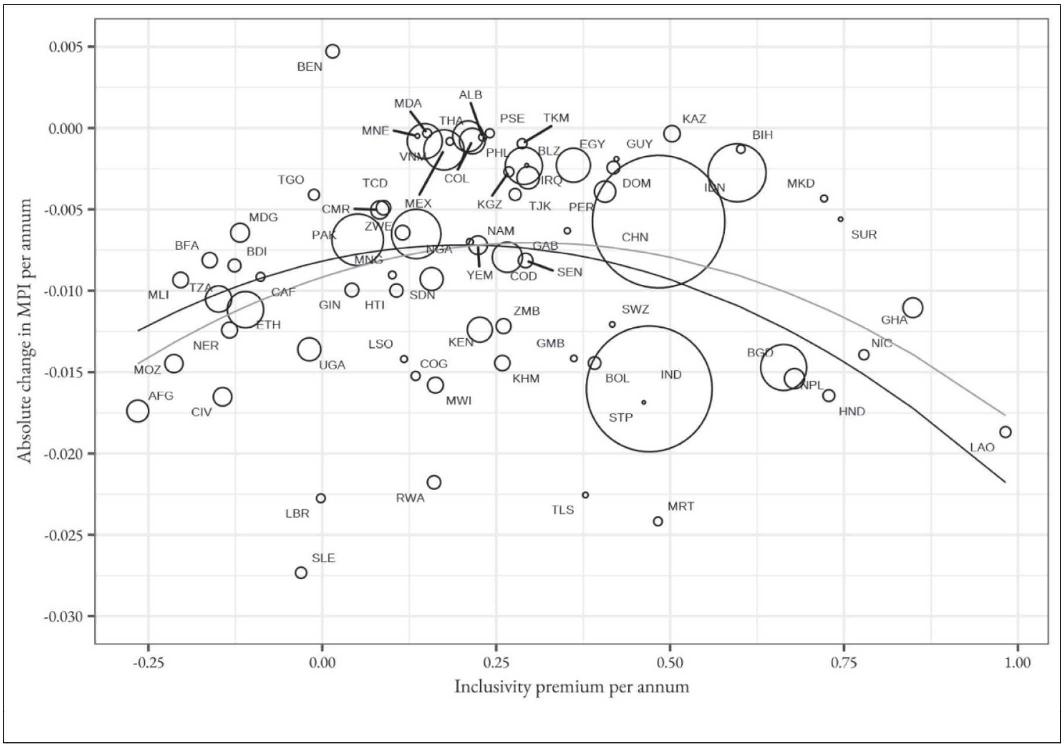

Fig. 3. Inclusivity premiums and absolute changes in the MPIs across countries. Notes: Figures for inclusivity premiums and absolute changes in the MPIs are reported in Appendix G. The solid black line corresponds to the population weighted trend line for 75 countries. The solid grey line corresponds to the population unweighted trend line for 75 countries. The size of each bubble reflects the average population size of the country across both periods. Country abbreviations: AFG: Afghanistan; ALB: Albania; BDI: Burundi; BEN: Benin; BFA: Burkina Faso; BGD: Bangladesh; BIH: Bosnia and Herzegovina; BLZ: Belize; BOL: Bolivia; CAF: Central African Republic: CHN: China; CIV: Côte d'Ivoire; CMR: Cameroon; COD: Congo, DR; COG: Republic of Congo; COL: Colombia; DOM: Dominican Republic; EGY: Egypt; ETH: Ethiopia; GAB: Gabon; GHA: Ghana; GIN: Guinea; GMB: Gambia; GUY: Guyana; HND: Honduras; HTI: Haiti; IDN: Indonesia; IND: India; IRQ: Iraq; JAM: Jamaica; KAZ: Kazakhstan; KEN: Kenya; KGZ: Kyrgyzstan; KHM: Cambodia; LAO: Lao PDR; LBR: Liberia; LSO: Lesotho; MDA: Moldova; MDG: Madagascar; MEX: Mexico; MKD: Macedonia; MLI: Mali; MNE: Montenegro; MNG: Mongolia; MOZ: Mozambique; MRT: Mauritania; MWI: Malawi; NAM: Namibia; NER: Niger; NGA: Nigeria; NIC: Nicaragua; NPL: Nepal; PAK: Pakistan; PER: Peru; PHL: Philippines; PSE: State of Palestine; RWA: Rwanda; SDN: Sudan; SEN: Senegal; SLE: Sierra Leone; STP: São Tomé and Príncipe; SUR: Suriname; SWZ: Eswatini; TCD: Chad; TGO: Togo; THA: Thailand; TJK: Tajikistan; TKM: Turkmenistan; TLS: Timor-Leste; TZA: Tanzania; UGA: Uganda; VNM: Vietnam; YEM: Yemen; ZMB: Zambia; ZWE: Zimbabwe. .
Source: Authors' computations based on the micro-datasets produced by Alkire et al. (2020a)

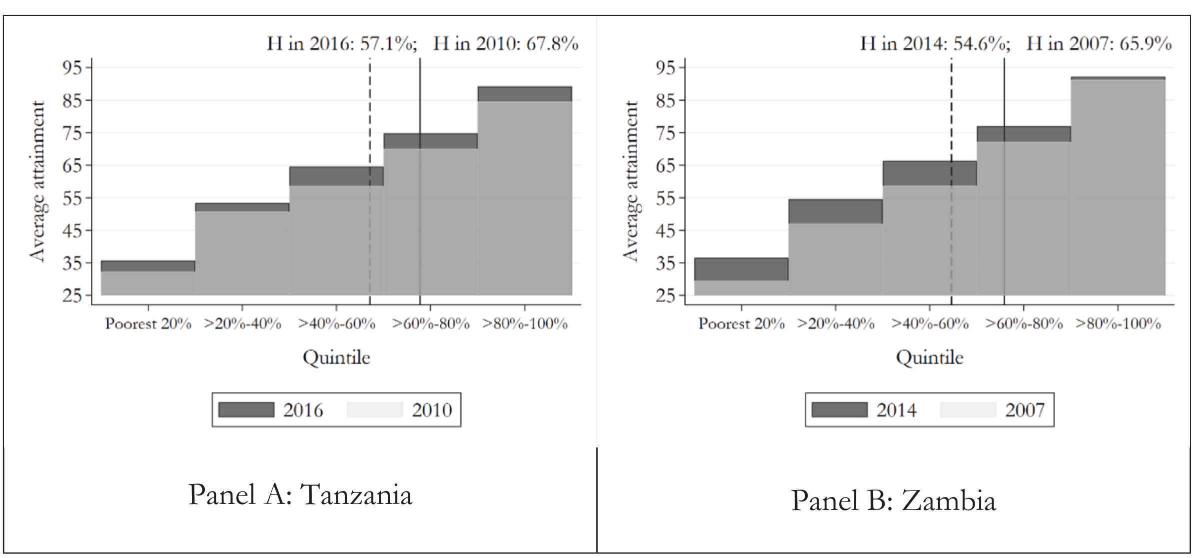

Fig. 4. Average attainment scores by quintile across two periods in Tanzania and Zambia. Notes: The solid and dashed vertical lines correspond to the MPI headcount ratios for the first year and the second year, respectively. .
Source: Authors' computations based on Appendix D and Appendix G

robust statistically significantly negative inclusivity premiums.

We compare our approach to assessing the inclusiveness of well-being to that of the World Bank's monetary shared prosperity analysis as well as to the absolute changes in global-MPI. We observed a non-linear relationship with both these measures through cross-country analysis – meaning neither higher monetary shared prosperity nor faster absolute reduction in multidimensional poverty at the national level are necessarily associated with more inclusive improvement in well-being over time. Despite its close link to the global-MPI framework, the non-linear relationship between inclusivity premium and global-MPI reductions demonstrates that our approach may provide additional insights to the existing effective multidimensional poverty measurement framework.

In this paper, we employ an internationally comparable multidimensional well-being measure for developing countries that is closely linked to the global-MPI framework. However, depending on the context a different set of indicators and deprivation cutoffs that are richer or more informative may be used to develop other multidimensional well-being measures using the counting approach, but the same framework that we propose in this paper can be employed to assess inclusivity. Our framework may have wider applications and could be used to study and analyse the inclusiveness of well-being changes within different regions of a country: the data for such subnational analyses are present in the global MPI database and may be of considerable interest. Finally, we use a multidimensional counting framework as a measure of well-being as there is a strong justification that well-being and poverty are both multidimensional, but our approach is equally applicable to any bounded indicator of well-being that may have attainment and deprivation representations.

CRediT authorship contribution statement

Suman Seth: Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Conceptualization. **Sabina Alkire:** Writing – review & editing, Writing – original draft, Methodology, Funding acquisition, Conceptualization.

Declaration of competing interest

Suman Seth: None. Sabina Alkire: Financial support received from the Department for International Development (DFID) (project 300706), the Economic and Social Research Council (ESRC-DFID grant number ES/N01457X/1), and the Swedish International Development Cooperation Agency (SIDA) (project 11141) that enabled this project.

Acknowledgement

The authors are grateful to James Foster and Indranil Dutta for their valuable comments and to Sophie Scharlin-Pettee and Ayush Patel for research assistance. We use the global Multidimensional Poverty Index (MPI) 2020 microdata, which were cleaned, standardized, and produced for further analysis by Sabina Alkire, Usha Kanagaratnam and Nicolai Suppa (2020), and are particularly grateful to Usha and Nicolai for access to this dataset. We benefitted from insightful comments from the participants of the OPHI–GWU–HDRO seminar series in November 2022, the 17th Annual Conference on Economic Growth and Development in Delhi, India, in December 2022, the 10th Meeting of the Society for the Study of Economic Inequality in Aix-in-Provence, France, in July 2023 and the 2023 Human Development and Capability Association Conference in Sofia, Bulgaria. OPHI is grateful for the financial support received from the Department for International Development (DFID) (project 300706), the Economic and Social Research Council (ESRC-DFID grant number ES/N01457X/1), and the Swedish International Development Cooperation Agency (SIDA) (project 11141) that enabled this project. All errors remain our own.

Appendix A. Axiomatic foundation and restrictions on quantile weights

Let $\mathscr{F}$ be the set of all possible distributions of adequacy levels and Ω be the set of all possible Q-dimensional quantile-weight vectors. To understand how the change measure Δ responds to different transformations in quantile averages, we expect the measure to satisfy the following properties. The first standard property is *weak monotonicity*, which requires that the overall well-being should not register a fall (i.e., $\Delta \geq 0$) when there is no deterioration in any quantile-wise averages (i.e., $\Delta_q \geq 0$ for all q) between two periods. This property ensures that Δ respects the directional changes in all quintile averages.

***Weak monotonicity*.** For any $F_1, F_2 \in \mathscr{F}$ and $\omega \in \Omega$, $\Delta(F_1, F_2; \omega) \geq 0$ whenever $\Delta_q(F_1, F_2) \geq 0$ for all $q \in \mathscr{Q}$.

We refer to the second property as *translation homogeneity*. The property requires that whenever there is an equal change in all quantile averages, then the same change should apply to the overall change. This property is similar in spirit to the linear homogeneity property elsewhere – requiring an overall well-being measure to change in the same proportion whenever all underlying components are scaled up or down by the same proportion (see Foster et al., 2013).

***Translation homogeneity*.** For any $F_1, F_2 \in \mathscr{F}$ and $\omega \in \Omega$, $\Delta(F_1, F_2; \omega) = \gamma$ whenever $\Delta_q(F_1, F_2) = \gamma$ for all $q \in \mathscr{Q}$.

