Volume LX No. 2
December 2023

p-ISSN 1655-1516
e-ISSN 2984-8156

The Philippine Review of Economics

ARTICLES IN THIS ISSUE

A joint publication of the
University of the Philippines
School of Economics
and the **Philippine Economic Society**

The Philippine Review of Economics

A joint publication of the UP School of Economics (UPSE)
and the Philippine Economic Society (PES)

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Publication Information: The PRE (p-ISSN 1655-1516; e-ISSN 2984-8156) is a peer-reviewed journal published every June and December of each year. A searchable database of published articles and their abstracts is available at the PRE website (http://pre.econ.upd.edu.ph).

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Acknowledgements: The PRE gratefully acknowledges the financial support towards its publication provided by the Philippine Center for Economic Development (PCED). The Review nonetheless follows an independent editorial policy. The articles published reflect solely the editorial judgement of the editors and the views of their respective authors.

The Philippine Review of Economics

Vol. LX No. 2
December 2023

p-ISSN 1655-1516
e-ISSN 2984-8156
DOI: 10.37907/ERP3202D

The Philippine Review of Economics
60(2):1-24. DOI:10.37907/1ERP3202D

Shared prosperity characterized by four development goals: pro-poor growth, pro-poor development, inclusive growth, and inclusive development*

Nanak Kakwani**
University of New South Wales

Zakaria Siddiqui
Jamia Millia Islamia University

This paper is on shared prosperity and its measurement. Economic growth enhances total prosperity, increasing the economic pie in society, but the pie distribution determines how the population shares the pie. Based on a social welfare framework, we have developed an integrated methodology to evaluate growth and distribution simultaneously. Linking the two phenomena gives rise to four development goals: (i) pro-poor growth, (ii) inclusive growth, (iii) pro-poor development, and (iv) inclusive development. These four goals provide an alternative characterization of shared prosperity. The paper defines the four goals, providing a methodology to operationalize them using real-world data. The empirically measured goals inform at what rate the shared prosperity is enhancing in any country or the world. The methodology is applied globally to determine whether the growth and development have been pro-poor and inclusive in 173 countries over the two decades in the new millennium.

JEL classification: D63, D31, O11, O20, O47
Keywords: shared prosperity, pro-poor growth, inclusive growth and development, poverty, inequality

1. Introduction

In the 1950s and 1960s, trickle-down was the dominant development strategy for bettering people's lives. It implied that economic growth was the dominant factor that would automatically enhance people's living standards. The growth process, resulting from market forces, generally benefits the wealthy first, and then in the second round, the poor benefit when the rich start spending their gains from growth. The trickle-down ensures a vertical flow of the benefits of growth

* Lecture delivered at the Philippine Economic Society 61st Annual Meeting on November 8, 2023.
** Address all correspondence to n.kakwani@unsw.edu.au.

from the rich to the poor. Thus, economic growth only benefits the poor indirectly through vertical flows from the rich. The trickle-down was silent on how much benefits of growth flow to the poor. The rich may reap huge benefits, but at the same time, the poor may receive only a meager fraction of the total benefits.

Thus, the view in development economics was that the government's strategy should promote investments, increase production capabilities, and enhance economic growth. The governments need not be concerned with how economic growth distributes benefits among the people, and the distribution was not considered a fundamental problem for serious study.

In his book, Bronfenbrenner [1971] raised an important question, "Is distribution a sufficiently important problem for serious study, and if so, why?" Chapter 1 of his book presents a representative sample of divergent views of economists. Some economists viewed distribution as fundamental, while others thought that distribution was unimportant. There existed little consensus among them.

Economic growth provides means, but distribution is fundamental to economic and social equality. In this context, the following quotation from Sen and Drèze [1989] is helpful: "*Economic growth is very important as a means for bettering people's lives, but to go much faster, it has to be combined with devoting resources to remove illiteracy, ill health, undernutrition, and other deprivations.*"

America has been the wealthiest economy in the world; recently, the Nobel Laureate economist Angus Deaton (June 7, 2023) has emphasized the flipside of American progress, calling it economic failure or failed economics. He argues, "growth is worthless to those who do not share it. [Gross domestic product or] GDP is blind to who benefits and who loses, and over the last half-century, most Americans have not seen the growth in incomes that might seem warranted by the growth in the economy." Thus, Deaton has forcefully argued that we cannot achieve prosperity for all through economic growth without considering the distribution of the output generated by economic growth.

This paper links the two phenomena of growth and distribution that give rise to four development goals: (i) pro-poor growth, (ii) inclusive growth, (iii) pro-poor development, and (iv) inclusive development. The literature has not distinguished the four development goals. We view these four goals as the alternative characterizations of shared prosperity.

This paper's main contribution is defining the four goals and providing a social welfare framework to operationalize them using real-world data. Thus, these goals offer alternative ways of measuring shared prosperity.

Based on a social welfare framework, we have developed an integrated methodology to evaluate the size of the pie and its distribution simultaneously. Our proposed social welfare framework links economic growth and distribution, giving rise to the four development goals through this linkage. From this framework, we can also determine the contributions of growth and distribution to social welfare and well-being. This decomposition is essential to understanding the policy implications of shared prosperity.

The empirically measured goals inform at what rate the shared prosperity is enhancing in any country or the world. Thus, the paper's main contribution is to provide an operational system to monitor shared prosperity.

The methodology developed in the paper is applied globally to determine whether the growth and development have been pro-poor and inclusive in 173 countries over the two decades in the new millennium.

2. What is pro-poor growth?

The term pro-poor growth is relatively new and emerged in the late 1990s. Many development practitioners began discussing it but did not offer a precise concept of pro-poor growth. International agencies such as the UN [2000] and the OECD [2001] defined pro-poor growth as growth that benefits the poor and provides them with opportunities to improve their economic situation. *The poverty reduction strategy* by the Asian Development Bank describes pro-poor growth as labor-absorbing growth accompanied by policies and programs that mitigate inequalities and facilitate income and employment generation for the poor, particularly women and other traditionally excluded groups. These definitions are very broad and focused on policies to achieve pro-poor growth. Before discussing policies, it makes logical sense to define pro-poor growth precisely. The broad policies are not a helpful guide in measuring pro-poor growth.

Kakwani and Pernia [2000] developed the precise concept of pro-poor growth arguing that pro-poor growth is biased in favor of the poor, meaning that the poor must enjoy higher benefits of growth than the non-poor. Based on this definition, they proposed an operational measure of pro-poor growth, which informed when one could say that growth is pro-poor. And if so, to what degree?

Kakwani and Son [2008] proposed two alternative definitions of pro-poor growth. A brief review of these definitions is now provided.

(i) Relative definition of pro-poor growth

The growth is relative pro-poor (anti-poor) if the average relative growth rate of the income is positive, and the poor benefit proportionally more (less) than the non-poor.

