THE SUSTAINABLE DEVELOPMENT GOALS PUSH: AN INTEGRATED APPROACH TO ACCELERATE THE SDGS

Framework on the Application of Macro-Micro Economic Models to SDG Push

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1. Introduction

In September 2015, all countries of the world agreed to work towards achieving a set of common goals that meet urgent global environmental, economic and political challenges by 2030, i.e. the United Nations (UN) Sustainable Development Goals (SDGs). The SDGs succeeded the Millennium Development Goals (MDGs) which ended in 2015.

The vision of the SDGs, or the UN's 2030 Agenda, is a world free of poverty and hunger, and where every country enjoys sustained and inclusive economic growth and decent work for all (United Nations, 2015). The SDGs are grounded in the Universal Declaration of Human Rights, the International Human Rights Treaties, the Millennium Declaration, and the 2005 World Summit Outcome and informed by the Declaration on the Right to Development (United Nations, 2015).

There are many pathways to reach the UN's 2030 Agenda ambition and the COVID-19 pandemic has spotlighted the urgency to act today. Navigating the unprecedented disruption caused by the health crisis and its cascade effects has proven incredibly complex. Today's decisions could take the world in very different directions, and the SDG regression we see already is profound but not random.

Economic simulation models are practical tools to support evidence-based planning and implementation of development strategies and programs. They establish a relationship between program inputs and its expected outputs and outcomes to facilitate the identification and prioritization of effective and efficient policies and investment areas.

The SDG Push combines microeconomic and macroeconomic models to simultaneously address several sustainable development goals and targets. The tool outlines a journey for which there are options and considerations specific to the context in which SDG accelerators are being identified. The tool will be carefully calibrated to each country's economic reality before exploring the possible and desired outcomes to be pursued under the SDG acceleration.

The SDG Push will be developed through a stakeholder-centred design approach prioritizing iterative testing and prototyping to create holistic and evidence-based diagnostic roadmap. This process will establish best-in-class approaches to connect analytical capabilities and modeling to assess context and develop options, with qualitative methods to evaluate the options against potential bottlenecks. The roadmaps developed will be country and context specific, building from countries' current development plans and priorities, serving to identify bold policy choices, needed investments and development pathways that can accelerate the most pressing SDGs in each country and support a fair, sustainable recovery from COVID-19. The initiative aims to build a diagnostic approach that creates evidence-based policy options and combines with systematic interrogation of feasibility to drive development impact in the decisive decade.

The remainder of the paper is structured as follows. The next section 2 provides an overview of the SDGs and identifies those of particular interest to the economic modeling. Then, the standard features of the macro and micro economic models are presented in section 3 and the modeling of SDG-related peculiarities are discussed in section 4. The latter also presents a reduced indicator framework including milestones to facilitate the tracking of progress towards the sustainable development targets. The status of countries with respect to the sustainable development goals and targets are assessed in section 5 which includes the evaluation of the likely impact of the COVID-19 pandemic on the SDGs achievement. Section 6 discusses the setting of milestones to SDG acceleration. National development strategies and policies are brought into the analytical framework in section 7 to create coherence between the national and international agendas. Section 8 presents and discusses the results of the prospective analyses under various scenarios, as well as the identification and prioritization of SDG accelerators. Finally, section 9 provides a synthesis of the key features of the SDG Push, i.e. model and data, and the requirements for a country-level implementation.

2. The Global Indicator Framework for Sustainable Development

The United Nations sustainable development agenda is translated into 17 goals (Box 1) among which 9 goals are covered by the macro-micro economic model described in the next section. Indicators defined under the remainders are not supported for projection by the analytical framework. The 9 goals listed below are then discussed further in the coming sections:

- End poverty in all its forms everywhere (Goal 1),
- End hunger, achieve food security and improved nutrition and promote sustainable agriculture (Goal 2),
- Achieve gender equality and empower all women and girls (Goal 5),
- Promote inclusive and sustainable economic growth, employment, and decent work for all (Goal 8),
- Build resilient infrastructure, promote sustainable industrialization, and foster innovation (Goal 9),
- Reduce inequality within and among countries (Goal 10),
- Ensure sustainable consumption and production patterns (Goal 12),
- Take urgent action to combat climate change and its impacts (Goal 13),
- Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development (Goal 17).

A global indicator framework for SDGs was developed by the Inter-Agency and Expert Group on SDG Indicators (IAEG-SDGs) to track the implement of the agenda across the world and to monitor progress towards the achievement of its goals. The IAEG-SDGs agreed upon the global indicator framework at the 48th session of the United Nations Statistical Commission held in March 2017. The framework was adopted by the General Assembly on 6 July 2017 with a provision for annual refinements and comprehensive reviews by the Statistical Commission at its 51st session in March 2020 and its 56th session, to be held in 2025. The global indicator framework is complemented by indicators at the regional and national levels, which are developed by Member States.

The global indicator framework includes 169 targets and 232 unique indicators. A total number of 247 indicators are listed in the framework but 12 indicators repeat under two or three different targets. The above 9 goals are translated into 60 targets and 93 indicators representing 36 and 40 percent of all SDGs targets and indicators respectively.[1] It is worth noting that not all 93 indicators are supported by the SDG Push. Indeed, many indicators are related to policies, institutions, and human and physical resources which outcomes are solely influenced by government unilateral and souverain decisions.[2]

[1] The SDG indicator framework includes 17 goals, 169 targets and 232 indicators. The full list is available at https://unstats.un.org/sdgs/indicators/Global%20Indicator%20Framework%20after%202021%20refinement_Eng.pdf

[2] Given the limitation of the proposed modeling approach to capture other SDG related indicators, it would be useful to consider complementary approaches to address this concern.