We refer to the third property as *weak priority*, which requires that, with everything else unchanged, an improvement in the average within a poorer quantile (say, quantile q') should not lead to a lower well-being improvement than an equal amount of improvement in a less-poor quantile (say, quantile q'', such that $q' < q''$). This property is crucial for incorporating the (weak) inclusiveness of well-being changes and is important from both an egalitarian perspective (Sen, 1976) and a prioritarian perspective (Parfit, 1997). The property suggests providing no less priority to the improvements among those in the poorer quantiles.[26]

***Weak priority*.** For any $F_1, F_2, F_2' \in \mathscr{F}$, for any $\omega \in \Omega$ and for some pair $\{q', q'' | q' < q''\} \in \mathscr{Q}$, $\Delta(F_1, F_2; \omega) \geq \Delta(F_1, F_2'; \omega)$ whenever $\Delta_{q'}(F_1, F_2) = \Delta_{q''}(F_1, F_2') = \eta > 0$, $\Delta_q(F_1, F_2) = 0$ for all $q \in \mathscr{Q} \backslash \{q'\}$ and $\Delta_q(F_1, F_2') = 0$ for all $q \in \mathscr{Q} \backslash \{q''\}$.

Based on the three properties – weak monotonicity, translation homogeneity and weak priority – Proposition 1 characterizes the restrictions on quantile weights that our change in well-being measure in Eq. (2) should respect.

[26] See Fleurbaey (2015) for a comparative philosophical discussion on these two views. For a recent operationalization of the prioritarian principle while measuring poverty with ordinal variables, see Seth and Yalonetzky (2021b).

Proposition 1. A change in well-being measure $\Delta : \mathscr{F} \times \mathscr{F} \times \Omega \mapsto \mathbb{R}$ satisfies weak monotonicity, translation homogeneity and weak priority if and only if: (i) $\omega_q \geq 0$ for all $q \in \mathscr{Q}$, (ii) $\sum_{q=1}^{Q} \omega_q = 1$, and (iii) $\omega_{q'} \geq \omega_{q''}$ for all pairs $\{q', q'' | q' < q''\} \in \mathscr{Q}$.

Proof. For some $F_1, F_2 \in \mathscr{F}$ and $\omega \in \Omega$, we know that $\Delta(F_1, F_2; \omega) = \sum_{q=1}^{Q} \omega_q \Delta_q(F_1, F_2)$. First, we prove the sufficiency part, showing that Δ satisfies weak monotonicity, translation homogeneity and weak priority if $\omega_q \geq 0$ for all q, $\sum_{q=1}^{Q} \omega_q = 1$ and $\omega_{q'} \geq \omega_{q''}$ for all pairs $\{q', q'' | q' < q''\} \in \mathscr{Q}$. Provided $\omega_q \geq 0$, we clearly have $\Delta(F_1, F_2; \omega) \geq 0$ whenever $\Delta_q(F_1, F_2) \geq 0$ for all $q \in \mathscr{Q}$, and so Δ satisfies weak monotonicity. Provided $\sum_{q=1}^{Q} \omega_q = 1$, it can be seen that $\Delta(F_1, F_2; \omega) = \gamma$ whenever $\Delta_q(F_1, F_2) = \gamma$ for all $q \in \mathscr{Q}$, and so Δ satisfies translation homogeneity. Finally, for some $F_1, F_2, F_2' \in \mathscr{F}$ and for some $\{q', q'' | q' < q''\} \in \mathscr{Q}$, suppose $\Delta_{q'}(F_1, F_2) = \Delta_{q''}(F_1, F_2') = \eta > 0$, $\Delta_q(F_1, F_2) = 0$ for all $q \neq q'$, $\Delta_q(F_1, F_2') = 0$ for all $q \neq q''$. Then for some ω, $\Delta(F_1, F_2; \omega) - \Delta(F_1, F_2'; \omega) = \omega_{q'} \Delta_{q'}(F_1, F_2) - \omega_{q''} \Delta_{q''}(F_1, F_2') = (\omega_{q'} - \omega_{q''})\eta$. Provided $\omega_q \geq \omega_{q'}$ for all $q < q'$, we certainly have $\omega_{q'} \geq \omega_{q''}$ and hence $\Delta(F_1, F_2; \omega) \geq \Delta(F_1, F_2'; \omega)$. Therefore, Δ satisfies weak priority.

Next, we prove the *necessity* part. First, suppose that Δ satisfies translation homogeneity, which requires $\Delta(F_1, F_2; \omega) = \gamma$ whenever $\Delta_q(F_1, F_2) = \gamma > 0$ for all $q \in \mathscr{Q}$. Thus, inserting the values in the equation $\Delta(F_1, F_2; \omega) = \sum_{q=1}^{Q} \omega_q \Delta_q(F_1, F_2)$ we obtain $\gamma = \sum_{q=1}^{Q} \omega_q \gamma$, which implies $\sum_{q=1}^{Q} \omega_q = 1$. Second, suppose that Δ satisfies weak monotonicity, which requires $\Delta(F_1, F_2; \omega) \geq 0$ whenever $\Delta_q(F_1, F_2) \geq 0$ for all $q \in \mathscr{Q}$. We need to show that $\omega_q \geq 0$ for all q. Without loss of generality, for an arbitrary q', suppose $\Delta_{q'}(F_1, F_2) > 0$ and $\Delta_q(F_1, F_2) = 0$ for all $q \neq q'$. Then, $\Delta(F_1, F_2; \omega) = \omega_{q'} \Delta_{q'}(F_1, F_2)$. Now, $\omega_{q'} < 0$ implies that $\Delta(F_1, F_2; \omega) < 0$, which contradicts the monotonicity property. Given that $\omega_{q'} \geq 0$ is necessary for an arbitrary q', it is necessary that $\omega_q \geq 0$ for all $q \in \mathscr{Q}$. Finally, for some $F_1, F_2, F_2' \in \mathscr{F}$ and for some arbitrary pair $\{q'', q''' | q'' < q'''\} \in \mathscr{Q}$, suppose $\Delta_{q''}(F_1, F_2) = \Delta_{q'''}(F_1, F_2') = \eta > 0$, $\Delta_q(F_1, F_2) = 0$ for all $q \neq q''$ and $\Delta_q(F_1, F_3) = 0$ for all $q \neq q'''$. Then, for some ω, $\Delta(F_1, F_2; \omega) - \Delta(F_1, F_3; \omega) = \omega_{q''} \Delta_{q'}(F_1, F_2) - \omega_{q'''} \Delta_{q'''}(F_1, F_2') = (\omega_{q''} - \omega_{q'''})\eta$. Now, $\omega_{q''} < \omega_{q'''}$ implies $\Delta(F_1, F_2; \omega) < \Delta(F_1, F_2'; \omega)$, violating the weak priority property. So, $\omega_{q''} \geq \omega_{q'''}$ is necessary for $\Delta(F_1, F_2; \omega) \geq \Delta(F_1, F_2'; \omega)$ and since this condition holds for any arbitrary pair $\{q'', q'''\}$, it holds for all pairs $\{q', q'' | q' < q''\} \in \mathscr{Q}$. This completes our proof for the necessity part. ■

Proposition 1 requires that the quantile weights assigned to all quantiles are: (i) non-negative; (ii) sum up to one; and (iii) the quantile weights assigned to poorer quantiles are no lower than the quantile weights assigned to the less-poor quantiles, which ensures that the change in well-being measure is *weakly* inclusive.[27] A well-being index W satisfying the restrictions in Proposition 1 can be seen as an *equally distributed equivalent overall average adequacy level* which, if assigned to all quantiles, should result in the same level of well-being.[28] Similarly, a change in well-being measure Δ satisfying the restrictions in Proposition 1 can be seen as an *equally distributed equivalent change in overall average adequacy level* which, if assigned to all quantiles, should result in the same change in well-being.

Appendix B. Inclusivity premium and restriction on weights

The second term on the right-hand side of Eq. (3), $\pi(F_1, F_2; \omega)$, is the quantile-weighted sum of the differences $\pi_q(F_1, F_2) = \Delta_q(F_1, F_2) - \overline{\Delta}(F_1, F_2)$ for all $q \in \mathscr{Q}$. Thus, $\pi(F_1, F_2; \omega) = \Delta(F_1, F_2; \omega) - \overline{\Delta}(F_1, F_2) = \sum_{q=1}^{Q} \omega_q [\Delta_q(F_1, F_2) - \overline{\Delta}(F_1, F_2)] = \sum_{q=1}^{Q} \omega_q \pi_q(F_1, F_2)$, where each difference $\pi_q(F_1, F_2)$ captures the change in the average within the q $^{\text{th}}$ quantile compared to the change in the overall average adequacy level. Note that the inclusivity premium is always equal to zero by construction at the equal quantile-weight vector and so we are more interested in situations where the inclusivity premium is (strictly) positive. We consider a well-being change to be *strictly* inclusive whenever every poorer quantile registers strictly higher improvement than every less-poor quantile, that is $\Delta_q(F_1, F_2) > \Delta_{q+1}(F_1, F_2)$ for all quintiles except the least-poor quantile; that is, $q \in \mathscr{Q} \backslash \{Q\}$. Accordingly, in such a situation, the inclusivity premium should be *positive*, that is, $\pi(F_1, F_2; \omega) > 0$. Proposition 2 presents the restrictions on quantile weights that enable the inclusivity premium to be positive, while denoting the set of quantile-weight vectors characterized in Proposition 1 by $\Omega_0 \subset \Omega$, as follows.

Proposition 2. For any $F_1, F_2 \in \mathscr{F}$ such that $\Delta_q(F_1, F_2) > \Delta_{q+1}(F_1, F_2)$ for all $q \in \mathscr{Q} \backslash \{Q\}$ and for any $\omega \in \Omega_0$, $\pi(F_1, F_2; \omega) > 0$ if and only if $\omega_q \geq \omega_{q+1}$ for all $q \in \mathscr{Q} \backslash \{Q\}$ and $\omega_q > \omega_{q+1}$ for at least one $q \in \mathscr{Q} \backslash \{Q\}$.

Proof. From Eq. (3), we obtain the inclusivity premium as $\pi(F_1, F_2; \omega) = \Delta - \overline{\Delta} = \sum_{q=1}^{Q} \omega_q (\Delta_q - \overline{\Delta})$. For the ease of presentation in the proof, we suppress the inputs of the functions. Then, using summation by parts, we may rewrite the right-hand side of the equation as[29]:

$$\pi(F_1, F_2; \omega) = \omega_Q \sum_{q=1}^{Q} (\Delta_q - \overline{\Delta}) + \sum_{q=1}^{Q-1} \left([\omega_q - \omega_{q+1}] \left[\sum_{r=1}^{q} (\Delta_r - \overline{\Delta}) \right] \right). \tag{4}$$

By definition, $\overline{\Delta} = \left[\sum_{q=1}^{Q} \Delta_q\right] / Q$ and so $\sum_{q=1}^{Q} (\Delta_q - \overline{\Delta}) = 0$. Thus, the first term in Eq. (4) equals to zero. Next, suppose $\omega_q \geq \omega_{q+1}$ for all $q \in \mathscr{Q} \backslash \{Q\}$ and $\omega_{q'-1} > \omega_{q'}$ for some $q' \in \mathscr{Q} \backslash \{Q\}$. Then, $\omega_q - \omega_{q+1} \geq 0$ for all $q \in \mathscr{Q} \backslash \{Q, q'\}$ and $\omega_{q'-1} - \omega_{q'} > 0$. Finally, whenever $\Delta_q > \Delta_{q+1}$ for all $q \in \mathscr{Q} \backslash \{Q\}$, then $\sum_{r=1}^{q} (\Delta_r - \overline{\Delta}) > 0$ for all $q \in \mathscr{Q} \backslash \{Q\}$. Hence, $\pi(F_1, F_2; \omega) > 0$. We next prove the necessity part by showing that $\pi < 0$ whenever $\omega_q < \omega_{q+1}$ for some

[27] The results obtained in Proposition 1 are analogous to those obtained by Donaldson and Weymark (1980) and Ebert (2004). We have presented all properties and the main result in the proposition in terms of weak inequalities, but it should be straightforward to establish the results with strict inequalities as and where required (e.g., strong inclusiveness). Moreover, our theoretical presentation in this section is based on adequacies, but many indicators may have shortfall representations in practice. Our approach is consistent and is robust to adequacy and shortfall representations.