The growth is also relative pro-poor (anti-poor) if the relative growth rate of income is negative, and the poor suffer a proportionally smaller (larger) decline in their income than the non-poor.

Kakwani and Pernia [2000] proposed this definition, implying that growth results in income redistribution favoring the poor. This is a relative concept of pro-poor growth because the growth process reduces relative inequality.

(ii) Absolute definition of pro-poor growth

The growth is absolute pro-poor (anti-poor) if the average absolute growth of income is positive, and the poor benefit absolutely more (less) than the non-poor.

The growth is also absolute pro-poor (anti-poor) if the average absolute growth rate of income is negative, and the poor absolutely suffer a smaller (larger) decline in their income than the non-poor.

Kakwani and Son [2008] proposed this definition, implying that growth results in the redistribution of income in favor of the poor, contributing to a greater absolute gain of income for the poor than the non-poor. If the growth is negative, the redistribution of income due to growth leads to a smaller loss of absolute income for the poor than for the non-poor. This is an absolute concept of pro-poor growth because the growth process reduces the absolute inequality of income. Kolm [1976] developed the idea of absolute inequality, which remains unchanged when everyone's income changes by the same amount. This paper has extended this idea to measuring absolute pro-poor growth.

3. Poverty equivalent growth rate (PEGR) explained

The linkage between growth and poverty is complex and is determined by inequality changes. Thus, pro-poor growth provides the interrelationship between three factors: poverty, inequality, and growth, known in the literature as the PIG axis [Sumner 2003]. Kakwani and Son [2008] developed the idea of a "poverty equivalent growth rate" (PEGR) that takes into account both the growth rate in mean incomes and how the benefits of growth are distributed among the poor and non-poor. It encompasses the two definitions of pro-poor growth discussed in the previous section. This paper demonstrates that the PEGR satisfies an essential requirement that the magnitude of poverty reduction is a monotonically increasing function of the PEGR. Thus, the PEGR is an effective tool to reduce or alleviate poverty; maximization of the PEGR implies a maximum reduction in poverty. The government's social objective should be to maximize the PEGR.

The derivation of the PEGR is explained in [Kakwani and Son 2008]. The following hypothetical example can provide an intuitive explanation of the PEGR. Suppose the actual growth rate is seven percent, which has reduced poverty by ten percent, meaning that $\delta = -0.10$ and $\gamma = 0.07$. Suppose the growth elasticity of poverty is $\eta = -1.2$, interpreted as a one percent increase in mean income reduces poverty by 1.2 percent, provided the relative inequality had not changed. The growth in poverty under the counterfactual that inequality had not changed would be $-1.2 \times 0.07 = -0.084 \approx -8.4$ percent. The actual poverty reduction is ten percent, meaning that the actual poverty reduction is higher than the reduction that would have occurred if growth were inequality neutral, which gives a pro-poor index $\varphi = (-.10)/(-.084) = 1.19$. Hence, the poor enjoy 19 percent higher benefits than the non-poor, so growth is pro-poor. The PEGR $= 0.07 \times 1.19 = 0.08 \approx 8$ percent, which

is higher than the actual economic growth rate of seven percent. Thus, there is a gain of one percent in the growth rate because growth is pro-poor.

Suppose the economy suffered a recession, so the economic growth rate declined by five percent, implying $\gamma = -0.05$, which led to an increase in poverty by seven percent, giving $\delta = 0.07$. If the recession were inequality neutral, poverty would have increased by $-1.2 \times (-0.05) = 0.06 \approx 6$ percent. The actual increase in poverty is seven percent, which yields the pro-poor index $\varphi = 7/6 = 1.17$. It means that the poor suffer a 17 percent higher loss of income than the non-poor; therefore, the recession is anti-poor. Thus, the PEGR $= -0.05 \times 1.17 = -0.059 \approx -5.9$ percent, which is lower than the actual growth rate of -5 percent. Therefore, society suffers a loss of growth rate equal to 0.9 percent. A similar interpretation applies to the absolute PEGR.

This hypothetical example has a critical message: it shows that pro-poor growth contributes to a gain in the growth rate in poverty reduction, while anti-poor growth results in the loss of the growth rate in poverty reduction. This result is intuitive and can be more readily conveyed to policymakers.

4. Poverty social welfare approach to pro-poor growth

The PEGR requires the specification of the poverty line and an aggregate poverty measure, and several poverty measures are available in the literature based on alternative assumptions. The PEGR can be calculated for any poverty measure, a general method encompassing any poverty measure. Any income and expenditure household survey can be used to operationalize the technique. This technique requires the estimation of the growth elasticity of poverty η, and Kakwani and Son [2008] proposed to estimate the elasticity using the poverty decomposition proposed by Kakwani [2000]. Many researchers have found the estimation of this elasticity rather tricky. This section offers an alternative method of estimating pro-poor growth using the poverty social welfare approach. The poverty social welfare function can be directly linked to poverty measures, implying a one-to-one relationship. But, at the same time, it provides a more straightforward way of identifying a growth pattern as pro-poor.

The idea of poverty social welfare function is explained below.

Suppose z is the poverty line, the income below which individuals cannot satisfy their minimum needs. Persons are identified as poor if their income x is below the poverty line. We develop below a general class of poverty social welfare functions and show how it can drive a class of pro-poor growth indices.

Suppose $v_k(z, x)$ is the weight given to a poor person with income x, when poverty line is z, defined as

$$\begin{aligned} v_k(z,x) &= \frac{(k+1)}{H}\left[\frac{H-F(x)}{H}\right]^k \quad if\ x < z \\ &= 0 \qquad\qquad\qquad\qquad\quad if\ x \geq z. \end{aligned} \tag{1}$$

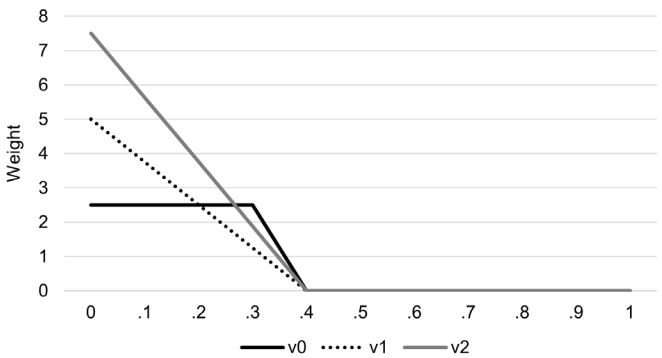
$F(x)$ is the probability distribution function, which is the probability of a person with income less than x. H is the proportion of poor identified by the poverty line z.

