

## **Measuring the SDGs Progress with DEA**

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The synthesis report of the Secretary-General, entitled “The Road to Dignity by 2030” (§ 133) states: “Progress in sustainable development will depend on vibrant economies and inclusive growth to keep pace with growing populations and longer life expectancies, and to generate employment, wages, and revenues for social programmes. But for making our economies inclusive and sustainable, our understanding of economic performance, and our metrics for gauging it, must be broader, deeper and more precise.”

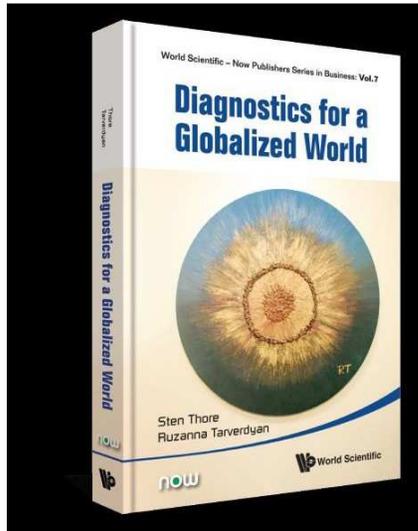
**Background:** Agenda 21, along with the of the UN Rio+20 outcome document “The future we want”, spell out the commitment of the international community towards the common cause of a sustainable future. Global deliberations on the post-2015 development agenda call for forging a political consensus to fight poverty, inequality, and hunger amongst other goals. The Secretary- General’s report, “A Life of Dignity for All,” provides a vision for bold action to achieve the MDGs and calls for a new and responsive sustainable development framework that meets the needs of both the people and the planet.

**Analytical challenges:** Good strategies for sustainable development integrate and balance multiple goals where possible, and provide trade-offs between its multiple dimensions where necessary. Past strategies have not always succeeded in this respect, even when sustainable development and

poverty reduction were the objectives of policy interventions. An integrated analysis and evaluation of trade-offs between policy goals involves a multiple-input and multiple-output framework. Existing metrics fail to adequately capture the multidimensional character of the development. Due to the non-commensurate nature of policy and performance variables and the absence of market prices reflecting social and environmental costs and benefits, traditional tools fail to adequately measure societal well-being and capture the progress beyond-GDP.

**Political Commitment:** There is a new consensus among major development stakeholders to move away from input-oriented impact monitoring to output and outcome- based approaches that help shift the emphasis of technical cooperation programs to development priorities and results and policy outcomes. The UN High-level Political Forum (HLPF) established in 2012 is mandated to provide political guidance on sustainable development and to strengthen the science-policy interface by enhancing evidence-based decision-making at all levels.

How do you gauge the accomplishments of policy and its failures? While a number of nations are successful in maximizing a socioeconomic welfare function, others are woefully falling short of the optimal frontier.



*Diagnostics for a Globalized World* proposes a reformulation of the inherited theory of economic and social policy (codified in the 1950s by Jan Tinbergen) to find a diagnostic tool in measuring the effectiveness of economic and social policy. Using a logarithmic adaptation of data envelopment analysis, the authors explain how to assess the progress of attainment of nations of multidimensional goals such as those expressed by the UN Millennium Development Goals (MDGs) and upcoming Sustainable Development Goals (SDGs).

**Composite indicators:** The UN secretary general backs the 17 goals and 169 targets

proposed by the UN working group with the launch of his synthesis report, *The Road to Dignity by 2030*. Despite the difficulty member states may have in communicating them, he has ruled out any immediate cut in the number. Single indices measuring multi-dimensional and complex phenomena, are popular amongst policy makers, because of their communication potential, but are often criticized on methodological and scientific grounds.

Principal component analysis combined with data envelopment analysis (PCA-DEA), has been applied to solve the problem of efficiency over-estimation through data aggregation. Using PCA-DEA, the authors solve the multi-dimensional problem of relative efficiency estimation and benchmarking, using small space analysis to present the issues graphically.

**A solution:** Considering the large number of SDGs and development targets, the accomplishments and failures of nations and their policy performance will always be multi-dimensional. Once we have agreed on a single measure of such progress, it becomes possible to document numerically how policymakers succeed (or fail) in achieving their goals and communicate them politically.

Data envelopment analysis (DEA), co-developed by Abraham Charnes and William Cooper in 1978, is ideally suited for the purpose, delivering a metric that evaluates the performance of Decision Making Units DMUs (nations, regions, cities, enterprises, banks, schools, etc.) according to their ability to use inputs, and marshal economic and social policy to attain a spectrum of desired goals. We propose a DEA framework to assess an empirical production function and to serve as an interactive-iterative policy evaluation system for monitoring the multi-dimensional



A framework to measure the relative socio-economic performance of developing countries

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ABSTRACT

This research develops a framework to estimate the relative efficiency of developing countries in utilizing both their domestic and external resources to achieve the Millennium Development Goals. The analysis highlights distinct efficiency differences across lending groups and geographic regions e.g. between Sub-Saharan Africa and Latin America. The performance of regions exposed to natural disasters and political violence need to be analyzed individually and risk management ought to be an integrated part of development policy. The gap between the Millennium Development Goals and human rights approaches is then examined. Finally, we qualify a country's performance level as potentially sustainable in terms of human, social and environmental welfare, in turn searching for realistic benchmarks and intermediate targets for the relatively inefficient countries. Principal component analysis in combination with data envelopment analysis was applied to solve the problem of efficiency overestimation with multi-dimensional scaling used to present the issue graphically. In summary, the aim of this work is not to rank countries in a league table rather to provide a framework that combines economic, environmental and social issues in order to search for sustainable, pragmatic benchmarks, pushing the boundaries of the Human Development Index.

progress various nations make towards achievement of the SDGs. The DEA scores:

- transcend the standard measures of economic, social, and environmental performance;
- can serve as the basis for comprehensive packages of policy advice for regional, industry, and global agendas.

#### **A PCA-DEA score to highlight effective SDG policies!**

**Added value:** The proposed framework draws on the concept of a frontier of optimal policy performance and is substantially more informative than existing ones. It enables an analysis of the current level of multiple dimensional development of a nation, achieved through the optimal use of available resources and can be used for the allocation of official development assistance (ODA) and other financial resources effectively and efficiently in order to support positive future trends toward meeting SDG targets. The derived scores are based on the estimates of relative values rather than a-priori impositions.

This iterative framework can incorporate expert opinion and additional preference information into the following phases of the analysis and would also enable the main development stakeholders to analyze different peer-country sub-group behaviours. The model results might provide an early warning signal about poor development trends and could serve as a basis for the development of an integrated package of policy advice helping to track progress towards selected policy goals.

The framework could also become a strategic means of institutional support to UN member states, contributing to the achievement of SDGs and ultimately ensuring a sustainable

future by improving global welfare using a statistical analysis of past trends as a base.

The Way Forward: Our empirical analysis reveals that most of the countries record a “sustainable development deficit” and derives numerical estimates of such deficits. The proposed framework can be used to deliver to the HLPF with the analytical underpinnings in order to take evidence-based policy decisions, ensuring policy coherence in a highly globalized world whilst accounting for sustainability too. It will contribute to ongoing UN efforts for implementation of the post-2015 Development Agenda toward harmonious convergence of the relationship between environmental protection, economic development, and social progress.