[28] The concept is analogous to the concept presented by Atkinson (1970).

[29] This is also known as Abel's lemma (Guenther and Lee, 1988) or Abel's formula (Fishburn and Lavalle, 1995, p.518).

q and $\pi = 0$ whenever $\omega = \overline{\omega}$. For the first part, suppose $Q = 2$ and suppose further without loss of generality that $\Delta_1 > \Delta_2$ and $\overline{\Delta} = 0$. Then, $\pi = \omega_1\Delta_1 + \omega_2\Delta_2$. Given that $\overline{\Delta} = [\Delta_1 + \Delta_2]/2$, then $\Delta_1 = -\Delta_2$ or $-(\Delta_2/\Delta_1) = 1$. Now, suppose $\omega_1 < \omega_2$. Clearly, $\omega_1/\omega_2 < -(\Delta_2/\Delta_1) = 1$ or $\omega_1\Delta_1 + \omega_2\Delta_2 < 0$. Hence, $\pi < 0$. For the second part, by definition, $\overline{\Delta} = \left[\sum_{q=1}^{Q}\Delta_q\right]/Q$ and so $\pi(F_1, F_2; \overline{\omega}) = \sum_{q=1}^{Q}\overline{\omega}_q(\Delta_q - \overline{\Delta}) = \frac{1}{Q}\sum_{q=1}^{Q}(\Delta_q - \overline{\Delta}) = 0$, which completes our proof. ■

Proposition 2 shows that the restrictions, $\omega_q \geq \omega_{q+1}$ for all $q \in \mathscr{Q}\backslash\{Q\}$ (i.e., all elements in $\mathscr{Q}$ excluding the highest quantile Q) and $\omega_q > \omega_{q+1}$ for at least one lower quantile $q \in \mathscr{Q}\backslash\{Q\}$, are both necessary and sufficient for the inclusivity premium to be strictly positive whenever $\Delta_q(F_1, F_2) > \Delta_{q+1}(F_1, F_2)$ for all $q \in \mathscr{Q}\backslash\{Q\}$. Thus, according to Proposition 2, the set of quantile weights that are necessary and sufficient for the inclusivity premium to be positive is $\Omega_0\backslash\{\overline{\omega}\}$, or the set of all quantile-weight vectors characterized in Proposition 1 excluding the equal quantile-weight vector. Note that the inclusivity premium becomes higher for any two given distributions across two periods whenever larger quantile weights are assigned to lower quantiles.[30]

Appendix C. Dimensions, indicators, relevant SDG areas and weights for the Global MPI.

Dimensions of poverty	Indicator	Deprived if …	SDG area	Weight
Health	Nutrition	Any person under 70 years of age for whom there is nutritional information is **undernourished.**[1]	SDG 2	1/6
	Child mortality	A child **under 18** has **died** in the household in the five-year period preceding the survey.[2]	SDG 3	1/6
Education	Years of schooling	**No** eligible household member has completed **six years** of **schooling**.[3]	SDG 4	1/6
	School attendance	Any school-aged child is **not attending** school **up to** the age at which he/she would complete **class 8.**[4]	SDG 4	1/6
Living standards	Cooking fuel	A household cooks using **solid fuel**, such as dung, agricultural crop, shrubs, wood, charcoal or coal.[5]	SDG 7	1/18
	Sanitation	The household has **unimproved** or **no** sanitation **facility** or it is improved but **shared** with other households.[6]	SDG 6	1/18
	Drinking water	The household's source of **drinking water** is **not safe** or safe drinking water is a **30-minute** or **longer walk** from home, roundtrip.[7]	SDG 6	1/18
	Electricity	The household has **no electricity**.[8]	SDG 7	1/18
	Housing	The household has **inadequate** housing materials in **any** of the three components: **floor**, **roof** or **walls**.[9]	SDG 11	1/18
	Assets	The household does **not own more than one** of these **assets**: radio, TV, telephone, computer, animal cart, bicycle, motorbike or refrigerator, and does not own a car or truck.	SDG 1	1/18

Source: Alkire et al. (2020a).

Notes: The global MPI is related to the following SDGs: No Poverty (SDG 1), Zero Hunger (SDG 2), Good Health and Well-being (SDG 3), Quality Education (SDG 4), Clean Water and Sanitation (SDG 6), Affordable and Clean Energy (SDG 7) and Sustainable Cities and Communities (SDG 11).

[1] Children under 5 years old (60 months and younger) are considered undernourished if their z-score of either height-for-age (stunting) or weight-for-age (underweight) is below minus two standard deviations from the median of the reference population. Children 5–19 years old (61–228 months) are identified as deprived if their age-specific Body Mass Index (BMI) cutoff is below minus two standard deviations. Adults 19–70 years old (229–840 months) are considered undernourished if their BMI is below 18.5 m/kg^2.

[2] The child mortality indicator of the global MPI is based on birth history data provided by mothers aged 15 to 49. In most surveys, men have provided information on child mortality as well, but this lacks the date of birth and death of the child. Hence, the indicator is constructed solely from mothers. However, if the data from the mother are missing, and if the male in the household reported no child mortality, then we identify no child mortality in the household.

[3] If all individuals in the household are in an age group where they should have formally completed six or more years of schooling, but none have this achievement, then the household is deprived. However, if any individuals aged 10 years and older reported six years or more of schooling, the household is not deprived.

[4] Data sources for the age children start compulsory primary school are DHS or MICS survey reports, and the UNESCO Institute for Statistics (https://data.uis.unesco.org).

[5] If the survey report uses other definitions of solid fuel, we follow the survey report.

[6] A household is considered to have access to improved sanitation if it has some type of flush toilet or latrine, or ventilated improved pit or composting toilet, provided that they are not shared. If the survey report uses other definitions of adequate sanitation, we follow the survey report.

[7] A household has access to clean drinking water if the water source is any of the following types: piped water, public tap, borehole or pump, protected well, protected spring, or rainwater, and it is within a 30-minute walk, round trip. If the survey report uses other definitions of clean or safe drinking water, we follow the survey report.

[8] Several countries do not collect data on electricity because of 100% coverage. In such cases, we identify all households in the country as non-deprived in electricity.

[9] A household is considered deprived if its floor is made of natural materials or if the dwelling has no roof or walls, or if either the roof or walls are constructed using natural or rudimentary materials. The definition of natural and rudimentary materials follows the classification used in country-specific DHS or MICS questionnaires.

[30] Our inclusivity premium definition is conceptually analogous to the 'progressivity component' used in the social mobility literature to study egalitarian improvements in social mobility. See Palmisano and Van de Gaer (2016).

Appendix D. Quintile-wise average attainment scores and national average attainment scores across countries