Box 1: The United Nations (UNs) Sustainable Development Goals (SDGs)

Goal 1. End poverty in all its forms everywhere

Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture

Goal 3. Ensure healthy lives and promote well-being for all at all ages

Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

Goal 5. Achieve gender equality and empower all women and girls

Goal 6. Ensure availability and sustainable management of water and sanitation for all

Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all

Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

Goal 10. Reduce inequality within and among countries

Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable

Goal 12. Ensure sustainable consumption and production patterns

Goal 13. Take urgent action to combat climate change and its impacts

Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development

Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

Goal 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels

Goal 17. Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development

Source: United Nations, Department of Economic and Social Affairs (2021)
https://unstats.un.org/sdgs/indicators/indicators-list

An effective indicator framework must include an adequate number of indicators at all levels of measurement along the results chain, i.e. input, output, and outcome levels. "A results chain is a diagram that depicts the assumed causal linkage between an intervention and desired impacts through a series of expected intermediate results" (Foundations of Success, 2009). Thus, a results chain is a useful tool of the theory of change that logically links inputs, outputs, and outcomes to a desired impact.

In general, input indicators refer to resources (financial, human, and physical) and to policies and institutions to be in placed to trigger the desired ripple effects. Policy and institutions can be seen as another level in the results chain (activity level) as they require actions to be taken that use inputs. However, effective policies are important to maximise the benefit of investments, as efficient institutions are necessary to implement effective policies. In that sense, policies, institutions, and investments can be seen as complementary in program design and implementation. The next level in the results chain is the output level which is a direct consequence of a set of activities implemented under a given program. Programs largely have control over delivering outputs, but not outcomes. Outcome results are broader and are achieved at the end or even after a programme. They contribute directly to the broader impact expected from a program. Outcome indicators and measurements are directly link to the achievement of the SDGs. The above discussion is illustrated by Figure 1, which displays SDG 2 indicators in a results chain presentation.

Figure 1: SDG 2 Indicators in a Results Chain Presentation

Source: Author using information from the United Nations, Department of Economic and Social Affairs (2021) https://unstats.un.org/sdgs/indicators/indicators-list.

The mapping of the SDGs indicators along the three levels of measurement of the results chain reveals that SDGs indicators are adequately spread across all levels of the results chain. Beyond the representation of indicators along the levels of the results chain, evidence of strong correlation between input, output, and outcome indicators is important to ensure an effective delivery on the SDGs. The SDGs input indicators cover a large range of areas including public expenditures and international financing, institutions and policies, and human and physical resources (Box 2). These areas are useful in guiding countries to identify and prioritize a set of policies and interventions to accelerate the delivery on SDGs.

Box 2: Selected SDGs Input Indicators

INSTITUTIONS AND POLICIES

- Number of countries that adopt and implement national disaster risk reduction strategies (1.5.3)
- Proportion of local governments that adopt and implement local disaster risk reduction strategies (1.5.4)
- Value of agricultural export subsidies (2.b.1)
- Whether or not legal frameworks are in place to promote, enforce and monitor equality and non-discrimination on the basis of sex (5.1.1)
- Number of countries with laws and regulations that guarantee full and equal access to women and men aged 15 years and older to sexual and reproductive health care, information and education (5.6.2)
- Proportion of total agricultural population with ownership or secure rights over agricultural land, by sex; and (b) share of women among owners or rights-bearers of agricultural land, by type of tenure (5.a.1)
- Proportion of countries where the legal framework (including customary law) guarantees women's equal rights to land ownership and/or control (5.a.2)
- Proportion of countries with systems to track and make public allocations for gender equality and women's empowerment (5.c.1)
- Level of national compliance with labour right (8.8.2)
- Existence of a developed and operationalized national strategy for youth employment (8.b.1)
- Proportion of small-scale industries with a loan or line of credit (9.3.2)
- Proportion of tariff lines applied to imports from least developed countries and developing countries with zero-tariff (10.a.1)
- Remittance costs as a proportion of the amount remitted (10.c.1)
- Number of countries that have implemented well-managed migration policies (10.7.2)
- Number of countries developing, adopting or implementing policy instruments aimed at supporting the shift to sustainable consumption and production (12.1.1)
- Degree of sustainable public procurement policies and action plan implementation (12.7.1)
- Implementation of standard accounting tools to monitor the economic and environmental aspects of tourism sustainability (12.b.1)
- Amount of fossil-fuel subsidies (production and consumption) per unit of GDP (12.c.1)

Source: United Nations, Department of Economic and Social Affairs (2021)
https://unstats.un.org/sdgs/indicators/indicators-list

Box 2: SDGs Input Indicators (Cont.)

INSTITUTIONS AND POLICIES (CONT.)