The total weight in the domain of x adds up to one:

$$\int_0^H v(z,x)\,f(x)dx = \frac{(k+1)}{H}\int_0^H \left[\frac{H-F(x)}{H}\right]^k f(x)dx = 1. \qquad (2)$$

The poorest person gets the maximum weight of $(k + 1)$, which decreases monotonically as income increases and becomes zero when the income of the poor increases to the poverty line z or higher. Thus, all the weight is given to the poor, and the non-poor receives zero weight, which characterizes poverty social welfare functions. Figure 1 depicts the weights assigned to the poor. For an illustration, H is assumed to be 0.4.

FIGURE 1. Poverty social welfare functions



Note: Weights: H = 0.4

The figure depicts the three alternative weighting schemes. When $k = 0$, every poor person receives the exact weight of 2.5 until the income of the poor equals the poverty line so that all the non-poor receive zero weights. When $k = 1$ or $k = 2$, the weight decreases monotonically as the income of the poor increases, attaining the value 0 when the poor cross the poverty line. This weighting scheme leads to the following class of poverty social welfare functions.

$$x^*(z,k) = \frac{1}{H}\int_0^z xv(z,x)\,f(x)dx = \frac{(k+1)}{H}\int_0^z x\left[\frac{H-F(x)}{H}\right]^k f(x)dx\,, \qquad (3)$$

which is the money metric poverty social welfare function measured in the income currency such as the dollar. This social welfare class depends on the income ranking of the poor. Sen [1976] proposed the idea of rank order ranking from the viewpoint of capturing the relative deprivation suffered by persons when they compare their economic circumstances with others in society. The basic intuition behind the rank ordering is that the lower a person is on the welfare scale, the higher this person's

sense of deprivation. Intuitively, the person suffering from the highest deprivation must receive the most importance and, thus, the largest weight.

When $k = 0$, $x^*(z, k)$ becomes

$$x^*(z, 0) = \frac{1}{H}\int_0^z xf(x)dx\,, \tag{4}$$

which equals the mean income of the poor. It is the most straightforward poverty social welfare function. This social welfare function has one limitation: it gives equal weight to all people experiencing poverty, irrespective of economic circumstances. All poor cannot be identical; they have different incomes, so they must have different weights. Figure 1 shows that when $k > 0$, the importance given to the poor decreases linearly as their income increases. As k increases from one to two, Figure 1 also shows that the weight function becomes steeper, giving relatively greater weight to the poorer persons among the poor. It means that the parameter k is interpreted as the inequality aversion parameter; as k rises, more and more importance is given to transfers among the poor at the lower end of the distribution and less weight to the transfer at the top. This is a desirable property if society is concerned with giving greater importance to poorer persons among the poor. Thus, it would be more appropriate to measure pro-poor growth using the general class of poverty social welfare functions in (3) for $k > 0$; the higher the value of k, the greater society's inequality aversion.

Having explained the poverty social welfare function, we show how we can derive the measures of pro-poor growth from it.

Suppose $\gamma = \Delta\ln(\mu)$ is the relative growth rate of the mean income of the society, which can be shown to give equal proportion weight to everyone in society. Further, suppose $\gamma(z, k) = \Delta\ln(x^*(z, k))$ is the growth rate of the social welfare $x^*(z, k)$, which gives all the weight to only the poor, with the poorest getting the maximum weight. We may now define the pro-poor index as follows.

If $\gamma(z, k) > \gamma$, the growth will be pro-poor because the growth will benefit the poor proportionally more than the non-poor [definition (i) of pro-poor growth]. That leads to a relative pro-poor index $\rho(z, k)$ given by

$$\rho(z, k) = \frac{\Delta\ln(x^*(z, k))}{\Delta ln(\mu)} = \frac{\gamma(z, k)}{\gamma}\,, \tag{5}$$

where $\gamma(z, k)$ is the relative growth rate of the poverty social welfare $x^*(z, k)$. Poverty social welfare function gives the highest weight to the poorest person in society, and the weight decreases monotonically with income, becoming zero as the person's income becomes equal to or higher than the poverty line z. The non-poor persons get zero weight, which implies that the growth will be pro-poor (anti-poor) if the growth in social welfare $\gamma(z, k)$ is higher (lower) than the growth in the mean of society γ, because the poor will receive greater (smaller) proportional growth benefits.

Suppose $\gamma > 0$; growth will be pro-poor (anti-poor) if $\rho(z, k)$ is greater (smaller) than unity. If $\gamma < 0$, the growth will be pro-poor (anti-poor) if $\rho(z, k)$ is smaller (greater) than one because people experiencing poverty suffer a smaller (larger) loss of income due to the downturn in the economy.

The pattern of relative growth is determined by

$$\gamma(z, k) = \gamma + (\rho(z, k) - 1)\gamma, \tag{6}$$

which immediately shows that there will always be a gain (loss) in the relative growth of poverty social welfare if the growth process is pro-poor (anti-poor). The decision rule regarding the gain or loss in growth rate is straightforward to explain to the policy makers: the gain signifies pro-poor growth, and the loss anti-poor growth.

Similar to the relative pro-poor index in (3), we can also define an absolute pro-poor index for the class of social welfare function, $x^*(z, k)$ as

$$\rho^*(z, k) = \frac{\Delta x^*(z, k)}{\Delta \mu} = \frac{\gamma_A^*(z, k)}{\gamma_A}. \tag{7}$$

From definition (ii), the growth is absolute pro-poor (anti-poor) with an absolute positive growth rate, γ_A; the poor receive greater (smaller) absolute benefits than the non-poor, implying that $\rho^*(z, k)$ is greater (smaller) than one. Similarly, if $\gamma_A < 0$, the growth is absolute pro-poor (anti-poor) if the absolute loss of growth for the poor is smaller (larger) than that of the non-poor, implying that $\rho^*(z, k) < 1$ [$(\rho^*(k) > 1$], respectively.

The pattern of absolute growth is determined by

$$\gamma_A^*(z, k) = \gamma_A + (\rho^*(z, k) - 1)\gamma_A, \tag{8}$$

which immediately shows that there will always be a gain (loss) in the absolute growth of social welfare if the growth process is absolute pro-poor (anti-poor).

5. What is pro-poor development?

First, we need to clarify what development is. It is a complex issue, having different meanings for different people, and economic growth is commonly perceived as development. If a country achieves high economic growth, it is applauded as a country with a high level of development. Economic growth is measured in income space, which provides people with the means to lead a better life. Means are necessary but insufficient to give people the quality of life they must have.

According to Nobel Laureate Amartya Sen [1983], economic development has to be concerned with the kind of life people can lead and what they can or cannot do;

for example, whether they are well-nourished, get an education, or able to escape avoidable morbidity. His idea of development relates to enhancing people's well-being (or standard of living). He developed the most comprehensive framework of well-being through functionings and capabilities. While functioning is people's achievement, capability is their ability to achieve. Functionings are directly related to what life people lead, whereas capabilities are related to people's freedom in choosing the functions they value. Thus, development is a multidimensional concept defined in terms of capabilities that reflect the extent of freedom people have in determining the life they wish to lead. Following this framework, we describe development as enhancing peoples' capabilities (well-being).