		Survey		Year		Overall				Poorest quintile				Second-poorest quintile				Middle quintile				Second-richest quintile				Richest quintile			
Country (ISO)	Region	1st	2nd	1st	2nd	μ_1	μ_2	$\overline{\Delta}$		μ_1^1	μ_2^1	Δ_1		μ_1^2	μ_2^2	Δ_2		μ_1^3	μ_2^3	Δ_3		μ_1^4	μ_2^4	Δ_4		μ_1^5	μ_2^5	Δ_5	
Egypt (EGY)	ARS	DHS	DHS	2008	2014	90.8	92.7	0.32	***	70.7	76.0	0.88	***	84.9	87.9	0.50	***	98.2	99.5	0.22	***	100.0	100.0	0.00		100.0	100.0	0.00	
Iraq (IRQ)	ARS	MICS	MICS	2011	2018	87.9	91.0	0.44	***	64.9	71.6	0.96	***	82.8	84.9	0.29	***	92.0	98.5	0.94	***	100.0	100.0	0.00		100.0	100.0	0.00	
State of Palestine (PSE)	ARS	MICS	MICS	2010	2014	94.3	95.3	0.26	***	80.9	84.1	0.80	***	94.4	94.4	0.00	***	96.0	97.9	0.48	***	100.0	100.0	0.00		100.0	100.0	0.00	
Sudan (SDN)	ARS	MICS	MICS	2010	2014	61.8	65.0	0.81	***	26.7	30.1	0.84	***	47.5	52.1	1.16	***	63.3	67.4	1.03	***	78.1	81.1	0.75	***	93.4	94.5	0.27	***
Yemen (YEM)	ARS	MICS	DHS	2006	2013	73.1	78.6	0.79	***	39.1	46.8	1.09	***	63.4	69.8	0.91	***	76.7	83.3	0.94	***	87.3	93.2	0.85	***	98.9	100.0	0.16	***
Cambodia (KHM)	EAP	DHS	DHS	2010	2014	68.9	73.9	1.26	***	39.3	45.8	1.61	***	59.4	65.1	1.43	***	71.0	76.4	1.36	***	80.8	85.9	1.30	***	93.8	96.3	0.62	***
China (CHN)	EAP	CFPS	CFPS	2010	2014	84.9	88.7	0.97	***	63.7	70.3	1.66	***	78.6	83.5	1.22	***	87.0	91.5	1.14	***	95.0	98.4	0.84	***	100.0	100.0	0.00	
Indonesia (IDN)	EAP	DHS	DHS	2012	2017	90.9	94.4	0.70	***	71.8	79.3	1.49	***	88.2	93.7	1.10	***	94.6	99.2	0.91	***	100.0	100.0	0.00		100.0	100.0	0.00	
Lao PDR (LAO)	EAP	MICS	MICS	2011–12	2017	71.0	80.1	1.66	***	35.2	51.1	2.89	***	60.1	73.8	2.50	***	75.5	85.6	1.83	***	89.0	94.3	0.97	***	95.2	95.8	0.11	***
Philippines (PHL)	EAP	DHS	DHS	2013	2017	88.6	90.9	0.57	***	67.3	71.9	1.16	***	86.7	88.7	0.49	***	92.6	94.4	0.46	***	96.5	99.5	0.74	***	100.0	100.0	0.00	
Thailand (THA)	EAP	MICS	MICS	2012	2015–16	94.2	95.1	0.27	***	79.0	80.6	0.45	***	93.0	95.1	0.58	***	98.9	100.0	0.31	***	100.0	100.0	0.00		100.0	100.0	0.00	
Timor-Leste (TLS)	EAP	DHS	DHS	2009–10	2016	58.2	69.1	1.69	***	29.6	43.2	2.11	***	47.1	60.7	2.09	***	58.5	70.3	1.81	***	69.9	79.6	1.49	***	85.8	91.9	0.95	***
Vietnam (VNM)	EAP	MICS	MICS	2010–11	2014	90.7	91.7	0.29	***	69.2	70.4	0.36	*	89.5	91.3	0.53	***	94.9	96.8	0.57	***	100.0	100.0	0.00		100.0	100.0	0.00	
Albania (ALB)	ECA	DHS	DHS	2008–9	2017–18	93.5	95.2	0.19	***	79.0	84.2	0.57	***	92.0	94.4	0.27	***	96.2	97.2	0.11	***	100.0	100.0	0.00		100.0	100.0	0.00	
Bosnia and Herzegovina (BIH)	ECA	MICS	MICS	2006	2011–12	93.1	94.0	0.17	***	77.7	84.7	1.29	***	93.5	94.4	0.17	***	94.4	94.4	0.00	***	99.8	96.5	−0.61	***	100.0	100.0	0.00	
Kazakhstan (KAZ)	ECA	MICS	MICS	2010–11	2015	95.0	97.1	0.47	***	82.0	87.0	1.11	***	94.2	98.6	0.97	***	98.8	100.0	0.26	***	100.0	100.0	0.00		100.0	100.0	0.00	
Kyrgyzstan (KGZ)	ECA	MICS	MICS	2005–6	2014	86.9	91.4	0.53	***	68.4	75.5	0.85	***	82.1	88.8	0.78	***	89.2	94.4	0.61	***	94.9	98.4	0.41	***	100.0	100.0	0.00	
Macedonia (MKD)	ECA	MICS	MICS	2005–6	2011	92.7	96.0	0.59	***	73.6	85.3	2.12	***	93.5	94.5	0.19	***	96.4	100.0	0.66	***	100.0	100.0	0.00		100.0	100.0	0.00	
Moldova (MDA)	ECA	DHS	MICS	2005	2012	95.1	95.5	0.06	***	82.1	84.9	0.40	***	94.4	94.4	0.00	***	98.9	98.2	−0.10	***	100.0	100.0	0.00		100.0	100.0	0.00	
Mongolia (MNG)	ECA	MICS	MICS	2010	2013	80.1	84.0	1.29	***	58.6	62.8	1.40	***	74.9	78.9	1.35	***	82.2	86.7	1.49	***	86.6	92.4	1.95	***	98.3	99.1	0.27	***
Montenegro (MNE)	ECA	MICS	MICS	2005–6	2013	95.3	95.2	−0.01		82.9	85.1	0.29	*	94.4	94.4	0.00	***	99.0	96.3	−0.36	***	100.0	100.0	0.00		100.0	100.0	0.00	
Tajikistan (TJK)	ECA	DHS	DHS	2012	2017	84.0	87.2	0.65	***	64.5	69.2	0.94	***	76.9	81.5	0.90	***	85.9	90.6	0.94	***	93.2	94.9	0.33	***	99.3	100.0	0.14	***
Turkmenistan (TKM)	ECA	MICS	MICS	2006	2015–16	91.6	95.5	0.41	***	75.6	81.7	0.63	***	87.6	95.6	0.85	***	94.6	100.0	0.57	***	100.0	100.0	0.00		100.0	100.0	0.00	
Belize (BLZ)	LAC	MICS	MICS	2011	2015–16	91.5	92.6	0.23	***	71.1	74.1	0.68	***	88.6	90.5	0.42	***	98.0	98.2	0.05		100.0	100.0	0.00		100.0	100.0	0.00	
Bolivia (BOL)	LAC	DHS	DHS	2003	2008	74.0	82.9	1.78	***	42.6	53.3	2.14	***	65.4	76.5	2.22	***	78.3	89.2	2.19	***	88.9	95.6	1.34	***	95.0	100.0	1.01	***
Colombia (COL)	LAC	DHS	DHS	2010	2015–16	93.1	94.1	0.19	***	73.3	75.6	0.42	***	92.2	95.0	0.51	***	99.9	100.0	0.02	***	100.0	100.0	0.00		100.0	100.0	0.00	
Dominican Republic (DOM)	LAC	DHS	MICS	2007	2014	89.5	94.5	0.72	***	69.5	78.5	1.30	***	87.2	94.2	1.00	***	94.3	100.0	0.81	***	96.4	100.0	0.52	***	100.0	100.0	0.00	
Guyana (GUY)	LAC	DHS	MICS	2009	2014	92.3	94.5	0.43	***	72.8	77.8	1.00	***	90.9	94.7	0.77	***	98.1	100.0	0.39	***	100.0	100.0	0.00		100.0	100.0	0.00	
Haiti (HTI)	LAC	DHS	DHS	2012	2016–17	67.9	71.3	0.77	***	38.7	41.7	0.68	***	56.8	62.1	1.17	***	70.3	74.6	0.96	***	81.5	84.8	0.73	***	92.1	93.4	0.30	***
Honduras (HND)	LAC	DHS	DHS	2005–6	2011–12	72.7	81.6	1.49	***	39.1	53.5	2.39	***	61.8	74.7	2.16	***	75.6	85.2	1.61	***	87.7	94.7	1.17	***	99.1	100.0	0.15	***
Jamaica (JAM)	LAC	JSLC	JSLC	2010	2014	91.4	91.9	0.12	**	74.2	75.8	0.39		88.2	89.2	0.26	***	94.5	94.4	−0.01	*	100.0	99.8	−0.05	***	100.0	100.0	0.00	
Mexico (MEX)	LAC	ENSANUT	ENSANUT	2012	2016	93.3	93.8	0.12	***	73.3	75.2	0.47	***	93.3	93.7	0.08	***	99.8	100.0	0.04	***	100.0	100.0	0.00		100.0	100.0	0.00	
Nicaragua (NIC)	LAC	DHS	DHS	2001	2011–12	71.3	85.3	1.33	***	33.6	57.8	2.30	***	58.9	80.0	2.01	***	76.4	91.1	1.40	***	89.0	97.4	0.80	***	98.7	100.0	0.12	***
Peru (PER)	LAC	DHS	ENDES	2012	2018	87.3	90.6	0.55	***	63.9	71.1	1.20	***	82.5	86.4	0.65	***	91.6	95.2	0.61	***	98.4	100.0	0.27	***	100.0	100.0	0.00	
Suriname (SUR)	LAC	MICS	MICS	2006	2010	91.0	93.1	0.51	***	62.8	70.5	1.93	***	92.8	94.9	0.52	***	99.5	100.0	0.11	***	100.0	100.0	0.00		100.0	100.0	0.00	
Afghanistan (AFG)	SAS	MICS	DHS	2010–11	2015–16	51.8	59.0	1.44	***	19.0	23.1	0.81	***	39.0	46.9	1.59	***	51.8	60.8	1.80	***	65.1	74.2	1.81	***	84.2	90.2	1.22	***
Bangladesh (BGD)	SAS	DHS	MICS	2014	2019	73.1	79.7	1.33	***	45.1	56.2	2.22	***	64.2	73.1	1.78	***	75.9	83.4	1.51	***	85.4	89.1	0.74	***	94.7	96.8	0.41	***
India (IND)	SAS	DHS	DHS	2005–6	2015–16	65.1	79.0	1.39	***	32.0	51.9	1.99	***	53.5	71.0	1.75	***	66.2	81.3	1.51	***	78.9	91.4	1.25	***	94.9	99.2	0.43	***
Nepal (NPL)	SAS	DHS	DHS	2011	2016	71.4	77.6	1.23	***	40.4	51.6	2.23	***	61.6	69.5	1.57	***	73.6	80.2	1.31	***	85.4	89.0	0.72	***	96.0	97.6	0.31	***
Pakistan (PAK)	SAS	DHS	DHS	2012–13	2017–18	70.1	73.6	0.70	***	33.5	36.6	0.62	***	57.6	61.8	0.84	***	73.4	79.1	1.13	***	87.2	90.5	0.66	***	98.7	100.0	0.25	***
Benin (BEN)	SSA	MICS	DHS	2014	2017–18	59.2	58.0	−0.34	***	26.5	25.5	−0.29	**	45.9	44.6	−0.38	***	60.0	58.7	−0.37	***	73.9	72.3	−0.46	***	89.6	88.8	−0.22	***
Burkina Faso (BFA)	SSA	MICS	DHS	2006	2010	37.1	40.4	0.81	***	6.9	9.5	0.65	***	22.3	24.8	0.62	***	35.0	37.8	0.71	***	48.8	52.1	0.84	***	72.7	77.5	1.22	***
Burundi (BDI)	SSA	DHS	DHS	2010	2016–17	49.9	54.1	0.64	***	23.5	26.0	0.38	***	38.1	42.6	0.69	***	50.5	54.4	0.60	***	59.8	65.8	0.92	***	77.7	81.6	0.59	***
Cameroon (CMR)	SSA	DHS	MICS	2011	2014	66.8	68.3	0.51	***	29.6	31.4	0.60	**	54.3	56.1	0.61	***	70.7	72.2	0.49	***	83.8	85.4	0.56	***	95.7	96.6	0.28	***
Central African Republic (CAF)	SSA	MICS	MICS	2000	2010	40.4	48.0	0.76	***	11.8	17.4	0.55	***	27.8	35.5	0.77	***	38.9	48.5	0.95	***	52.1	60.0	0.79	***	71.3	78.6	0.72	***
Chad (TCD)	SSA	MICS	DHS	2010	2014–15	38.0	40.0	0.44	***	9.5	11.6	0.47	***	24.1	27.1	0.68	***	36.0	37.8	0.38	***	49.5	51.6	0.45	***	70.7	71.7	0.22	
Congo, DR (COD)	SSA	DHS	DHS	2007	2013–14	51.8	55.8	0.62	***	24.2	28.4	0.65	***	37.5	46.6	1.39	***	51.4	55.1	0.57	***	63.8	67.4	0.55	***	81.9	81.6	−0.05	
Côte d’Ivoire (CIV)	SSA	DHS	MICS	2011–12	2016	62.4	69.3	1.53	***	30.0	35.8	1.28	***	50.3	56.4	1.36	***	63.1	71.9	1.96	***	76.2	84.8	1.92	***	92.4	97.4	1.12	***
Eswatini (SWZ)	SSA	MICS	MICS	2010	2014	77.2	82.2	1.26	***	50.9	58.3	1.84	***	69.6	75.5	1.49	***	80.0	85.8	1.45	***	88.2	93.2	1.24	***	97.2	98.4	0.29	***