- Number of countries that adopt and implement national disaster risk reduction strategies in line with the Sendai Framework for Disaster Risk Reduction 2015–2030 (13.1.2)
- Proportion of local governments that adopt and implement local disaster risk reduction strategies in line with national disaster risk reduction strategies (13.1.3)
- Number of countries with nationally determined contributions, long-term strategies, national adaptation plans and adaptation communications, as reported to the secretariat of the United Nations Framework Convention on Climate Change (13.2.1)
- Number of least developed countries and small island developing States with nationally determined contributions, long-term strategies, national adaptation plans and adaptation communications, as reported to the secretariat of the United Nations Framework Convention on Climate Change (13.b.1)
- Number of countries that adopt and implement investment promotion regimes for developing countries, including the least developed countries (17.5.1)
- Number of countries with mechanisms in place to enhance policy coherence of sustainable development (17.14.1)
- Extent of use of country-owned results frameworks and planning tools by providers of development cooperation (17.15.1)
- Number of countries reporting progress in multistakeholder development effectiveness monitoring frameworks that support the achievement of the Sustainable Development Goals (17.16.1)
- Statistical capacity indicator for Sustainable Development Goal monitoring (17.18.1)
- Number of countries that have national statistical legislation that complies with the Fundamental Principles of Official Statistics (17.18.2)
- Number of countries with a national statistical plan that is fully funded and under implementation, by source of funding (17.18.3)

Source: United Nations, Department of Economic and Social Affairs (2021)
https://unstats.un.org/sdgs/indicators/indicators-list

Box 2: SDGs Input Indicators (Cont.)

PUBLIC EXPENDITURES AND INTERNATIONAL FINANCING

- Proportion of domestically generated resources allocated by the government directly to poverty reduction programmes (1.a.1)
- Proportion of total government spending on essential services - education, health, and social protection (1.a.2)
- Pro-poor public social spending (1.b.1)
- Agriculture orientation index for government expenditures (2.a.1)
- Research and development expenditure as a proportion of GDP (9.5.1)
- Amounts provided and mobilized in United States dollars per year in relation to the continued existing collective mobilization goal of the $100 billion commitment through to 2025 (13.a.1)
- Total official flows (official development assistance plus other official flows) to the agriculture sector (2.a.2)
- Aid for trade commitments and disbursements (8.a.1)
- Total official international support (official development assistance plus other official flows) to infrastructure (9.a.1)
- Total resource flows for development, by recipient and donor countries and type of flow (10.b.1)
- Total government revenue as a proportion of GDP, by source (17.1.1)
- Proportion of domestic budget funded by domestic taxes (17.1.2)
- Foreign direct investment, official development assistance and South-South cooperation as a proportion of gross national income (17.3.1)
- Volume of remittances (in United States dollars) as a proportion of total GDP (17.3.2)
- Debt service as a proportion of exports of goods and services (17.4.1)
- Total amount of funding for developing countries to promote the development, transfer, dissemination and diffusion of environmentally sound technologies (17.7.1)
- Dollar value of financial and technical assistance (including through North-South, South-South and triangular cooperation) committed to developing countries (17.9.1)
- Amount in United States dollars committed to public-private partnerships for infrastructure (17.17.1)
- Dollar value of all resources made available to strengthen statistical capacity in developing countries (17.19.1)

Source: United Nations, Department of Economic and Social Affairs (2021)
https://unstats.un.org/sdgs/indicators/indicators-list

Box 2: SDGs Input Indicators (Cont.)

HUMAN AND PHYSICAL RESOURCES

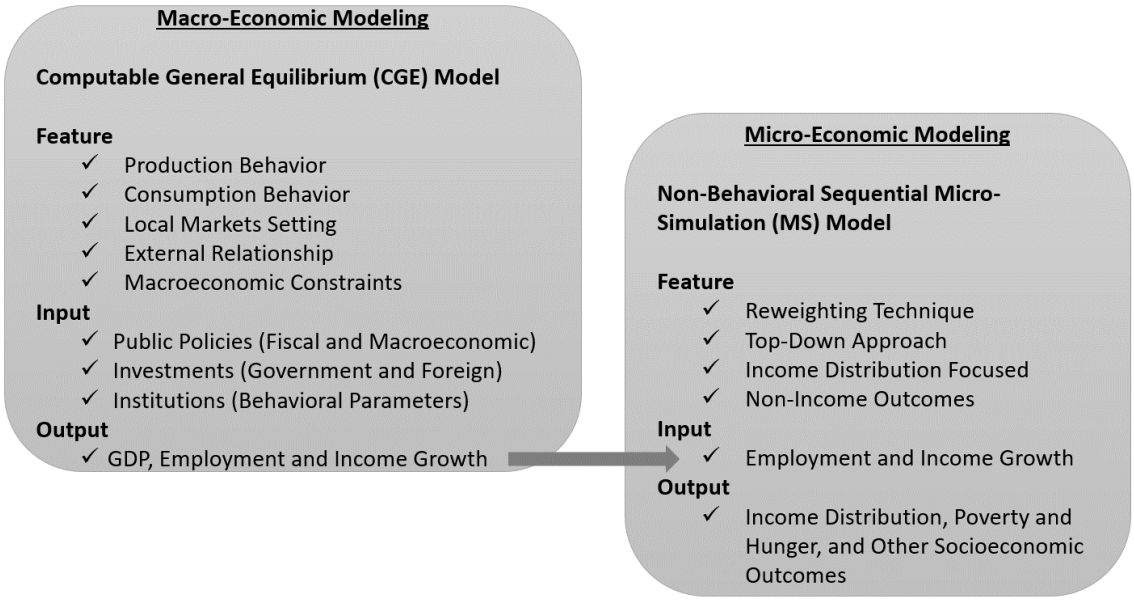
- Proportion of health facilities that have a core set of relevant essential medicines available and affordable on a sustainable basis (3.b.3)
- Proportion of schools with access to (a) electricity; (b) the Internet for pedagogical purposes; (c) computers for pedagogical purposes; (d) adapted infrastructure and materials for students with disabilities; (e) basic drinking water; (f) single-sex basic sanitation facilities; and (g) basic handwashing facilities (as per the WASH indicator definitions) (4.a.1)
- Proportion of individuals who own a mobile telephone (5.b.1)
- Number of researchers (in full-time equivalent) per million inhabitants (9.5.2)
- Proportion of population covered by a mobile network, by technology (9.c.1)