Economic growth generates people's incomes, which are the means enabling people to have a command over commodities. But Sen's idea of well-being relates to the kind of life people can lead. Thus, well-being is the people's ultimate achievement, which we call ends, whereas means generated by economic growth enable people to achieve these ends. It is essential to note that there is no one-to-one relationship between means and ends.

We define development more narrowly as ends, whereas economic growth is a means. Means and ends have different characteristics; means can impact ends, so they are related, but still distinct, and policies to enhance means will differ from those that enhance ends.

This paper defines and measures four development goals: pro-poor and inclusive growth based on means and pro-poor and inclusive development on the ends. So, we treat them as different development goals.

Well-being is a multidimensional concept reflecting many aspects of people's lives. Several indicators measure well-being, and constructing a composite index to measure overall well-being is not essential. The construction of a composite well-being index suffers from many conceptual issues, well-documented in the literature [Kakwani and Son 2022]. Constructing a composite index requires weights to be assigned to various dimensions of well-being, and no meaningful method exists for determining the weights. We have refrained from creating composite indices of pro-poor development. Our conclusions on pro-poor development derive from the individual development indicators, which are sensible approaches to formulating policies.

Pro-poor development concerns the performance of the poor in achieving development relative to the non-poor. We propose the following two definitions of pro-poor development.

(iii) Relative pro-poor development

The development is relatively pro-poor (anti-poor) if the average relative well-being growth rate is positive and the poor enjoy a proportionally higher (lower) increase in well-being than the non-poor.

The development is also relatively pro-poor (anti-poor) if the average relative well-being growth rate is negative and the poor suffer a proportionally lower (higher) decline in well-being than the non-poor.

(iv) Absolute pro-poor development

The development is absolute pro-poor (anti-poor) if the average absolute well-being growth rate is positive, and the poor enjoy an absolutely higher (lower) increase in well-being than the non-poor.

The development is also absolute pro-poor (anti-poor) if the absolute well-being growth rate is negative and the poor suffer an absolutely lower (higher) decline in well-being than the non-poor.

6. The measurement of pro-poor development

Suppose $\omega(x)$ is the well-being indicator of a person with income x; several indicators characterize the overall well-being. For ease of presentation, $\omega(x)$ will be referred to as well-being.

We propose generalizing the poverty social welfare function in (3) to achieve this objective. This generalization will be called Poverty Social Well-being Function (PSWBF) given by

$$\omega_P^*(z, k) = \frac{(k+1)}{H}\int_0^z \omega(x)\left[\frac{H - F(x)}{H}\right]^k f(x)dx, \tag{9}$$

which links the well-being with the economic circumstances of the poor.

When $k = 0$, $\omega_P^*(k)$ collapses to $\bar{\omega}_z$ given by

$$\bar{\omega}_z = \frac{1}{H}\int_0^z \omega(x)f(x)dx, \tag{10}$$

which is the mean well-being of the poor. This is the most straightforward poverty social well-being function. Its main limitation is that the well-being of all the poor gets the same weight irrespective of their economic situation. However, if $k > 0$, the weight given to the well-being of the poor varies with their income. The well-being of the poorest gets the highest importance.

The pro-poor relative development index for the (PSWF) is given by

$$\tau_P(z, k) = \frac{\Delta Ln(\omega_P^*(z, k))}{\Delta Ln(\bar{\omega})} = \frac{\sigma_P(z, k)}{\sigma}, \tag{11}$$

where $\sigma_P(z, k)$ is the relative growth rate of poverty social well-being, and σ is the relative growth rate of the well-being of the whole population. The development, based on definition (iii), will be relative pro-poor (anti-poor) if $\sigma > 0$, *and* $\tau_P(z, k)$ is greater (less) than one. If $\sigma < 0$, *and* $\tau_P(z, k)$ is less (greater) than one, the development will be relatively pro-poor (anti-poor).

The pattern of pro-poor development is described by

$$\sigma_P(z, k) = \sigma + (\tau_P(z, k) - 1)\sigma, \tag{12}$$

which immediately shows that relative pro-poor development leads to a gain in relative well-being growth rate, while anti-poor development results in a loss in relative well-being growth rate. Thus, we propose to measure the degree of relative pro-poor development by the gain or loss of relative growth in a well-being indicator.

The pro-poor absolute development index for the PSWF is given by

$$\tau_P^*(z, k) = \frac{\Delta(\omega_P^*(z, k))}{\Delta(\bar{\omega})} = \frac{\sigma_P^*(z, k)}{\sigma^*}, \tag{13}$$

where $\sigma_P^*(z, k)$ is the absolute growth rate of poverty social well-being, and σ^* is the absolute growth rate of the well-being of the whole population. The development, based on definition (iv), will be absolute pro-poor (anti-poor) if $\sigma^* > 0$, *and* $\tau_P^*(z, k)$ is greater (less) than one. If $\sigma^* < 0$, *and* $\tau_P^*(z, k)$ is less (greater) than one, the development will be relatively pro-poor (anti-poor); and will be absolute pro-poor (anti-poor) if $\tau_P^*(k)$ is greater (less) than one. The pattern of pro-poor development is described by

$$\sigma_P^*(z, k) = \sigma^* + \tau_P^*(z, k) - 1)\sigma^*, \tag{14}$$

which immediately shows that absolute pro-poor development leads to a gain in absolute well-being growth rate, while anti-poor development results in a loss in well-being growth rate. Thus, we propose to measure the degree of absolute pro-poor development by the gain or loss of absolute growth of a development indicator.

7. What is inclusive growth, and how did it evolve?

What is the origin of the term inclusive growth? Our simple answer is that we do not know, and our Google search did not help. The development literature, however, has integrated the concept of inclusive growth into policymaking. In the new millennium, there has been widespread debate on the idea, still providing no clear definition of what inclusive growth is and how it differs from other development ideas proposed in the literature. The concept remains elusive, as pointed out by Ranieri and Ramos [2013] in a one-pager publication of the International Policy Centre for Inclusive Growth. A careful review of various ADB documents revealed many conflicting definitions of inclusive growth, as pointed out by Klassen [2010]. He concluded that inclusive growth concepts are vague and do not allow easy quantitative operationalization. Further complicating matters, the World Bank defines inclusive growth in ways that are at odds with the ADB concept.

The debate on inclusive growth advanced in India. Unfortunately, it did not clarify what inclusive growth is. Inclusive growth includes a cocktail of policies, which could lead to inclusive growth, but we do not know where we are heading. We cannot precisely measure inclusive growth without a precise definition, and policies do not define inclusive growth if we do not know where we are heading. We can only evaluate policies if they achieve inclusive growth, provided we know our achievement function. The following sections define inclusive growth and development, two distinct concepts.