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Country (ISO)	Region	Survey 1st	Survey 2nd	Year 1st	Year 2nd	Overall μ_1	Overall μ_2	Overall $\overline{\Delta}$		Poorest quintile μ_1^1	Poorest quintile μ_2^1	Poorest quintile Δ_1		Second-poorest quintile μ_1^2	Second-poorest quintile μ_2^2	Second-poorest quintile Δ_2		Middle quintile μ_1^3	Middle quintile μ_2^3	Middle quintile Δ_3		Second-richest quintile μ_1^4	Second-richest quintile μ_2^4	Second-richest quintile Δ_4		Richest quintile μ_1^5	Richest quintile μ_2^5	Richest quintile Δ_5	
Ethiopia (ETH)	SSA	DHS	DHS	2011	2016	43.3	47.9	0.92	***	16.0	20.7	0.94	***	32.9	35.0	0.41	***	40.3	47.2	1.39	***	52.9	58.5	1.12	***	74.5	78.2	0.75	***
Gabon (GAB)	SSA	DHS	DHS	2000	2012	77.5	85.2	0.64	***	46.6	59.1	1.04	***	68.4	79.7	0.94	***	80.8	91.1	0.86	***	92.6	96.1	0.29	***	99.4	100.0	0.05	***
Gambia (GMB)	SSA	MICS	DHS	2005–6	2013	55.8	64.4	1.15	***	21.3	33.4	1.61	***	41.8	52.6	1.44	***	56.8	66.0	1.23	***	71.2	78.0	0.90	***	87.6	91.9	0.57	***
Ghana (GHA)	SSA	MICS	DHS	2011	2014	75.2	77.9	0.91	***	45.3	52.3	2.33	***	67.8	71.3	1.18	***	79.4	81.2	0.61	***	87.9	88.8	0.31	***	95.7	96.1	0.11	
Guinea (GIN)	SSA	DHS	MICS	2012	2018	51.7	56.7	0.83	***	19.7	24.0	0.71	***	36.7	43.4	1.12	***	50.7	56.5	0.96	***	66.3	71.5	0.86	***	85.4	88.4	0.50	***
Kenya (KEN)	SSA	DHS	DHS	2008–9	2014	65.7	70.1	0.79	***	40.4	45.8	0.99	***	57.0	63.1	1.11	***	68.3	73.1	0.86	***	75.5	79.5	0.73	***	87.5	89.0	0.27	***
Lesotho (LSO)	SSA	DHS	DHS	2009	2014	68.7	74.7	1.20	***	42.8	49.0	1.26	***	58.9	66.1	1.44	***	69.5	75.7	1.25	***	79.8	85.9	1.22	***	92.6	96.8	0.83	***
Liberia (LBR)	SSA	DHS	DHS	2007	2013	49.7	60.1	1.73	***	22.9	31.3	1.40	***	37.2	50.8	2.27	***	50.2	60.5	1.73	***	60.3	72.6	2.05	***	78.1	85.2	1.19	***
Madagascar (MDG)	SSA	DHS	MICS	2008–9	2018	52.1	56.9	0.50	***	24.4	26.3	0.20	***	37.9	43.9	0.63	***	51.6	56.3	0.49	***	63.8	71.4	0.80	***	83.0	86.4	0.35	***
Malawi (MWI)	SSA	DHS	DHS	2010	2015–16	59.2	65.8	1.19	***	33.0	41.3	1.50	***	51.6	57.5	1.08	***	59.3	67.1	1.41	***	70.0	75.5	1.01	***	82.3	87.4	0.94	***
Mali (MLI)	SSA	DHS	MICS	2006	2015	47.0	53.7	0.74	***	19.4	23.2	0.42	***	34.2	40.1	0.65	***	44.5	51.7	0.80	***	57.4	66.8	1.05	***	79.4	86.6	0.80	***
Mauritania (MRT)	SSA	MICS	MICS	2011	2015	58.7	66.9	2.04	***	24.5	34.1	2.40	***	43.2	54.4	2.79	***	58.8	68.1	2.34	***	74.6	81.4	1.69	***	92.6	96.5	0.99	***
Mozambique (MOZ)	SSA	DHS	DHS	2003	2011	45.5	55.2	1.21	***	16.9	24.6	0.95	***	33.4	41.0	0.95	***	43.6	54.3	1.34	***	55.2	68.1	1.61	***	78.4	87.9	1.19	***
Namibia (NAM)	SSA	DHS	DHS	2006–7	2013	71.6	75.7	0.63	***	42.3	47.7	0.84	***	60.2	66.2	0.92	***	72.9	77.1	0.65	***	84.3	88.3	0.62	***	98.4	99.3	0.14	***
Niger (NER)	SSA	DHS	DHS	2006	2012	31.9	38.8	1.15	***	7.5	12.9	0.90	***	18.6	25.6	1.17	***	29.5	36.3	1.13	***	38.8	47.7	1.49	***	64.9	71.3	1.06	***
Nigeria (NGA)	SSA	DHS	DHS	2013	2018	64.1	66.7	0.53	***	25.8	28.6	0.57	***	50.8	54.9	0.81	***	67.9	71.4	0.70	***	81.8	83.8	0.40	***	94.1	94.9	0.17	***
Republic of Congo (COG)	SSA	DHS	MICS	2005	2014–15	66.1	79.0	1.36	***	38.7	51.1	1.30	***	55.3	72.4	1.80	***	68.1	82.8	1.54	***	77.1	91.4	1.50	***	91.1	97.3	0.65	***
Rwanda (RWA)	SSA	DHS	DHS	2010	2014–15	58.4	65.4	1.56	***	32.4	40.2	1.75	***	48.8	56.1	1.62	***	58.2	66.6	1.86	***	68.9	76.0	1.57	***	83.5	87.9	0.99	***
São Tomé and Príncipe (STP)	SSA	DHS	MICS	2008–9	2014	73.1	81.9	1.61	***	45.6	57.4	2.14	***	63.2	74.3	2.02	***	74.6	85.2	1.91	***	85.5	93.1	1.38	***	96.3	99.7	0.61	***
Senegal (SEN)	SSA	DHS	DHS	2005	2017	57.9	65.5	0.63	***	18.7	30.6	0.99	***	40.2	50.5	0.87	***	57.4	66.9	0.79	***	76.3	82.1	0.49	***	97.1	97.5	0.04	
Sierra Leone (SLE)	SSA	DHS	MICS	2013	2017	53.9	62.4	2.12	***	25.0	32.0	1.75	***	41.8	51.8	2.52	***	53.9	63.8	2.47	***	66.4	76.0	2.40	***	82.5	88.3	1.45	***
Tanzania (TZA)	SSA	DHS	DHS	2010	2015–16	59.3	63.5	0.77	***	32.3	35.7	0.62	***	50.8	53.4	0.48	***	58.6	64.6	1.08	***	70.1	74.7	0.85	***	84.6	89.2	0.83	***
Togo (TGO)	SSA	MICS	DHS	2010	2013–14	61.1	62.2	0.32	***	26.4	27.0	0.18		49.1	50.6	0.42	***	63.2	65.3	0.59	***	76.5	77.0	0.13	*	90.3	91.2	0.26	***
Uganda (UGA)	SSA	DHS	DHS	2011	2016	58.2	63.7	1.09	***	30.7	36.3	1.12	***	49.9	54.2	0.87	***	57.9	65.0	1.42	***	69.9	75.0	1.02	***	82.9	88.0	1.02	***
Zambia (ZMB)	SSA	DHS	DHS	2007	2013–14	59.7	65.4	0.87	***	29.5	36.6	1.10	***	47.1	54.6	1.16	***	58.7	66.4	1.18	***	72.1	77.0	0.75	***	91.2	92.2	0.15	*
Zimbabwe (ZWE)	SSA	DHS	DHS	2010–11	2015	73.0	75.2	0.49	***	48.4	51.0	0.58	***	63.8	67.1	0.72	***	74.1	75.8	0.38	***	82.5	85.2	0.60	***	96.2	97.0	0.18	***

Source: Authors' computations based on the micro-datasets produced by Alkire et al. (2020a).

Notes: Statistical significance: ***: $p < 0.01$, **: $p < 0.05$, *: $p < 0.1$. $\mu_t = \mu(F_t)$ is the overall average attainment for period t (= 1,2); $\overline{\Delta} = \mu_2 - \mu_1$ is the annual absolute change in overall average; $\mu_t^q = \mu_q(F_t)$ is the average attainment score within quintile q (= 1,2,3,4,5) for period t (= 1,2); and $\Delta_q = \mu_q(F_2) - \mu_q(F_1)$ is the annual absolute change in the q th quintile. Region abbreviations: ARS: Arab States; EAP: East Asia and the Pacific; ECA: Europe and Central Asia; LAC: Latin America and Caribbean; SAS: South Asia; SSA: sub-Saharan Africa. Survey abbreviations: DHS: Demographic Health Survey; MICS: Multiple Indicator Cluster Survey; CFPS: China Family Panel Study; JSLC: Jamaica Survey of Living Conditions; ENSANUT: Mexico National Survey of Health and Nutrition; ENDES: Peru Demographic and Family Health Survey.

Appendix E. Robustness of inclusive well-being changes and inclusivity premiums

So far, we have chosen a quantile-weight vector $\omega^0 \in \Omega_0$ for assessing well-being changes and inclusivity premiums. How do we assess the robustness of our conclusions to alternative weighting structures? Corresponding to ω^0, let us denote the change in well-being and the inclusivity premium between F_1 and F_2 by $\Delta(F_1, F_2; \omega^0) = \sum_{q=1}^{Q} \omega_q^0 \Delta_q$ and $\pi(F_1, F_2; \omega^0) = \sum_{q=1}^{Q} \omega_q^0 \pi_q$. In other words, both are presented as weighted sums of Δ_q's and π_q's. However, any other quantile-weight vector $\omega \in \Omega_0' \subseteq \Omega_0$ could be an admissible alternative for assessing well-being and inclusivity premiums, where Ω_0' is the set of alternative quantile-weight vectors. Under different circumstances, Ω_0' could either be a subset of Ω_0 or be the entire set itself (i.e., $\Omega_0' = \Omega_0$).

Without loss of generality, suppose the overall well-being change at ω^0 is non-negative, $\sum_{q=1}^{Q} \omega_q^0 \Delta_q \geq 0$, and/or the inclusivity premium is positive, $\sum_{q=1}^{Q} \omega_q^0 \pi_q > 0$. For both these comparisons to be robust with respect to alternative quantile-weight vectors $\omega \in \Omega_0'$, we need to show that $\sum_{q=1}^{Q} \omega_q \Delta_q \geq 0$ and $\sum_{q=1}^{Q} \omega_q \pi_q > 0$ for all $\omega \in \Omega_0'$. There are an infinite number of alternative quantile-weight vectors in Ω_0', but we may invoke various results from Seth and McGillivray (2018) to obtain a finite number of tractable conditions. We can illustrate the concept using an example with $Q = 3$ in which the entire distribution is divided across terciles.

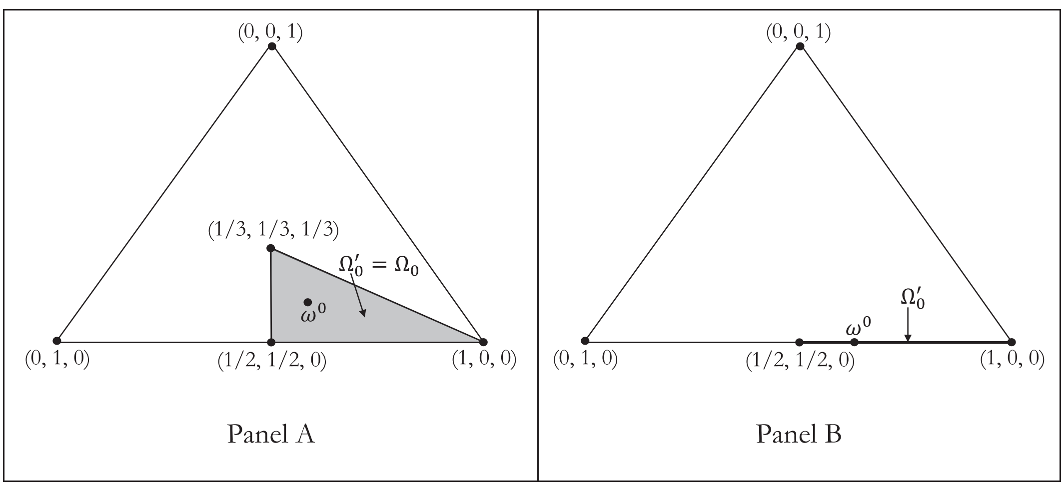

Fig. A1. Set of alternative quantile-weight vectors for checking robustness. Source: Adapted from Fig. 2b of Seth and McGillivray (2018).

