FONDATION POUR LES ÉTUDES ET RECHERCHES SUR LE DÉVELOPPEMENT INTERNATIONAL

Measuring Progress Using the Logit Variation

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LA FERDI EST UNE FONDATION RECONNUE D'UTILITÉ PUBLIQUE. ELLE MET EN ŒUVRE AVEC L'IDDRI L'INITIATIVE POUR LE DÉVELOPPEMENT ET LA GOUVERNANCE MONDIALE (IDGM). ELLE COORDONNE LE LABEX IDGM+ QUI L'ASSOCIE AU CERDI ET À L'IDDRI. CETTE PUBLICATION A BÉNÉFICIÉ D'UNE AIDE DE L'ÉTAT FRANÇAIS GÉRÉE PAR L'ANR AU TITRE DU PROGRAMME « INVESTISSEMENTS D'AVENIR » PORTANT LA RÉFÉRENCE « ANR-10-LABX-14-01 »

The time has come to define a method for monitoring the SDGs.

2016 has seen the start of the 17 Sustainable Development Goals (SDGs) — set out September 2015 by the United Nations General Assembly — being implemented. While the development community has thus far focused on the targets to be achieved by 2030, the relevant measurement indicators and the availability of the data required for statistical monitoring of this new agenda, little research has been conducted to select the methodologies by which to measure progress.

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• • • / Public policies, however, are defined — at least in part — according to the objective evaluation of a situation and its evolution, themselves the result of statistical assessment. While the choice of monitoring indicators is a decisive factor in this assessment, the way in which the progress of these indicators is measured is equally important. The method for measuring changes in indicators can thus influence the way in which the statistical results are judged and, consequently, guide the analyses that will determine future policies. Methodology issues must not, therefore, be neglected.

Universal goals and targets for a very diverse set of countries

A number of the indicators used to measure development goals are bounded and the target to be achieved is often expressed as the percentage by which the indicator has been increased or reduced: reduce by two thirds the under-five mortality rate (MDG 4A), halve the number of global deaths and injuries from road traffic accidents (SDG 3.6), etc. The majority of these goals and targets apply to all countries, regardless of their level of development. And yet, can two very dissimilar countries really be expected to set themselves the same relative goals?

For example, reducing poverty by 50% has a different meaning depending on the initial level of poverty recorded.

Firstly, the fall in the number of percentage points required to reach the goal is higher when the initial level is higher. The effort required to cut poverty in half is therefore not the same in two countries with differing initial rates.

Secondly, there is little doubt that a country facing numerous and challenging vulnerabilities will find it harder to combat poverty than a country where the tools needed for the job are already in place. In a somewhat similar vein, addressing the poverty observed in a developed country often means addressing the root causes of exclusion. In general, these are particularly hard to combat and can make reducing the poverty rate a slower and more difficult task than in a middle-income country where the poverty rate is higher but where there is more room for improvement and the required institutional capacity is available. The rate of progression for a bound indicator may therefore depend on the level of development. In other words, the path between the starting value of an indicator and the end value corresponding to the goal is not necessarily a linear one.

Quantified goals and the speed at which countries are expected to reach them should not, therefore, be identical for all as a matter of course, yet the Millennium Development Goals (MDGs) were defined and subsequently assessed in this way. This is also the direction in which work on the SDGs is headed.

Accounting for the initial levels of indicators and the fact that progress is not linear

Although the new goals, targets and indicators have already been defined, it is still possible to take account of the initial levels for each country and to introduce the concept of non-linearity in assessing actual progress against the SDGs. This paper proposes a method for doing so.

Accounting for non-linearity involves applying a different monitoring method to analyse the progress made. In order to fully evaluate progress, the theoretical form of progression for the variable studied must be taken into account. In the case of a variable experiencing non-linear change, a simple comparison between countries' rates of growth or relative rates of progress towards the target has only limited value.

This is the case for numerous bounded variables, which are particularly well represented in the MDGs and SDGs, and for which the rate of growth is often around their lower limit, increases once a certain threshold has been passed, then slows again as the maximum level is approached. This type of change corresponds to the graphical representation of the Logit mathematical function.

Measuring progress using the Logit difference.

The traditional way of measuring progress involves estimating the rate of growth, g, of the indicator, which is calculated as the distance covered by the indicator from its initial value R_0 towards the observed value R_1, divided by the same initial value R_0: $g = (R_1 - R_0) / R_0$. An alternative measure involves estimating the ratio of the distance covered by the indicator to the remaining distance to the target: $v = (R_1 - R_0) / (Target - R_0)$. In both cases, the assessment remains linear, and the initial level has a significant influence on the end result (while, of course, the target takes no account of it).