8. Defining and measuring inclusive growth

This section provides a precise definition of inclusive growth for the first time.

The pro-poor growth is deliberately biased in favor of the poor, and its primary purpose is rapidly reducing poverty. In the previous sections, we developed a framework for pro-poor growth employing poverty social welfare functions, and these functions assign entire weight to the poor. The non-poor receive zero weight, meaning society is only concerned with the benefits of growth going to the poor and not with how the growth impacts the non-poor. In contrast, we view inclusive growth as broad-based growth, benefiting everyone, not just the poor. If the growth results in high inequality, some people receive excessive benefits, and others receive meager benefits. Recently, many countries have achieved rapid economic growth accompanied by a sharp increase in inequality, and we cannot classify such a growth process as inclusive.

Discrimination based on gender, religion, caste, or ethnicity may exclude many social groups from participating in growth. Inclusive growth ensures that all social groups can participate in economic activities and receive benefits to lead a decent life. In India, the caste system is crucial in excluding social groups such as scheduled castes and scheduled tribes from participating in the growth process. It would be challenging to link the discrimination suffered by the social groups to the inclusive growth developed in the paper. That would be our future project. The operationalizing of inclusive growth is produced below.

There is a one-to-one linkage between equality and social welfare function. How we measure equality depends on the social welfare function we choose, and we measure equality in income space using a class of social welfare functions. We view inclusive growth as broad-based growth, benefiting everyone, not just the poor. Hence, social welfare must assign positive weights to everyone's income so everyone participates in the growth process and benefits from it. The inclusive growth must also ensure that the growth benefits are equitably distributed. We cannot achieve perfect equity when everyone receives the same proportional or absolute benefits. However, inclusive growth must ensure everyone can lead a socially acceptable minimum standard of living. That means that inclusive growth must achieve higher economic growth with equity so everyone can enjoy

the minimum standard of living. It is, therefore, essential to measure the degree of inclusive growth to devise policies to enhance it.

We propose to utilize a class of inclusive social welfare functions to measure inclusive growth given by

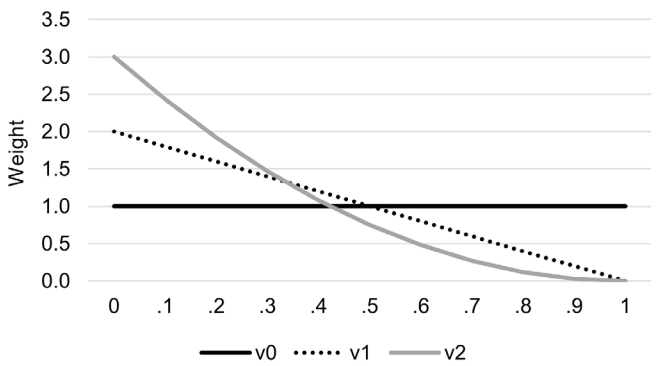
$$w(k) = (k + 1) \int_0^\infty x[1 - F(x)]^k f(x)dx. \quad (15)$$

$F(x)$ is the probability distribution function, interpreted as the proportion of persons with income less than or equal to x. The total weight given to everyone's income adds to one:

$$(k + 1) \int_0^\infty [1 - F(x)]^k f(x)dx = 1, \quad (16)$$

Kakwani and Son [2022] have proposed this general class of social welfare functions. We use this class of social welfare functions to measure inclusive growth that considers society's different value judgments. Figure 2 depicts the weighting scheme underlying the class of social welfare functions in (15). When $k = 0$, everyone in society gets a weight equal to one, in which case the social welfare $w(k)$ reduces to the average income of the society. In this scenario, society would have no concern for inequality. When $k > 0$, the social welfare function in (15) ensures that the poorest person gets the highest weight, decreasing monotonically as income increases. Hence, the richest person receives the slightest importance. This property is desirable for any social welfare function to capture income equity.

FIGURE 2. Social welfare functions weights



If $k = 1$, the social welfare function $w(k)$ reduces to the social welfare function proposed by Sen [1974]. As k increases from 1 to 2, the weight function becomes steeper, implying that the higher the value of k, the greater importance is given to the poorer person in society. k is interpreted as the inequality aversion parameter; as it increases, society gives greater importance to the incomes of the more impoverished.

Like pro-poor growth, inclusive growth can be relative and absolute. The index of relative inclusive growth is determined by

$$\delta(k) = \frac{\Delta Ln(\omega(k))}{\Delta Ln(\mu)} = \frac{\emptyset(k)}{\gamma}, \tag{17}$$

where $\emptyset(k)$ is the relative growth rate of the social welfare $w(k)$, and γ is the relative growth rate of the mean income.

If $\gamma > 0$ *and* $\delta(k) > 1$, the growth process captures the relative equity, so we define growth as relatively inclusive. The growth will not be inclusive if $\delta(k) < 1$ because the growth will not be equitable.

If $\gamma < 0$ *and* $\delta(k) < 1$, the growth will be equitable and, therefore, inclusive. If $\delta(k) > 1$, the growth will not be equitable, and hence not inclusive,

The pattern of relative inclusive growth is determined by

$$\emptyset(k) = \gamma + (\delta(k) - 1)\gamma, \tag{18}$$

which immediately shows that there will be a gain (loss) in the relative growth of social welfare if the growth process is relatively inclusive (non-inclusive).

Similar to the relative inclusive growth index in (17), we can also define an absolute inclusive growth index for the class of social welfare function $w(k)$ in (15) as

$$\delta^*(k) = \frac{\Delta(\omega(k))}{\Delta(\mu)} = \frac{\emptyset^*(k)}{\gamma_A}. \tag{19}$$

$\emptyset^*(k)$ is the absolute growth of social welfare, and γ_A the absolute growth rate of the mean income.

If $\gamma_A > 0$ *and* $\delta^*(k) > 1$, the growth captures absolute equity, so we define growth as absolute inclusive. The growth will not be absolute inclusive if $\delta^*(k) < 1$ because the growth will not be equitable.

If $\gamma_A < 0$ *and* $\delta^*(k) < 1$, the growth captures absolute equity, so we define growth as absolute inclusive. The growth will not be absolute inclusive if $\delta^*(k) > 1$ because the growth will not be equitable.

The pattern of absolute inclusive growth is determined by

$$\gamma_A^*(k) = \gamma_A + (\rho^*(k) - 1)\,\gamma_A, \tag{20}$$

which immediately shows that there will be a gain (loss) in the absolute growth of social welfare if the growth process is inclusive (non-inclusive).