In both panels of Fig. A1, all quantile-weight vectors with non-negative quantile weights that sum up to one in three dimensions are summarized by a simplex with three quantile-weight vectors (0, 0, 1), (0, 1, 0) and (0, 0, 1) as its three vertices. The quantile-weight vectors (0, 0, 1), (0, 1, 0) and (1, 0, 0) assign the entire quantile weight to the change in the richest tercile, to the change in the middle tercile, and to the change in the poorest tercile, respectively. Any quantile-weight vector within the simplex is a convex combination of these three vertices.

Proposition 1 requires that $\omega_1 \geq \omega_2 \geq \omega_3$ for all weights in Ω^0. Panel A of Fig. A1 presents the most extreme case when $\Omega_0' = \Omega_0$, where all quantile weights are allowed to vary between 0 and 1. In this case, the set of all alternative quantile-weight vectors are summarized by the shaded region within the simplex, where ω^0 is a component in the set. To check the robustness of well-being changes evaluated at ω^0, we need to compare the well-being changes at all quantile-weight vectors within the shaded region. Following Seth and McGillivray (2018, Proposition 1), the requirement boils down to only comparing well-being changes at three vertices of the shaded region: (1, 0, 0), (1/2, 1/2, 0) and (1/3, 1/3, 1/3). If the well-being changes are robust at these three quantile-weight vectors then, following Foster et al. (2012), it can be easily shown that they are robust for all quantile weights in the shaded region.

Panel B of Fig. A1 presents another case where ω^0 is such that the two poorest terciles are assigned strictly positive quantile weight, but a zero quantile weight is assigned to the richest tercile (i.e., $\omega_1^0 \geq \omega_2^0 > \omega_3^0 = 0$). Then, following Seth and McGillivray (2018), the set of alternative quantile-weight vectors, $\Omega_0' \subset \Omega_0 \backslash \{\overline{\omega}\}$, is the linear segment between and including vertices (1/2, 1/2, 0) and (1, 0, 0). To test robustness with respect to Ω_0' then requires checking the robustness of well-being changes as well as the robustness of inclusivity premiums only at (1/2, 1/2, 0) and (1, 0, 0).

Formally, depending on particular cases, different tractable robustness criteria may be determined drawing from Seth and McGillivray (2018). However, we can provide a formal presentation of the case when $\Omega_0' = \Omega_0$. We introduce two additional vector notations: 1_q denotes a q-dimensional vector of ones and 0_q is a q-dimensional vector of zeros for any $q \in \mathscr{Q}$. In order to ensure robustness, in this case one is required to show that $\sum_{q=1}^{Q} \omega_q \Delta_q \geq 0$ for the following Q quantile-weight vectors: $\omega^q = (\frac{1}{q} 1_q, 0_{Q-q})$ for all $q = 1, \cdots, Q-1$ and $\omega^Q = (\frac{1}{Q} 1_Q)$.

Let us link to the case with $Q = 3$. For $q = 1$, $\omega^1 = (\frac{1}{1} 1_1, 0_2) = (1, 0, 0)$; for $q = 2$, $\omega^2 = (\frac{1}{2} 1_2, 0_1) = (1/2, 1/2, 0)$; and for $q = 3$, $\omega^3 = (\frac{1}{3} 1_3) = (1/3, 1/3, 1/3)$. Let us provide some intuition behind what it means for checking robustness at the Q quantile-weight vectors. First, consider the case for $q = 1$, that is, $\omega^1 = (1, 0, \cdots, 0)$, where $\Delta(F_1, F_2; \omega^1) = \Delta_1$ is the change in the poorest quantile. Next, consider the other extreme of $q = Q - 1$, that is, $\omega^{Q-1} = (\frac{1}{Q-1}, \cdots, \frac{1}{Q-1}, 0)$, where, $\Delta(F_1, F_2; \omega^{Q-1}) = \frac{1}{Q-1}\sum_{q=1}^{Q-1}\Delta_q$ is the average of the change in the $Q-1$ poorest quantiles. It is easy to check that for any $q \in \mathscr{Q} \setminus \{Q\}$ that $\omega^q = (\frac{1}{q}1_q, 0_{Q-q})$ corresponds to the average of the changes in the bottom q quantiles, that is, $\Delta(F_1, F_2; \omega^q) = \frac{1}{q}\sum_{j=1}^{q}\Delta_j$. Finally, consider $\omega^Q = (\frac{1}{Q}1_Q)$, which assigns equal quantile weights to all Q quantiles so that $\omega^Q = \overline{\omega}$ and $\Delta(F_1, F_2; \omega^Q) = \overline{\Delta}(F_1, F_2)$. Thus, the robustness test corresponds to checking the average of changes for every bottom q quantiles, that is, $\frac{1}{q}\sum_{q'=1}^{q}\Delta_{q'} \geq 0$ for all $q \in \mathscr{Q}$.[31]

Appendix F. Robustness of changes in well-being and of inclusivity premium for 75 countries

				Well-being (ω^1)				Well-being (ω^2)				Well-being (ω^3)				Robust	
Country	Region	Year1	Year2	W_1	W_2	Δ	π	W_1	W_2	Δ	π	W_1	W_2	Δ	π	Δ	π
Egypt	ARS	2008	2014	70.7	76.0	0.88***	0.56***	77.8	82.0	0.69***	0.37***	84.6	87.8	0.53***	0.21***	Yes	Yes
Iraq	ARS	2011	2018	64.9	71.6	0.96***	0.52***	73.8	78.2	0.63***	0.19***	79.9	85.0	0.73***	0.29***	Yes	Yes
State of Palestine	ARS	2010	2014	80.9	84.1	0.80***	0.54***	87.7	89.3	0.40***	0.14***	90.4	92.1	0.43***	0.17***	Yes	Yes
Sudan	ARS	2010	2014	26.7	30.1	0.84***	0.03	37.1	41.1	1.00***	0.19***	45.8	49.9	1.01***	0.20***	Yes	No
Yemen	ARS	2006	2013	39.1	46.8	1.09***	0.30***	51.3	58.3	1.00***	0.21***	59.7	66.6	0.98***	0.19***	Yes	Yes
Cambodia	EAP	2010	2014	39.3	45.8	1.61***	0.35***	49.4	55.5	1.52***	0.26***	56.6	62.4	1.46***	0.20***	Yes	Yes
China	EAP	2010	2014	63.7	70.3	1.66***	0.69***	71.2	76.9	1.44***	0.47***	76.4	81.8	1.34***	0.37***	Yes	Yes
Indonesia	EAP	2012	2017	71.8	79.3	1.49***	0.79***	80.0	86.5	1.30***	0.60***	84.9	90.7	1.17***	0.47***	Yes	Yes
Lao PDR	EAP	2011–12	2017	35.2	51.1	2.89***	1.23***	47.7	62.5	2.69***	1.03***	56.9	70.2	2.41***	0.75***	Yes	Yes
Philippines	EAP	2013	2017	67.3	71.9	1.16***	0.59***	77.0	80.3	0.83***	0.26***	82.2	85.0	0.71***	0.13***	Yes	Yes
Thailand	EAP	2012	2015–16	79.0	80.6	0.45***	0.18***	86.0	87.8	0.51***	0.25***	90.3	91.9	0.45***	0.18***	Yes	Yes
Timor-Leste	EAP	2009–10	2016	29.6	43.2	2.11***	0.42***	38.3	52.0	2.10***	0.41***	45.0	58.1	2.00***	0.31***	Yes	Yes
Vietnam	EAP	2010–11	2014	69.2	70.4	0.36*	0.07	79.3	80.9	0.44***	0.15**	84.5	86.2	0.49***	0.19***	Yes	No
Albania	ECA	2008–9	2017–18	79.0	84.2	0.57***	0.38***	85.5	89.3	0.42***	0.23***	89.1	91.9	0.32***	0.13***	Yes	Yes
Bosnia and Herzegovina	ECA	2006	2011–12	77.7	84.7	1.29***	1.12***	85.6	89.6	0.73***	0.56***	88.5	91.2	0.48***	0.32***	Yes	Yes
Kazakhstan	ECA	2010–11	2015	82.0	87.0	1.11***	0.64***	88.1	92.8	1.04***	0.57***	91.7	95.2	0.78***	0.31***	Yes	Yes
Kyrgyzstan	ECA	2005–6	2014	68.4	75.5	0.85***	0.31***	75.2	82.2	0.81***	0.28***	79.9	86.3	0.75***	0.22***	Yes	Yes
Macedonia	ECA	2005–6	2011	73.6	85.3	2.12***	1.53***	83.5	89.9	1.16***	0.56***	87.8	93.3	0.99***	0.40***	Yes	Yes
Moldova	ECA	2005	2012	82.1	84.9	0.40***	0.34***	88.3	89.7	0.20***	0.14***	91.8	92.5	0.10***	0.04***	Yes	Yes
Mongolia	ECA	2010	2013	58.6	62.8	1.40***	0.11	66.7	70.9	1.38***	0.08	71.9	76.1	1.41***	0.12***	Yes	No
Montenegro	ECA	2005–6	2013	82.9	85.1	0.29*	0.31**	88.7	89.8	0.15*	0.16***	92.1	91.9	−0.02	−0.01	No	No
Tajikistan	ECA	2012	2017	64.5	69.2	0.94***	0.29***	70.7	75.3	0.92***	0.27***	75.8	80.4	0.93***	0.28***	Yes	Yes
Turkmenistan	ECA	2006	2015–16	75.6	81.7	0.63***	0.22***	81.6	88.7	0.74***	0.33***	85.9	92.4	0.68***	0.27***	Yes	Yes
Belize	LAC	2011	2015–16	71.1	74.1	0.68***	0.45**	79.8	82.3	0.55***	0.32***	85.9	87.6	0.38***	0.15***	Yes	Yes
Bolivia	LAC	2003	2008	42.6	53.3	2.14***	0.36***	54.0	64.9	2.18***	0.40***	62.1	73.0	2.18***	0.40***	Yes	Yes
Colombia	LAC	2010	2015–16	73.3	75.6	0.42***	0.23***	82.7	85.3	0.47***	0.27***	88.4	90.2	0.32***	0.13***	Yes	Yes
Dominican Republic	LAC	2007	2014	69.5	78.5	1.30***	0.57***	78.3	86.4	1.15***	0.42***	83.7	90.9	1.04***	0.31***	Yes	Yes
Guyana	LAC	2009	2014	72.8	77.8	1.00***	0.57***	81.8	86.2	0.88***	0.45***	87.2	90.8	0.72***	0.29***	Yes	Yes
Haiti	LAC	2012	2016–17	38.7	41.7	0.68***	−0.09	47.8	51.9	0.92***	0.16***	55.3	59.5	0.94***	0.17***	Yes	No
Honduras	LAC	2005–6	2011–12	39.1	53.5	2.39***	0.89***	50.5	64.1	2.27***	0.78***	58.8	71.1	2.05***	0.55***	Yes	Yes
Jamaica	LAC	2010	2014	74.2	75.8	0.39	0.27	81.2	82.5	0.32**	0.21**	85.7	86.5	0.21**	0.09**	No	No
Mexico	LAC	2012	2016	73.3	75.2	0.47***	0.35***	83.3	84.4	0.28***	0.16***	88.8	89.6	0.20***	0.08***	Yes	Yes
Nicaragua	LAC	2001	2011–12	33.6	57.8	2.30***	0.98***	46.2	68.9	2.16***	0.83***	56.3	76.3	1.91***	0.58***	Yes	Yes
Peru	LAC	2012	2018	63.9	71.1	1.20***	0.66***	73.2	78.8	0.93***	0.38***	79.3	84.3	0.82***	0.27***	Yes	Yes
Suriname	LAC	2006	2010	62.8	70.5	1.93***	1.41***	77.8	82.7	1.23***	0.71***	85.0	88.5	0.86***	0.34***	Yes	Yes
Afghanistan	SAS	2010–11	2015–16	19.0	23.1	0.81***	−0.64***	29.0	35.0	1.20***	−0.24***	36.6	43.6	1.40***	−0.05	Yes	No
Bangladesh	SAS	2014	2019	45.1	56.2	2.22***	0.89***	54.6	64.6	2.00***	0.67***	61.7	70.9	1.84***	0.50***	Yes	Yes
India	SAS	2005–6	2015–16	32.0	51.9	1.99***	0.60***	42.8	61.4	1.87***	0.48***	50.6	68.1	1.75***	0.36***	Yes	Yes
Nepal	SAS	2011	2016	40.4	51.6	2.23***	1.00***	51.0	60.5	1.90***	0.67***	58.6	67.1	1.70***	0.47***	Yes	Yes
Pakistan	SAS	2012–13	2017–18	33.5	36.6	0.62***	−0.08	45.6	49.2	0.73***	0.03	54.9	59.2	0.86***	0.16***	Yes	No
Benin	SSA	2014	2017–18	26.5	25.5	−0.29**	0.05	36.2	35.0	−0.33***	0.01	44.1	42.9	−0.35***	0.00	Yes	No
Burkina Faso	SSA	2006	2010	6.9	9.5	0.65***	−0.16**	14.6	17.2	0.64***	−0.17***	21.4	24.0	0.66***	−0.15***	Yes	Yes
Burundi	SSA	2010	2016–17	23.5	26.0	0.38***	−0.25***	30.8	34.3	0.54***	−0.10***	37.4	41.0	0.56***	−0.08***	Yes	Yes
Cameroon	SSA	2011	2014	29.6	31.4	0.60**	0.09	41.9	43.7	0.60***	0.10	51.5	53.2	0.56***	0.06	Yes	No
Central African Republic	SSA	2000	2010	11.8	17.4	0.55***	−0.21***	19.8	26.4	0.66***	−0.10***	26.2	33.8	0.76***	0.00	Yes	No
Chad	SSA	2010	2014–15	9.5	11.6	0.47***	0.03	16.8	19.4	0.57***	0.13***	23.2	25.5	0.51***	0.07**	Yes	No
Congo, DR	SSA	2007	2013–14	24.2	28.4	0.65***	0.03	30.9	37.5	1.02***	0.40***	37.7	43.4	0.87***	0.25***	Yes	No
Côte d'Ivoire	SSA	2011–12	2016	30.0	35.8	1.28***	−0.25**	40.1	46.1	1.32***	−0.21***	47.8	54.7	1.54***	0.01	Yes	No
Eswatini	SSA	2010	2014	50.9	58.3	1.84***	0.58***	60.2	66.9	1.66***	0.40***	66.8	73.2	1.59***	0.33***	Yes	Yes
Ethiopia	SSA	2011	2016	16.0	20.7	0.94***	0.02	24.5	27.8	0.67***	−0.25***	29.8	34.3	0.91***	−0.01	Yes	No
Gabon	SSA	2000	2012	46.6	59.1	1.04***	0.41***	57.5	69.4	0.99***	0.36***	65.3	76.6	0.95***	0.31***	Yes	Yes
Gambia	SSA	2005–6	2013	21.3	33.4	1.61***	0.46***	31.6	43.0	1.53***	0.37***	40.0	50.7	1.43***	0.28***	Yes	Yes
Ghana	SSA	2011	2014	45.3	52.3	2.33***	1.43***	56.6	61.8	1.75***	0.85***	64.2	68.3	1.37***	0.47***	Yes	Yes
Guinea	SSA	2012	2018	19.7	24.0	0.71***	−0.12	28.2	33.7	0.91***	0.08**	35.7	41.3	0.93***	0.10***	Yes	No
Kenya	SSA	2008–9	2014	40.4	45.8	0.99***	0.20	48.7	54.5	1.05***	0.26***	55.2	60.7	0.99***	0.20***	Yes	No
Lesotho	SSA	2009	2014	42.8	49.0	1.26***	0.06	50.8	57.6	1.35***	0.15***	57.0	63.6	1.32***	0.12***	Yes	No
Liberia	SSA	2007	2013	22.9	31.3	1.40***	−0.33***	30.1	41.1	1.83***	0.11**	36.8	47.5	1.80***	0.07**	Yes	No
Madagascar	SSA	2008–9	2018	24.4	26.3	0.20***	−0.29***	31.1	35.1	0.42***	−0.08***	38.0	42.2	0.44***	−0.05***	Yes	Yes