The method presented in this paper proposes accounting for the influence of the initial situation, the distance moved from the initial situation, the distance still to cover to reach the target, and the non-linear nature of indicator change.

For bound indicators, this is reflected in the Logit difference (ΔLOGIT) between the two points R_0 and R_1, which can be expressed formally as follows:

$$\Delta LOGIT\,(R_i) = Ln\left[\frac{R_1}{Max - R_1}\right] - Ln\left[\frac{R_0}{Max - R_0}\right]$$

This variation is approximately the sum of the rate of growth and the relative reduction of the gap to the target. In effect:

$$\begin{aligned}
\Delta LOGIT\,(R_i) &= Ln\left[\frac{R_1}{Max - R_1}\right] - Ln\left[\frac{R_0}{Max - R_0}\right] \\
&= \Delta Ln[R_i] - \Delta Ln[Max - R_i] \\
&\approx \frac{R_1 - R_0}{R_0} - \frac{[Max - R_1] - [Max - R_0]}{[Max - R_0]} \\
&\approx \frac{R_1 - R_0}{R_0} - \frac{[-R_1] + R_0}{[Max - R_0]} \\
&\approx \frac{R_1 - R_0}{R_0} + \frac{R_1 - R_0}{[Max - R_0]} \\
&\approx g + v
\end{aligned}$$

The Logit variation therefore accounts for the relative variation of the variable and the relative variation of the gap to be covered to reach the upper limit.

Interpretation

The Logit difference is a measure of relative performance. For a given indicator, each country is ranked according to the score it obtains (the Logit difference). Each country's result then undergoes a statistical test to determine whether or not the result is significantly different from the average results of other countries.

A result that is significantly higher than the average indicates that the country has performed well against the assessed indicator; that is, the countries with the highest Logit variations are those that have made more progress than might normally have been expected[1], reflecting the country's good 'performance'. The reverse is true for countries whose results are significantly lower than the average.

Benefits of the Logit method

Measuring progress using the Logit difference:
- takes account of the non-linearity of a variable;
- takes account of the initial level of a variable;
- removes the need for parameters;
- largely reduces the influence of extreme values on the averages for country categories.

Limitations of the Logit method.

Although very useful, this method must be used with caution:
- the method is only valid for bound indicators;
- the Logit method is better suited to 'positive' bound indicators; that is, where the optimum situation is 1 (compared with 'negative' indicators, where the optimum situation is 0, such as the poverty rate, for example), but it is always easy to consider the inverse of a bound indica-

1. On the basis that the average of values for all countries is considered to be the norm.

tor (the number of people not living in poverty, for example);

- a slight statistical adjustment is required when considering the distance towards an intermediary target rather than a maximum. In effect, when the target is not the maximum (as with MDG 1A – halve the poverty rate, for example), the gap, *Target-*R_i, can be negative if the target is exceeded, so the absolute value of the gap needs to be considered in order to calculate the logarithm.

By proposing to fully account for the problem of non-linearity in bound indicators, the methodology set out by Ferdi makes it possible to measure the relative performance of each country for each bound indicator. This helps improve the assessment of the MDGs and, in due course, of the SDGs, in order to better identify the determinants behind the progress observed, to better target development policy priorities, and to better define future goals.

An initial application to serve as an example.

To illustrate the method, we have applied it to a reassessment of progress against the MDGs. Focusing on eight indicators representative of the MDGs, we have evaluated the performance of each developing country and least developed country (LDC) over the period 1990–2012. Our analysis shows some very wide variations in performance between different countries and for different indicators. Asian countries, including all Asian LDCs, achieved the best overall performance, however. Conversely, the majority of LDCs that achieved below-average performance are to be found in Sub-Saharan Africa. Relatively speaking, LDCs performed better in the area of education than their initial levels might have suggested, but performed poorly with regard to poverty reduction.

Our results show that LDCs in Sub-Saharan Africa must receive particular attention, given their poorer performance in a number of sectors, particularly those associated with poverty. The results argue for focusing concessional resources in these countries, and some much-needed reflection on how to improve allocation, delivery and the priorities financed by aid.

A further paper will soon be published to estimate, for each country, the progress required to achieve the SDGs, in order to better identify the priorities of the new Agenda.

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