9. Inclusive development

As discussed, economic growth is measured in income space, which provides people with the means to lead a better life. Means are necessary but insufficient to

give people the quality of life they must have. Inclusive development concerns the broad-based enhancement of the well-being of the population. The measurement of inclusive development requires generalizing the social welfare function given in (15). We refer to this generalization as inclusive social well-being function (ISWBF), defined as

$$\omega^*(k) = (k+1)\int_0^\infty \omega(x)[1-F(x)]^k f(x)dx, \tag{21}$$

where $\omega(x)$ is the well-being of a person with income x, when all the persons are arranged in ascending order of their income. In this function, the well-being of the poorest person in society is assigned the maximum weight of $(k+1)$, decreasing monotonically to 0 as income increases.

The relative inclusive development index for the ISWBF is given by

$$\tau(k) = \frac{\Delta Ln(\omega^*(k))}{\Delta Ln(\bar{\omega})} = \frac{\sigma(k)}{\sigma}, \tag{22}$$

where $\sigma(k)$ is the relative growth rate of social well-being, and σ is the relative growth rate of the well-being of the whole population. $\tau(k)$ captures the equity in the well-being of the society. The development will be relative inclusive (non-inclusive) if $\tau(k)$ is greater (less) than one. The pattern of pro-poor development is described by

$$\sigma(k) = \sigma + (\tau(k) - 1)\sigma, \tag{23}$$

which immediately shows that relative inclusive development leads to a gain in well-being growth rate, while non-inclusive development results in a loss in well-being growth rate.

The absolute inclusive index for the ISWBF is given by

$$\tau^*(k) = \frac{\Delta(\omega^*(k))}{\Delta(\bar{\omega})} = \frac{\sigma^*(k)}{\sigma^*}, \tag{24}$$

where $\sigma^*(k)$ is the absolute growth rate of social well-being and σ^* is the absolute growth rate of the well-being of the whole population. $\tau^*(k)$ captures the absolute equity in well-being. The development will be inclusive (non-inclusive) if $\tau^*(k)$ is greater (less) than one. The pattern of pro-poor development is described by

$$\sigma^*(k) = \sigma^* + (\tau^*(k) - 1)\sigma^*, \tag{25}$$

which immediately shows that absolute inclusive development leads to a gain in absolute well-being growth rate, while absolute non-inclusive development results in a loss in absolute well-being growth rate.

10. Pattern of global growth: a case study

This section examines whether the pattern of global growth has achieved shared prosperity and to what extent in the first two decades of the 21st century.

We have compiled the data for 173 countries over the period 2000-2021 from the World Bank's database, *World Development Indicators*, which includes four indicators:

1. Per capita GDP in 2017 purchasing power parity (PPP),
2. Life expectancy at birth in years,
3. Infant survival rate per 100 babies born,
4. Maternal survival rate per 100 childbearing women.

The pro-poor and inclusive growth is measured in income space, whereas the pro-poor and inclusive development is measured in the well-being space. Income or consumption at the individual level is ideal for measuring pro-poor and inclusive growth. However, to do so requires nationally representative household income or expenditure surveys for 173 countries over two decades, which is almost impossible.

Given this data limitation, we have carried out the analysis using each country as a unit of analysis based on countries' per capita GDP in 2017 PPP. The GDP, measured in PPP dollars, considers the prices in different countries to compare the per capita GDP across countries. The per capita GDP in the PPP exchange rate is used as a proxy for countries' economic standard of living. That enables ranking the countries from the poorest to the richest.

The main limitation of the country-level analysis is that it ignores the variations of pro-poorness and inclusiveness of individual-level growth within countries. We can only capture the between-country variations and obtain a broad picture of pro-poorness and inclusiveness globally.

In our empirical analysis, we have utilized three essential health well-being indicators: life expectancy at birth, infant survival rate, and maternal survival rate. Our analysis here is partial, ignoring many other dimensions of well-being, such as education, nutrition, living conditions, etc.

Growth rates can have wide yearly fluctuations, so it is essential to draw inferences based on trend growth rates. The least squares method applied to a semilog regression model commonly calculates the trend growth rates [World Bank 1978-2023]. Kakwani [1997] has demonstrated that it has adverse welfare implications, which are intuitively not appealing. In this section, we have used Kakwani's method to calculate trend growth rates, which satisfy all the essential properties of a social welfare function.

Table 1 presents the annual relative and absolute trend growth rates of the four indicators used in this illustration. These growth rates show that real per capita GDP has grown globally at a yearly relative growth rate of 2.20 percent between

2001 and 2020. The table also offers absolute growth rates, indicating that the real per capita global GDP has grown yearly at 286 PPP dollars. That means that the 173 countries, on average, are gaining a yearly income of 286 PPP dollars. The focus on absolute growth has an intuitive appeal because it measures the improvement in the standard of living in the income currency, easily understood by the people.

TABLE 1. Trend annual growth rates in 173 countries, 2001-2020

Indicators	Relative	Absolute
pc_gdp 2017 PPP	2.20	286
Life expectancy at birth	0.41	0.29
Infant survival rate	0.13	0.12
Maternal survival rate	0.22	0.01

That means that global growth has been significant, enhancing the average prosperity in the world in the new millennium of two decades. However, our main concern is whether this prosperity has been shared widely across all the countries, poor and non-poor (developing or developed). We answer this question by analyzing whether global economic growth has been pro-poor and inclusive.

10.1. Pro-poor global growth

Measuring pro-poor growth based on poverty social welfare functions requires identifying the poor countries. We identify a country as poor if it belongs to the bottom 40 percent of the poorest countries as determined by the per capita GDP in the 2017 PPP exchange rate. The choice of 40 percent is arbitrary; we have chosen it because the World Bank used this figure in its recently proposed development model described in Rosenblatt and McGavock [2013].

Ideally, we must construct a poverty line to measure poverty in each country based on household income and expenditure surveys. We did not follow this path because of the limited availability of the surveys.

We may turn to answer the question of whether global growth is pro-poor. We have utilized two poverty social welfare functions, one with an inequality aversion parameter of one (pswf1) and the other with two (pswf2). The higher value of inequality aversion implies greater weight to the relatively poorer countries, giving greater importance to relatively more impoverished countries.

Figure 3 answers whether the global growth has been relatively pro-poor or anti-poor. As derived, the growth is relatively pro-poor (anti-poor) if there is a gain (loss) in relative growth rate. The pswf1 contributes to a gain in the relative growth rate of 1.78 percent, whereas the pswf2 contributes to a gain in the relative growth rate of 1.23 percent. Both social welfare functions result in gains in growth rates, thus answering the question that the pattern of global growth is

relatively pro-poor. That means global growth has given more significant proportional benefits to the poorest 40 percent of the countries compared to the wealthiest sixty percent of countries.