(*continued on next page*)

[31] Comparing the well-being changes for every bottom quantile is conceptually analogous to generalized Lorenz dominance (Shorrocks, 1983). Palmisano and Peragine (2015) have produced analogous results for growth across income quantiles.

(*continued*)

Country	Region	Year1	Year2	Well-being (ω^1) W_1	W_2	Δ	π	Well-being (ω^2) W_1	W_2	Δ	π	Well-being (ω^3) W_1	W_2	Δ	π	Robust Δ	π
Malawi	SSA	2010	2015–16	33.0	41.3	1.50***	0.32***	42.3	49.4	1.29***	0.10***	48.0	55.3	1.33***	0.14***	Yes	Yes
Mali	SSA	2006	2015	19.4	23.2	0.42***	−0.32***	26.8	31.6	0.54***	−0.21***	32.7	38.3	0.62***	−0.12***	Yes	Yes
Mauritania	SSA	2011	2015	24.5	34.1	2.40***	0.36***	33.8	44.2	2.60***	0.55***	42.2	52.2	2.51***	0.47***	Yes	Yes
Mozambique	SSA	2003	2011	16.9	24.6	0.95***	−0.25***	25.2	32.8	0.95***	−0.26***	31.3	39.9	1.08***	−0.13***	Yes	Yes
Namibia	SSA	2006–7	2013	42.3	47.7	0.84***	0.20**	51.2	57.0	0.88***	0.25***	58.4	63.7	0.80***	0.17***	Yes	Yes
Niger	SSA	2006	2012	7.5	12.9	0.90***	−0.25***	13.0	19.2	1.04***	−0.11***	18.5	24.9	1.07***	−0.08***	Yes	Yes
Nigeria	SSA	2013	2018	25.8	28.6	0.57***	0.04	38.3	41.7	0.69***	0.16***	48.2	51.6	0.69***	0.16***	Yes	No
Republic of Congo	SSA	2005	2014–15	38.7	51.1	1.30***	−0.06	47.0	61.7	1.55***	0.19***	54.1	68.7	1.55***	0.19***	Yes	No
Rwanda	SSA	2010	2014–15	32.4	40.2	1.75***	0.19***	40.6	48.2	1.68***	0.13***	46.5	54.3	1.74***	0.19***	Yes	Yes
São Tomé and Príncipe	SSA	2008–9	2014	45.6	57.4	2.14***	0.53***	54.4	65.8	2.08***	0.47***	61.1	72.3	2.02***	0.41***	Yes	Yes
Senegal	SSA	2005	2017	18.7	30.6	0.99***	0.35***	29.4	40.5	0.93***	0.29***	38.8	49.3	0.88***	0.25***	Yes	Yes
Sierra Leone	SSA	2013	2017	25.0	32.0	1.75***	−0.36***	33.4	41.9	2.13***	0.02	40.2	49.2	2.25***	0.13***	Yes	No
Tanzania	SSA	2010	2015–16	32.3	35.7	0.62***	−0.15**	41.6	44.6	0.55***	−0.22***	47.2	51.2	0.73***	−0.05**	Yes	Yes
Togo	SSA	2010	2013–14	26.4	27.0	0.18	−0.14	37.7	38.8	0.30***	−0.02	46.2	47.6	0.40***	0.08**	No	No
Uganda	SSA	2011	2016	30.7	36.3	1.12***	0.03	40.3	45.3	1.00***	−0.09**	46.2	51.8	1.14***	0.05	Yes	No
Zambia	SSA	2007	2013–14	29.5	36.6	1.10***	0.23***	38.3	45.6	1.13***	0.26***	45.1	52.5	1.15***	0.28***	Yes	Yes
Zimbabwe	SSA	2010–11	2015	48.4	51.0	0.58***	0.09	56.1	59.1	0.65***	0.16***	62.1	64.6	0.56***	0.07***	Yes	No

Source: Authors' computations based on the micro-datasets produced by Alkire et al. (2020a).

Notes: Statistical significance: ***: $p < 0.01$, **: $p < 0.05$, *: $p < 0.1$. Δ is the absolute change. Weights are $\omega^1 = (1, 0, 0, 0, 0)$, $\omega^2 = (1/2, 1/2, 0, 0, 0)$ and $\omega^3 = (1/3, 1/3, 1/3, 0, 0)$. W_1: Well-being in year 1. W_2: Well-being in period 2. Δ: Annual change in well-being between two periods. π: inclusivity premium. Regions: ARS: Arab States; EAP: East Asia and the Pacific; ECA: Europe and Central Asia; LAC: Latin America and Caribbean; SAS: South Asia; SSA: sub-Saharan Africa.

Appendix G. Inclusivity premiums, shared prosperity premiums and annualized changes in the MPIs and the MPI headcount ratios