Source: United Nations, Department of Economic and Social Affairs (2021)
https://unstats.un.org/sdgs/indicators/indicators-list

3. The Micro-Macro Economic Modeling

The SDG Push combines a Computable General Equilibrium (CGE) model and a Micro-Simulation (MS) model to address several sustainable development goals and targets (Figure 2). The goals and targets related to income distribution, poverty and hunger, and other individual-level socioeconomic variables are addressed by the MS model. Issues related to public and private investments, income growth, employment, and external trade are addressed by the CGE model. The CGE and MS models communicate in a top-down fashion[3] through a set of interrelated variables. This section presents the standard features of the CGE and MS models, while the SDG-related peculiarities are discussed in the next section.

Figure 2: SDG Push Macro-Micro Economic Framework



Source: Author.

3.1 THE COMPUTABLE GENERAL EQUILIBRIUM MODEL

A Computable General Equilibrium (CGE) model is a numerical model that defines the behavior of and the interrelationship among the different actors of a national economy using a set of simultaneous non-linear equations. Most CGE models are rooted in the Walrasian small open economy framework. That is profit-maximizing producers and utility-maximizing consumers interact under a competitive domestic pricing system, while the economy is a price taker in world markets.

CGE models are used to estimate how economic actors react to changes in policies and shocks. They have been applied to a wide range of topics including international trade, fiscality, agriculture and food, and environmental and climate change.

The design of the SDGs acceleration CGE model follows the standard modeling approach which largely draws on Lofgren, Harris, and Robinson (2002) to which the reader may refer to for more details on model specifications. The following sections present briefly the key features of the model.

3 The output from the CGE model is used as an input by the MS model.

FIRMS

Firms' production decisions are driven by the maximization of profit. An industry production displays a multi-layered combination of factors and input using a Constant Elasticity of Substitution (CES) function. The output of an activity is obtained from value-added and aggregate intermediate consumption in the first level. The value-added aggregates agricultural land and efficient labor in the second level. Also, intermediate goods and services are combined into aggregate intermediate consumption in this level. Then, the efficient labor combines aggregate labor and capital in the third level. While there is one homogenous category of capital, various categories of labor are combined into an aggregate labor in the fourth level. As part of its profit-maximizing decision, each industry representative firm uses a set of factors up to the point where the marginal revenue equals the marginal cost.

HOUSEHOLDS

Households receive income from the factors of production (directly or indirectly via the firms) and transfers from other institutional units (i.e., other households, firms, government, and the rest of the world). Households use their income to pay direct taxes, save, consume, and make transfers to other institutions. Household consumption covers marketed commodities, purchased at market prices that include commodity taxes and transaction costs, and self-produced commodities which are valued at their opportunity cost, i.e. market prices. Consumption decisions are made according to an extended linear expenditure system (ELES) demand function derived from maximizing a Stone-Geary utility function with an endogenous saving behavior.

GOVERNMENT

Government collects taxes and receives transfers from other institutions. All taxes are at fixed ad valorem rates. The government uses this income to purchase commodities for its consumption and for transfers to other institutions. Government consumption and transfer expenditures are fixed and indexed to the average change in consumer prices (i.e., Consumer Price Index or CPI). Government savings - i.e. the difference between government income and spending - is a flexible residual.

REST OF THE WORLD

Domestic output is allocated between exports and domestic markets on the assumption that suppliers maximize sale revenues for any given output level, subject to imperfect transformability between exports and domestic sales, expressed by a Constant Elasticity of Transformation (CET) function. In the international markets, export demands are infinitely elastic at given world prices. The price received by domestic suppliers for exports is expressed in domestic currency and adjusted for the transaction costs (to the border) and export taxes (if any). The supply price for domestic sales is equal to the price paid by domestic demanders minus the transaction costs of domestic marketing (from the supplier to the demander) per unit of domestic sales. If the commodity is not exported, total output is passed to the domestic market.

Domestic demand is made up of the sum of demands for household final consumption, government final consumption, investment, and intermediate consumption including trade and transportation services (transactions cost). To the extent that a commodity is imported, all domestic market demands for a composite commodity are made up of imports and domestic output, the demands for which are derived on the assumption that domestic demanders minimize cost subject to imperfect substitutability. This is captured by a CES aggregation function. The derived demands for imported commodities are met by international supplies that are infinitely elastic at given world prices. The import prices paid by domestic demanders include import tariffs (at fixed ad valorem rates) and the cost of a fixed quantity of transactions services per import unit, covering the cost of moving the commodity from the border to the demander. Similarly, the derived demand for domestic output is met by domestic suppliers. The prices paid by the demanders include the cost of transactions services, in this case reflecting that the commodity was moved from the domestic

supplier to the domestic demander. The prices received by domestic suppliers are net of these transaction costs. Total market demand is directed to imports for commodities that lack domestic production and to domestic output for non-imported commodities.