FIGURE 3. Trend relative pro-poor growth rates

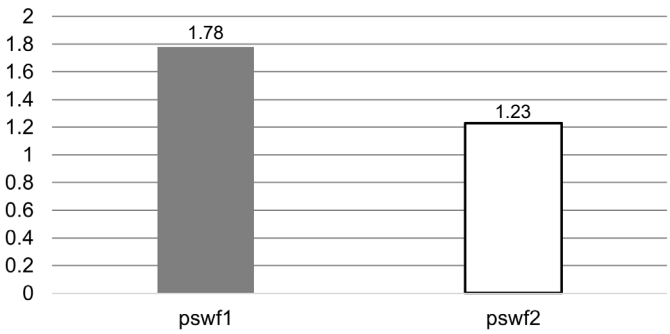
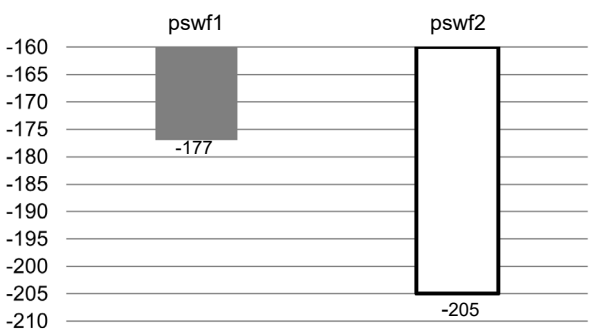


Figure 4 answers whether the global growth has been absolute pro-poor or anti-poor. As derived, the growth is absolute pro-poor (anti-poor) if a gain (loss) in absolute growth rate occurs.

FIGURE 4. Trend absolute pro-poor growth rates



The pswf1 contributes to a loss in the yearly absolute trend growth rate of USD 177, whereas the pswf2 contributes a loss in the annual growth rate of USD 205. These losses signify that the global growth rate had been anti-poor, meaning that the poorest 40 percent of the world's countries have enjoyed lower benefits of growth than the wealthiest 60 percent of countries.

The empirical conclusions emerging from this section indicate how we measure pro-poor growth matters. We have found that global growth is pro-poor in relative terms while anti-poor in absolute terms. This inconsistency may surprise many and even confuse the policymakers. However, we can intuitively explain it. Let's consider a hypothetical example of two countries, A with a per capita GDP of USD

1,000 and B with USD 5,000. Suppose A grows at a rate of 20 percent, whereas B grows at ten percent. The average growth of the two countries is 15 percent, which is relative pro-poor. The absolute growth rate of A is USD 400, and that of B is USD 500, which implies that the absolute growth is anti-poor because the more affluent country's absolute growth benefit is higher than that of the poorer country. Thus, the relative growth may be pro-poor but absolute anti-poor.

10.2. Inclusive growth

Measuring pro-poor growth requires a poverty social welfare function, which gives the entire weight to the poor; the non-poor receives zero weight. That means society is only concerned about the poor and not how the non-poor benefit from the growth. Inclusive growth is broad-based, benefiting the entire society. Therefore, its social welfare function gives a positive weight to everyone, declining monotonically as a person's income increases. Thus, even if the growth benefits everyone, to identify growth as inclusive, it must be equitable across the entire population. The growth will be non-inclusive if it is inequitable.

Figures 5 and 6 answer whether growth was relative and absolute inclusive, respectively. We answer this question based on the two inclusive social welfare functions, iswf1 and iswf2, with inequality aversion parameters 1 and 2, respectively. Figure 5 shows the gain of relative growth rates of 3.20 and 3.79 for iswf1 and iswf2, respectively. Both social welfare functions conclude that global growth is relatively inclusive.

However, the story changes when the inclusiveness of growth is measured in absolute terms. Figure 6 shows that the inclusive social welfare functions iswf1 and iswf2 result in a loss of the GDP growth rate of USD 63.24 and USD 106.72 per annum, respectively. The loss of growth rates is higher for the social welfare function with higher inequality aversion parameters, impacting the poorer countries more adversely.

Figures 5 and 6 indicate that global growth is relatively inclusive but not inclusive in absolute terms. That means how we measure inclusiveness matters.

FIGURE 5. Trend relative inclusive growth rates

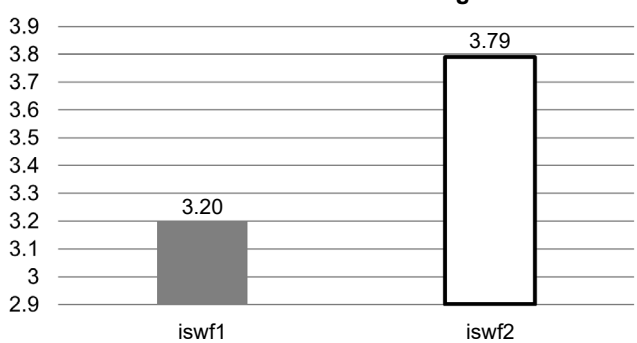
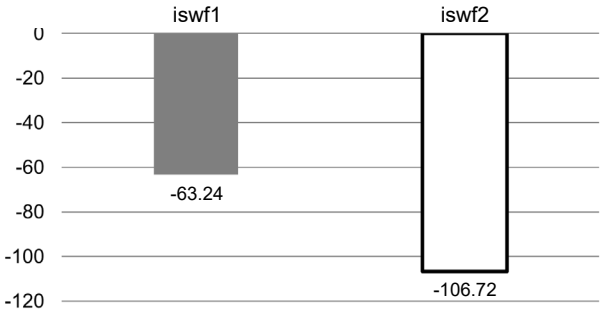


FIGURE 6. Trend absolute inclusive growth rates



10.3. Pro-poor development

How has the world performed in achieving shared development? To answer this question, we look at the pattern of development measured by the social well-being functions discussed in the paper.

Table 1 shows that the three development indicators have had positive trend growth rates, measured in relative and absolute terms. From this, we may conclude that global well-being has increased over the two decades, as measured by the three health indicators. This enhanced global well-being may have been due to the advancements in medical services that have produced improved health outcomes.

A pertinent question is whether the development has been pro-poor, benefiting the poor proportionally and absolutely more than the non-poor. Figures 7 and 8 depict the pro-poor relative and absolute development, respectively. They show that all three development indicators contribute to a gain in trend growth rates, signifying that global development was pro-poor in relative and absolute terms. That means the poorest 40 percent of countries have enhanced their health outcomes better than the wealthiest 60 percent, relatively and absolutely. That is an exciting result because it shows that the widely held perception that poor developing countries are somehow unable to progress better in their well-being compared to non-poor countries is not always true.