		Year		Well-being			MPI			H			Income growth				
Country	Region	1st	2nd	W_1	W_2	π	MPI_1	MPI_2	Δ MPI	H_1	H_2	Δ H (%pt)	Year1	Year2	G	G_{40}	SPP
Egypt	ARS	2008	2014	78.5	82.6	0.36***	0.032	0.018	−0.002***	8.0	4.9	−0.5***	2012	2017	−1.1	−2.5	−1.4
Iraq	ARS	2011	2018	73.9	79.0	0.30***	0.057	0.036	−0.003***	14.4	9.3	−0.7***					
State of Palestine	ARS	2010	2014	87.1	89.1	0.24***	0.005	0.004	0.000	1.3	1.0	−0.1	2011	2016	−0.6	−0.9	−0.3
Sudan	ARS	2010	2014	37.7	41.6	0.16***	0.317	0.280	−0.009***	57.0	52.4	−1.2**					
Yemen	ARS	2006	2013	51.4	58.5	0.22***	0.189	0.139	−0.007***	38.0	29.2	−1.3***					
Cambodia	EAP	2010	2014	49.5	55.6	0.26***	0.228	0.170	−0.014***	47.7	37.2	−2.6***					
China	EAP	2010	2014	71.3	77.1	0.48***	0.041	0.018	−0.006***	9.5	4.4	−1.3***	2013	2016	7.1	8.4	1.3
Indonesia	EAP	2012	2017	79.8	86.3	0.60***	0.028	0.014	−0.003***	6.9	3.6	−0.7***	2015	2019	3.8	4.6	0.8
Lao PDR	EAP	2011–12	2017	48.0	62.5	0.98***	0.211	0.108	−0.019***	40.4	23.1	−3.2***	2012	2018	3.1	1.9	−1.2
Philippines	EAP	2013	2017	76.6	80.0	0.29***	0.037	0.028	−0.002***	7.1	5.6	−0.4***	2015	2018	3.3	6.1	2.7
Thailand	EAP	2012	2015–16	85.9	87.6	0.21***	0.005	0.003	−0.001*	1.4	0.9	−0.2**	2015	2019	0.1	0.7	0.6
Timor-Leste	EAP	2009–10	2016	38.6	52.1	0.38***	0.362	0.215	−0.023***	69.6	46.9	−3.5***					
Vietnam	EAP	2010–11	2014	78.8	80.3	0.15**	0.039	0.036	−0.001	9.3	8.8	−0.1	2014	2018	6.5	5.8	−0.7
Albania	ECA	2008–9	2017–18	85.3	89.1	0.23***	0.008	0.003	−0.001***	2.1	0.7	−0.2***	2014	2017	0.8	2.5	1.7
Bosnia and Herzegovina	ECA	2006	2011–12	84.8	89.1	0.60***	0.015	0.008	−0.001***	4.0	2.2	−0.3***					
Kazakhstan	ECA	2010–11	2015	87.9	92.3	0.50***	0.003	0.002	0.000**	0.9	0.5	−0.1**	2013	2018	−0.2	−0.3	−0.1
Kyrgyzstan	ECA	2005–6	2014	75.3	82.1	0.27***	0.036	0.013	−0.003***	9.4	3.4	−0.7***	2014	2019	2.7	1.8	−0.9
Macedonia	ECA	2005–6	2011	82.8	90.0	0.72***	0.031	0.008	−0.004***	7.8	2.0	−1.0***	2013	2018	4.9	7.0	2.1
Moldova	ECA	2005	2012	88.1	89.6	0.15***	0.006	0.003	0.000**	1.5	0.9	−0.1***	2013	2018	0.3	1.9	1.6
Mongolia	ECA	2010	2013	66.6	70.8	0.10*	0.083	0.056	−0.009***	20.2	13.5	−2.2***	2011	2018	0.8	1.1	0.3
Montenegro	ECA	2005–6	2013	88.5	89.4	0.14**	0.015	0.011	0.000	3.5	3.0	−0.1	2012	2016	3.2	6.3	3.2
Tajikistan	ECA	2012	2017	71.0	75.7	0.28***	0.049	0.029	−0.004***	12.2	7.4	−1.0***					
Turkmenistan	ECA	2006	2015–16	81.7	88.4	0.29***	0.013	0.004	−0.001***	3.4	1.0	−0.2***					
Belize	LAC	2011	2015–16	79.9	82.3	0.29***	0.030	0.020	−0.002**	7.4	4.9	−0.5**					
Bolivia	LAC	2003	2008	54.2	65.0	0.39***	0.168	0.096	−0.014***	34.3	20.8	−2.7***	2014	2019	−0.9	3.1	4.0
Colombia	LAC	2010	2015–16	82.5	84.8	0.22***	0.024	0.020	−0.001***	6.0	4.8	−0.2***	2014	2019	−0.5	0.4	0.8
Dominican Republic	LAC	2007	2014	78.1	86.1	0.42***	0.032	0.015	−0.002***	7.8	3.9	−0.6***	2011	2016	4.3	5.2	0.9
Guyana	LAC	2009	2014	81.6	85.9	0.42***	0.023	0.014	−0.002*	5.5	3.3	−0.4**					
Haiti	LAC	2012	2016–17	48.3	52.2	0.11**	0.237	0.192	−0.010***	48.4	39.9	−1.9***					
Honduras	LAC	2005–6	2011–12	50.7	64.1	0.73***	0.192	0.093	−0.016***	37.9	20.0	−3.0***	2014	2019	0.7	1.6	0.9
Jamaica	LAC	2010	2014	81.2	82.4	0.18*	0.021	0.018	−0.001	5.3	4.7	−0.2					
Mexico	LAC	2012	2016	82.9	84.1	0.17***	0.030	0.025	−0.001**	7.5	6.4	−0.3*					
Nicaragua	LAC	2001	2011–12	46.8	68.9	0.78***	0.221	0.074	−0.014***	41.7	16.5	−2.4***					
Peru	LAC	2012	2018	73.2	78.9	0.41***	0.053	0.029	−0.004***	12.7	7.4	−0.9***	2014	2019	1.4	2.7	1.3
Suriname	LAC	2006	2010	76.9	81.9	0.75***	0.059	0.037	−0.006***	12.8	8.4	−1.1***					
Afghanistan	SAS	2010–11	2015–16	29.3	35.2	−0.27***	0.439	0.352	−0.017***	76.0	64.1	−2.4***					
Bangladesh	SAS	2014	2019	54.9	64.9	0.66***	0.175	0.101	−0.015***	37.6	24.1	−2.7***					
India	SAS	2005–6	2015–16	43.0	61.5	0.47***	0.283	0.123	−0.016***	55.1	27.9	−2.7***					
Nepal	SAS	2011	2016	51.2	60.7	0.68***	0.207	0.130	−0.015***	43.3	29.9	−2.7***					
Pakistan	SAS	2012–13	2017–18	46.0	49.7	0.05	0.233	0.198	−0.007**	44.5	38.3	−1.2**	2013	2018	1.5	1.1	−0.3
Benin	SSA	2014	2017–18	36.7	35.5	0.01	0.346	0.362	0.005	63.2	66.0	0.8*					

(*continued on next page*)

(*continued*)

		Year		Well-being				MPI				H				Income growth				
Country	Region	1st	2nd	W_1	W_2	π		MPI_1	MPI_2	Δ MPI		H_1	H_2	Δ H (%pt)		Year1	Year2	G	G_{40}	SPP
Burkina Faso	SSA	2006	2010	15.2	17.8	−0.16	***	0.607	0.574	−0.008	*	88.7	86.3	−0.6						
Burundi	SSA	2010	2016–17	31.4	34.7	−0.13	***	0.464	0.409	−0.008	***	82.3	75.1	−1.1	***					
Cameroon	SSA	2011	2014	42.4	44.1	0.08		0.258	0.243	−0.005		47.7	45.5	−0.7						
Central African Republic	SSA	2000	2010	20.2	26.8	−0.09	***	0.574	0.482	−0.009	***	89.6	81.5	−0.8	***					
Chad	SSA	2010	2014–15	17.3	19.7	0.09	**	0.600	0.578	−0.005	**	90.0	89.4	−0.1						
Congo, DR	SSA	2007	2013–14	31.7	37.4	0.27	***	0.439	0.388	−0.008	***	77.6	73.7	−0.6	*					
Côte d'Ivoire	SSA	2011–12	2016	40.4	46.7	−0.14	**	0.310	0.236	−0.017	***	58.9	46.1	−2.8	***					
Eswatini	SSA	2010	2014	60.4	67.1	0.42	***	0.130	0.081	−0.012	***	29.3	19.2	−2.5	***					
Ethiopia	SSA	2011	2016	24.4	28.4	−0.11	***	0.545	0.489	−0.011	***	88.4	83.5	−1.0	***					
Gabon	SSA	2000	2012	57.7	69.5	0.35	***	0.145	0.069	−0.006	***	30.9	15.5	−1.3	***					
Gambia	SSA	2005–6	2013	32.1	43.4	0.36	***	0.387	0.281	−0.014	***	68.0	54.7	−1.8	***					
Ghana	SSA	2011	2014	56.6	61.9	0.85	***	0.149	0.116	−0.011	***	31.1	26.2	−1.7	***	2012	2016	1.3	−0.2	−1.5
Guinea	SSA	2012	2018	28.8	34.0	0.04		0.433	0.373	−0.010	***	72.8	66.3	−1.1	***					
Kenya	SSA	2008–9	2014	49.0	54.6	0.23	***	0.247	0.179	−0.012	***	52.2	38.9	−2.4	***					
Lesotho	SSA	2009	2014	51.1	57.7	0.12	***	0.229	0.158	−0.014	***	49.8	35.9	−2.8	***					
Liberia	SSA	2007	2013	30.7	41.0	0.00		0.464	0.328	−0.023	***	81.6	63.9	−3.0	***					
Madagascar	SSA	2008–9	2018	31.9	35.5	−0.12	***	0.433	0.372	−0.006	***	75.7	67.4	−0.9	***					
Malawi	SSA	2010	2015–16	42.1	49.5	0.16	***	0.339	0.252	−0.016	***	68.1	54.2	−2.5	***	2010	2016	1.6	3.1	1.5
Mali	SSA	2006	2015	27.1	32.0	−0.20	***	0.501	0.417	−0.009	***	83.7	73.0	−1.2	***					
Mauritania	SSA	2011	2015	34.5	44.6	0.48	***	0.357	0.260	−0.024	***	63.0	50.5	−3.1	***					
Mozambique	SSA	2003	2011	25.4	33.3	−0.21	***	0.516	0.401	−0.014	***	84.3	71.2	−1.6	***					
Namibia	SSA	2006–7	2013	51.6	57.1	0.21	***	0.205	0.159	−0.007	***	43.0	35.4	−1.2	***					
Niger	SSA	2006	2012	13.6	19.7	−0.13	***	0.668	0.594	−0.012	***	92.9	89.9	−0.5	***					
Nigeria	SSA	2013	2018	38.8	42.1	0.13	***	0.287	0.254	−0.007	***	51.3	46.4	−1.0	***					
Republic of Congo	SSA	2005	2014–15	47.5	61.7	0.13	***	0.258	0.114	−0.015	***	53.8	24.7	−3.1	***					
Rwanda	SSA	2010	2014–15	40.7	48.4	0.16	***	0.357	0.259	−0.022	***	70.2	54.4	−3.5	***	2013	2016	−0.1	0.3	0.5
São Tomé and Príncipe	SSA	2008–9	2014	54.7	66.1	0.46	***	0.185	0.092	−0.017	***	40.7	22.1	−3.4	***					
Senegal	SSA	2005	2017	30.2	41.3	0.29	***	0.382	0.284	−0.008	***	64.3	52.5	−1.0	***					
Sierra Leone	SSA	2013	2017	33.8	42.2	−0.03		0.409	0.300	−0.027	***	74.1	58.3	−3.9	***	2011	2018	2.9	2.7	−0.2
Tanzania	SSA	2010	2015–16	41.4	44.8	−0.15	***	0.342	0.285	−0.011	***	67.8	57.1	−1.9	***	2011	2018	0.9	−0.2	−1.1
Togo	SSA	2010	2013–14	38.0	39.1	−0.01		0.316	0.301	−0.004		57.5	55.3	−0.6						
Uganda	SSA	2011	2016	40.1	45.5	−0.02		0.349	0.281	−0.014	***	67.7	57.2	−2.1	***	2012	2016	−1.0	−2.2	−1.2
Zambia	SSA	2007	2013–14	38.6	45.9	0.26	***	0.349	0.270	−0.012	***	65.9	54.6	−1.7	***					
Zimbabwe	SSA	2010–11	2015	56.4	59.1	0.12	***	0.176	0.147	−0.006	***	40.1	34.0	−1.4	***	2011	2017	−3.5	−3.7	−0.3

Source: Authors' own computations for W_1, W_2 and S. MPI and H were obtained from Table 6 available at https://ophi.org.uk/global-mpi/2020 and the shared prosperity figures were obtained from World Bank (n.d.).

Notes: W_1 and W_2: Well-being levels in periods 1 and 2; MPI_1 and MPI_2: MPI values for periods 1 and 2; H_1 and H_2: MPI headcount ratios for periods 1 and 2; *S*: Inclusivity premium; ΔMPI: Annualized absolute change in MPI; ΔH: Annualized absolute change in H in percentage points (%pt); G: Annualized growth in the average income; G_{40}: Annualized growth in the average income of the bottom 40%; SPP: Shared prosperity premium (G_{40} - G).

Data availability

We do not have permission to share the datasets but we will be glad to share do files on request.

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