MACROECONOMIC CONSTRAINTS

The equations also include a set of constraints that must be satisfied by the system and imposed to individual actors. These constraints cover markets (commodities and factors) and macroeconomic aggregates (balances for government, the current account of the rest of the world, and savings-and-investment). Flexible relative prices equilibrate demands and supplies of domestically marketed output. Several segments of the labor market are defined and assumed to be running in an imperfect competition setting. Government savings (the difference between current government revenues and current government expenditures) is a flexible residual while all tax rates are fixed. The real exchange rate is flexible while foreign savings (the current account deficit or the difference between foreign currency spending and receipts) is fixed. Investment is savings-driven in the sense that it is determined by the sum of private (households and firms), public (government), and foreign (rest of the world) savings.

DYNAMIC SETTING

The model is recursive dynamic involving several periods. However, consumers and producers take a one-period utility-maximization and profit-maximization decisions respectively, i.e. a "myopic" decision making. The consequences of their decisions in one period are translated into the next period mainly through savings and capital accumulation. The standard capital accumulation formula is used, i.e. savings increase the existing capital stock net of depreciation. The allocation of new investment by sector is influenced by the cost and return on capital specific to the sector (Junk and Torbecke, 2001). Other production factors, i.e. agricultural land and various categories of labor, are set to grow at a fix rate from one period to another. Incompressible private final consumption and public final consumption also grow at an exogenous rate.

DATA

CGE models use actual economic data provided by a Social Accounting Matrix (SAM). The latter is "a comprehensive, flexible, and disaggregated framework that elaborates and articulates the generation of income by activities of production and the distribution and redistribution of income between social and institutional groups" (Round, 2003). Data used to build a SAM come from different sources, including national accounts, surveys, government financial accounts, international trade data, etc. The primary source of information for a SAM, i.e. the national account tables, are generally prepared every five years or more. Therefore, it is possible to update an existing SAM using the most recent data available, where a new SAM cannot be constructed. Technical discussions on SAM updating are provided by Robinson et al. (2000), and Lemelin, Fofana, and Cockburn (2013).

THE MICRO-SIMULATION MODEL

Micro-Simulation (MS) models deal with the economic decisions and actions of economic agents in reaction to policy shocks. They integrate the heterogeneous behavior of individuals and firms while accounting for the aggregate costs and benefits of interventions or shocks (Bourguignon and Spadaro, 2006). There is a growing interest to combine CGE and MS models to assessing the effectiveness of pro-poor macroeconomic policies. CGE models address macro and sectoral issues such as growth, employment, and earnings. However, they do not capture issues related to income distribution, inequality, and poverty as do MS models. The latter focus on individual and firm levels distributive effects but fail to capture the general equilibrium effects, and macroeconomic and sectoral issues of policies and shocks. For these reasons, there is interest of linking CGE and MS models within the scientific community. CGE-MS analysis can be conducted in many

ways and the choice among the available approaches depends on data availability, the research question and time constraints (Cockburn, Savard, and Tiberti 2014).

Considering the type of linkage between the two models, CGE-MS models are grouped into integrated approach and layered approach. CGE-MS models can also be grouped into behavioral approach and non-behavioral approach according to the integration of individual and household reactions to policy shocks. Most CGE-MS models are linked in a layered or sequential manner. In this category, the MS model includes microeconomic behavior in the "Top-Down Behavioral" approach (e.g. Bourguignon, Robilliard, and Robinson; 2005), the "Bottom-Up Behavioral" approach (e.g. Boeters, Feil, and Gürtzgen; 2005), and the "Iterative" approach (e.g. Savard, 2010). The MS model does not include microeconomic behavior in the "Micro-accounting" approach (e.g. Ravallion and Lokshin, 2004), the "Reweighting" approach (e.g. Ferreira and Horridge, 2006), and the "Non-Parametric" approach (e.g. Vos and Sanchez, 2010).

The proposed Macro-Micro framework builds on the flexibility of the reweighting technique to address several SDGs. The reweighting approach consists in altering the sample weights in the MS model to reproduce changes in employment and earnings from the CGE model, and other population variables. The new weights are generated in such a way that new aggregate values of the population for selected variables are reproduced with minimal adjustments to the original weights. In other words, the approach minimizes the distance between new and old weights subject to a set of constraints on aggregate values. Thus, shocks are generated by the CGE model and transmitted to the MS model. Consistency between the two models is created by adjusting the household weights. The CGE and MS models are linked through several variables available in both models - e.g. employment by region, skill level, gender, and age group. The approach can project population dynamic for several groups of the population - i.e. region, gender, age, etc. Comparing the behavioral and the reweighting microsimulation approaches, Herault (2010) concludes that the two approaches delivered similar results when applied to the issue of trade liberalization in South Africa.

4. Modeling the Sustainable Development Goals

This section describes how the analytical framework is used to assess progress towards the 2030 Agenda of the United Nations. In other words, how the macro-micro model addresses several SDG result areas and indicators. Finally, the section recommends a reduced results framework (Table 1) to be used in assessing countries' status and conducting the prospective analysis of SDGs.

The SDG Push tool covers 9 out 17 goals including 42 out of 93 SDG indicators. It is worth noting once again that many indicators are related to policies and institutions, and human and physical resources, and social and cultural norms which outcomes are solely influenced by government unilateral and souverain decisions. Thus, several of these indicators are not captured at this stage of development of the macro-micro framework.