FIGURE 7. Trend relative pro-poor development

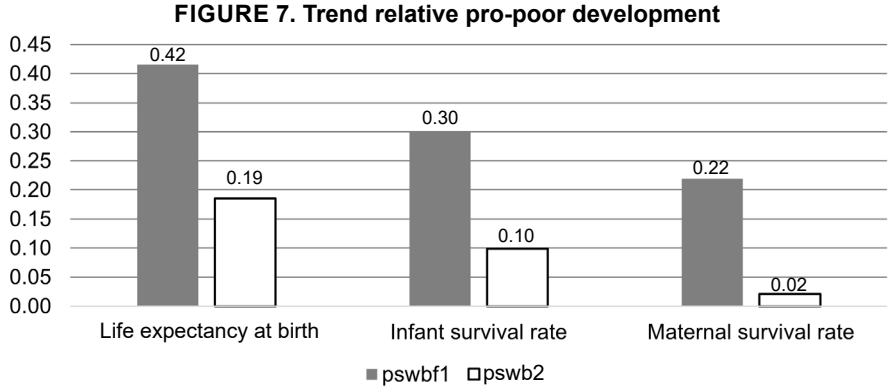
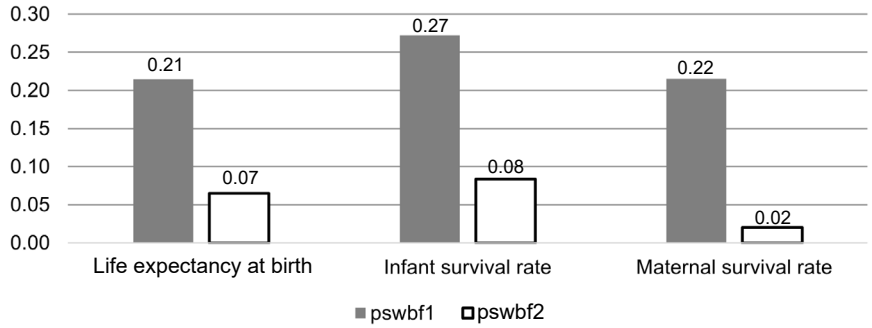


FIGURE 8. Trend absolute pro-poor development



10.4. Inclusive development

We measure inclusive development using the broad-based inclusive social well-being functions. We have utilized two inclusive social well-being functions, iswbf1, and iswbf2, with inequality aversion parameters 1 and 2, respectively.

Figures 9 and 10 show that both inclusive social well-being functions contribute relative and absolute gains in growth rates of the three well-being indicators. That leads to a fantastic conclusion that global development is inclusive in relative and absolute terms. It means the development is equitably distributed across countries.

FIGURE 9. Relative inclusive development

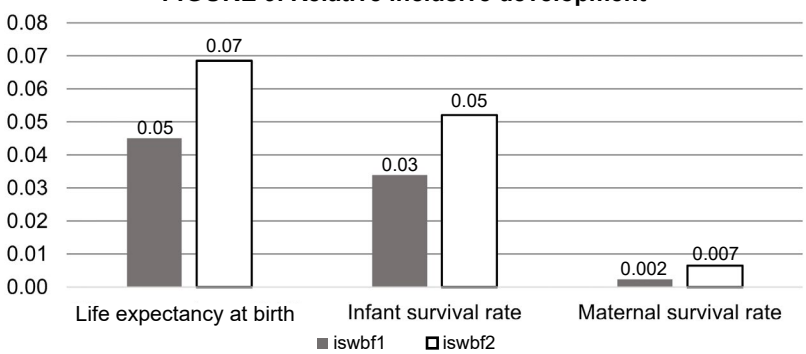
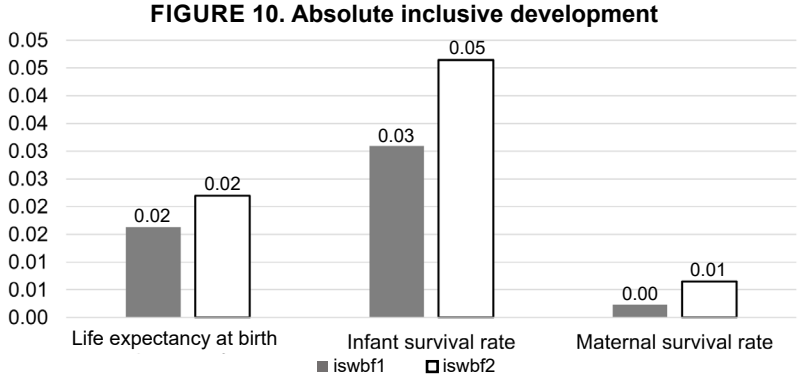


FIGURE 10. Absolute inclusive development



11. Concluding remarks

Based on a social welfare framework, the paper has developed an integrated methodology to evaluate growth and distribution simultaneously. Linking the two phenomena gives rise to four development goals: (i) pro-poor growth, (ii) inclusive growth, (iii) pro-poor development, and (iv) inclusive development. The paper has significantly contributed to defining the four concepts, providing a methodology to operationalize them using real-world data. These four development goals constitute shared prosperity, simultaneously dealing with growth and distribution. The paper has applied this methodology globally to determine whether growth and development have been pro-poor and inclusive in 173 countries over the two decades in the new millennium.

The paper concludes that global growth has been relatively pro-poor and inclusive. However, the conclusion reverses when we measure growth in absolute terms. We have explained that this inconsistency is not surprising. Even if growth is relatively pro-poor and inclusive, it may become anti-poor and non-inclusive when measured in absolute terms. That means the poorer countries have higher relative growth rates but lower absolute growth rates, which also means that the wealthier countries will tend to have lower relative growth rates but higher absolute growth rates. If this observation holds universally, we may predict that relative inequality between countries will decrease and absolute inequality will increase.

The global analysis concludes that development is both pro-poor and inclusive for the three health indicators. This finding is exciting, implying that the poorer countries have performed better in achieving better health outcomes than the more affluent countries. This conclusion may surprise many development practitioners: How can development be pro-poor and inclusive when absolute economic growth is neither pro-poor nor inclusive? We explain that this result is plausible.

As pointed out, our development concept is restricted to well-being indicators that vary in a narrow range, unlike income. For instance, the average life expectancy at birth has a maximum limit of not more than 85 years because people cannot live forever. Another essential characteristic, as articulated by Kakwani [1993b], is that achieving the same degree of improvement becomes increasingly difficult as well-being reaches progressively higher levels. For instance, it is easier to increase the average life expectancy at birth from 60 to 65 years than from 80 to 85 years. Thus, at a higher level of well-being, an incremental improvement would represent higher levels of achievement than a similar incremental improvement from a lower base. So, the relationship between achievement and values of well-being indicators is not linear.

Consequently, the observed difference in the values of indicators does not reflect the actual achievement in well-being between different countries. Thus, we must interpret pro-poor and inclusive development with caution. Kakwani [1993a] has provided a method of measuring the actual achievement of well-being indicators. Future research must utilize Kakwani's method of measuring pro-poor and inclusive development based on achieved well-being.

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