4.1 END POVERTY IN ALL ITS FORMS EVERYWHERE (GOAL 1)

The goal of ending poverty is monitored trough 13 indicators (annexed Table A.1). However, the macro-micro model captures 5 out of the 13 indicators. The remaining indicators are not supported by the proposed framework.

Poverty is measured at the individual level and use micro level information, i.e. nationally representative survey data. Thus, the goal of ending poverty is directly assessed using the MS model. The poverty measurement uses the money metric approach of Foster, Greer and Thorbecke (1984) and refers to the poverty headcount index which measures the proportion of the population under a given poverty line. The international and national poverty lines are used to measure the poverty headcount index related to *indicators 1.1.1 and 1.2.1* respectively (Table 1).

Although, poverty is often defined by one-dimensional measure, i.e. the monetary metric measure, it has multiple dimensions. The multidimensional measure of poverty incorporates a range of indicators in the context of education, health, and living standards. Monetary and non-monetary measures of poverty do not perfectly overlap. Thus, both monetary and non-monetary measures of poverty are useful to inform and guide pro-poor policies. Depending on the coverage of the country data, various indicators can be selected to monitor progress towards SDG Targets 1.2 and *indicator 1.2.2* (Table 1). A stepwise procedure is adopted to conduct the assessment:

- Step 1: The status of individuals with respect to the relevant indicators (1.1.1, 1.2.1 and 1.2.2) is assessed using the micro data, and an estimate is generated for the entire population.
- Step 2: A projection of these indicators is provided for the population under various scenarios of income growth and distribution using the CGE and MS models.
- Step 3: The estimated and simulated values for the population are compared to the targets set for these indicators to assess progress towards SDG 1.

Poverty is associated with income growth and its distribution across the population. Thus, income inequality is an important determinant of poverty results. The MS model captures changes in income distribution and inequality measures across the population. The income growth milestone is necessary but not sufficient to achieve the poverty goals (Fofana et al., 2019). Thus, income redistribution trough social protection schemes become a complementary strategy to the income growth strategy. Under the SDG Push scenario, social protection (*Indicator 1.3.1*) needs to be expanded across the population to achieving the goal of ending poverty by 2030.

Furthermore, the MS model provides an estimate of the cost implication of expanding the social protection scheme to meet the poverty reduction target. The CGE model captures public investments and its allocation across the economic sectors, including the social services such as education and health. Thus, the proportion

of total government spending on essential services including education, health, and social protection (*Indicator 1.a.2*) is tracked through both the macro and micro models.

4.2 END HUNGER, ACHIEVE FOOD SECURITY AND IMPROVED NUTRITION AND PROMOTE SUSTAINABLE AGRICULTURE (GOAL 2)

The macro-micro model addresses 1o out of the 13 indicators defined under the SDG 2 (annexed Table A.2). Like poverty measurements, hunger, food security and nutrition measurements are performed at individual level using a micro data. Thus, several indicators under this goal are assessed by the Micro-Simulation (MS) model. These indicators include: *the prevalence of undernourishment (2.1.1)*, *the prevalence of food insecurity (2.1.2)*, *the prevalence of childhood stunting (2.2.1)*, and *the prevalence of childhood malnutrition (2.2.1)*. Like poverty indicators, the assessment is conducted in three steps: first, the status of individuals with respect to the above four SDG 2 indicators is assessed using the micro data and an estimate is generated for the entire population. Then, a projection of these indicators is provided for the population under various scenarios of income growth and distribution using both the CGE and MS models. Finally, estimated and simulated values for the population are compared to the targets set for the indicators to assess progress towards SDG 2.

Income of small-scale food producers (2.3.2) is another indicator related to SDG 2 that is tracked by the MS model. Once the status of small-scale food producers is assigned to individual agricultural and food producers, changes in their income level is assessed using the CGE and the MS model. The two models must include detailed information on earnings, by category of production factor (i.e. land, capital, and labor) and by type of industry, including agricultural and food industries. This is necessary to capture the heterogeneity in income distribution and to adequately analyse the income of small-scale food producers.

Several other indicators under Goal 2 are addressed by the CGE model, including *the productivity of food producers (2.3.1)*, *the agriculture orientation index (2.a.1)*, *the official flows to agriculture (2.a.2)*, *the agricultural export subsidies (2.b.1)*, and *the food price anomalies (2.c.1)* (Table 1).

Like agricultural value added, the CGE model directly specifies the number of workers by industry, including the agricultural sector, to facilitate the analysis of the productivity of food producers (2.3.1). Thus, industry-specific average wage levels are introduced to reflect productivity differences among industries. Sector-specific wage differentials have been introduced by several authors including Krueger and Summers (1987, 1988).

The specification of public investment and its allocation to various industries and sectors of the economy help to compute the *Agriculture Orientation Index (AOI) indicator (2.a.1)*. Various financing mechanisms to the increase in public expenditures or investments are captured by the macro model, including the external channel. Combining the increase in external financing and public agricultural expenditure allows to capture the indicator related to *the official flows to agriculture (2.a.2)*.

Like export taxes, export subsidies are captured in the standard CGE framework to address the indicator related to the removal of all *agricultural export subsidies (2.b.1)*.

Results from the CGE simulations can contribute to monitor progress on the *food price volatility index*. The framework captures the average changes in food prices relative to the average economywide prices. Indeed, the CGE framework only solves for relative prices. In other words, decisions are influenced by relative prices and not absolute prices (i.e. there is no money illusion). Food price volatility can have multiple sources including local market dysfunction, external market disruptions, or monetary and fiscal policy mismanagement. Thus, the monitoring of the food price volatility through the CGE model includes only the first two sources, i.e. local market dysfunction, and external market disruptions.

4.3 ACHIEVE GENDER EQUALITY AND EMPOWER ALL WOMEN AND GIRLS (GOAL 5)

The goal of gender equality and empower all women and girls is assessed through 14 indicators (annexed Table A.3). Most indicators related to this goal fall into the categories of social and cultural norms, policies and institutional framework, and access to resources. The SDG Push captures 2 of the 14 indicators, i.e. *the proportion of time spent on unpaid domestic and care work (5.4.1)* and *the proportion of individuals who own a mobile telephone (5.b.1)*.

The proportion of individuals who own a mobile telephone (5.b.1) is analysed by both the CGE and MS models. First, the status of an individual is assessed using the micro data and the proportion of women and men with access to mobile phone is generated. Second, the prospect of gender earnings is generated by the CGE model and fit into the MS model to assess progress on indicator 5.b.1. Unlike many other resources, access to mobile phone is not supply-side binding. Thus, gender earnings are key determinants of mobile phone accessibility. The next section describes the gender dimension of the CGE model and its extension to include male and female unpaid domestic and care time along side with the market time to assess progress on indicator 5.4.1.

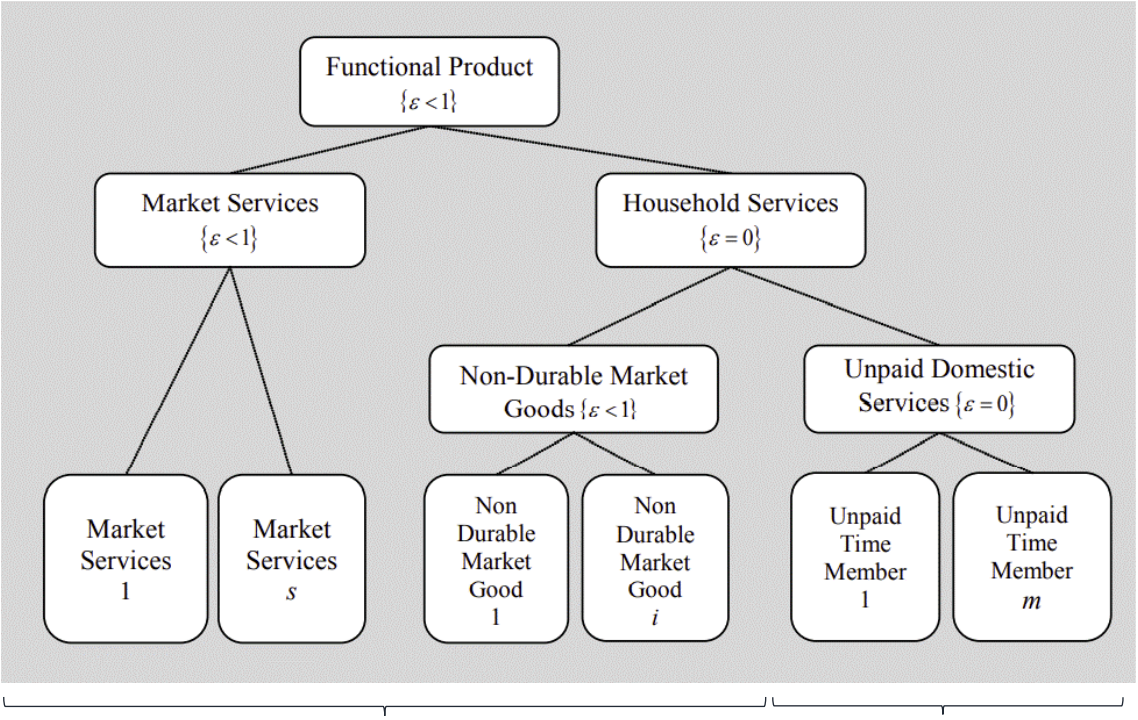
MODELING GENDER AND UNPAID ACTIVITIES

While education and experience are important determinants of earnings, other factors such as discrimination by gender are often associated with large wage differentials. Consequently, the CGE model splits up the various categories of workers by sex (i.e. male and female) and segments the labor markets accordingly. Each segment is imperfectly competitive and gender wage rates and unemployment rates are interrelated through a wage curve (Blanchflower, and Oswald, 1995). The demand for male and female market time is determined by industries, while the supply decision is made by households. Male and female workers are perfectly mobile across industries, and they imperfectly substitute in the industry's production technology. On the other hand, male and female labor supply responses to shocks are closely related to their involvement in home production activities.

Time allocation theory, as developed originally by Becker (1965), is exploited throughout the concept of basic good. This approach combines market goods and services with unpaid domestic time of men and women to generate basic good. The concept of basic good follows the functional nomenclature of the 1993 System of National Accounts (SNA) in which market goods and services contribute to realize various functions at the household level including food, housing, clothing, health, education, recreation, culture and sport, transport, and so forth. The approach considers the total cost of consumption by accounting for both market and nonmarket resources. In general, nonmarket activities are not measured by the statistics and are not suited for an industry approach analysis. Consequently, the functional approach makes it possible to integrate them into the traditional economic analysis.

A unitary household maximizes its welfare throughout the consumption of functional products and leisure time subject to a full income constraint. Functional goods are produced and consumed within the household. Thus, they are not traded in commodity markets. The production of functional goods by the household is a multi-level nested aggregation of household unpaid services and market products as depicted by Figure 3.

Figure 3: Structure of Production of Functional Products



Source: Fofana et al. (2012)

4.4 PROMOTE INCLUSIVE AND SUSTAINABLE ECONOMIC GROWTH, EMPLOYMENT AND DECENT WORK FOR ALL (GOAL 8)

The SDG 8 is tracked through 16 indicators (annexed Table 4) with half related to policies, institutions, practices and commitments, and are not addressed by the macro-micro framework. The other half (8 indicators) is included in the modeling framework to assess progress on SDG 8. The next section presents and discusses the latter indicators which are primarily related to economic output and employment.

MODELING ECONOMIC GROWTH

The goal to promote inclusive and sustainable economic growth is partially captured by three indicators: *GDP per capita growth rate (8.1.1)*, *GDP growth rate per employed person (8.2.1)*, *and Tourism contribution to GDP (8.9.1)*. The sequential dynamic CGE model addresses the issue of economic growth in a setting where consumers and producers are myopic optimizers. The multiple static models are linked through a dynamic of economic variables on the supply side (labor, agricultural land, and private capital stock) and on the demand side (government final consumption expenditure, household minimum consumption, and dividend distribution).

On the supply side, private capital stock increases with private investment net of capital depreciation. Agricultural land is activity-specific in the short-run and extends in the mid- and long-run according to the return to agricultural land and the land price elasticity. The growth rates of labor supply are set exogenously while labor demand is determined by the model (endogenous). Different supply growth rates are defined for various categories of labor based on their historical trends. Urban and rural migration is implicitly captured by defining different supply growth rates for urban and rural laborers.

On the demand side, household minimum final consumption is updated between periods using the growth rates of various categories of household. Government final consumption expenditure per capita is kept constant in real term as the modeling framework does not directly capture the implications of changes in government current expenditures on individuals' well-being. Dividends are distributed to investors (i.e. households, government, and the rest of the world) according to their initial investment shares. The latter are adjusted between periods using within-period savings. Households and firms save fixed proportions of their income. Government saving is residual after accounting for spending on goods and services for final consumption, and on transfers to other agents. Foreign saving is kept fixed as a ratio of the economywide GDP.

Thus, the framework allows the computation of the economywide GDP as well as industries' GDP including the accommodation and food services industries. The latter is used to measure the tourism contribution to GDP (*indicator 8.9.1*).

MODELING LABOR MARKET AND EMPLOYMENT

The model features several categories of worker and labor market segments to capture various employment indicators (annexed Table A.4). Workers are split up according to different criteria, including work status and age group. Indeed, the modeling framework separates salary and wage workers from self-employed workers. As the latter are likely to be involved in informal activities, the self-employment information is used to assess *employment in the informal economy as a percentage of total non-agricultural employment (indicator 8.3.1)*. Moreover, workers are split up in three age groups, i.e. child (5-17 years old), youth (18- to 29 years old), and adult (30 years old and above), to facilitate the projection of indicators related to *child labor (indicator 8.7.1)* and *youth employment (indicator 8.6.1)*.

The treatment of the labor markets reflects empirical evidence advanced by Blanchflower and Oswald (1995). Thus, an imperfect labor market is implemented through a wage curve specification. The wage curve depicts a negative relationship between the levels of unemployment and the real wage rates. Changes in the economywide unemployment rate aggregate the changes in unemployment rates from various labor categories to assess progress towards the *unemployment indicator (8.5.2)*.

Hourly earning (indicator 8.5.1) is computed by dividing total employment earnings and total number of hours worked by salary and wage workers. The total number of hours worked sums up the number of hours worked in each industry. The latter is equal to the industry-specific average hour worked times the number of workers in the industry.

4.5 BUILD RESILIENT INFRASTRUCTURE, PROMOTE SUSTAINABLE INDUSTRIALIZATION AND FOSTER INNOVATION (GOAL 9)

The SDG Push can capture 6 out of 12 indicators related to SDG 9 (annexed Table 5) when the required data are accessed. *Manufacturing sector contribution (9.2.1)* and *manufacturing employment share (9.2.2)* are assessed by the standard CGE model. When data on small-scall industries and medium and high-tech industry are accessible, the Social Accounting Matrix (SAM) can be disaggregated to include these categories to assess progress on the *proportion of small-scale industries in total industry value added (indicators 9.3.1)* and the *proportion of medium and high-tech industry value added in total value added (indicator 9.b.1)*. Data on industries' Carbon Emission Intensity (CEI) are used to assess progress on *the CO2 emissions per unit of value added (indicator 9.4.1)* under various scenario, including the SDG Push scenario.

On the other hand, *the accessibility to mobile phone and Internet (indicator 9.c.1)* is assessed by the MS model assuming that the outcome of this indicator is closely related to income growth and its distribution across the population. Income growth is assessed by the CGE model for various categories of households and transmitted to the MS model. The latter computes the income distribution among the population through the reweighting approach affecting the accessibility to mobile phone and Internet across the population.

4.6 REDUCE INEQUALITY WITHIN AND AMONG COUNTRIES (GOAL 10)

The goal of reducing inequality within and among countries is translated into 13 indicators (annexed Table A.6). Most indicators in this category are related to policies, institutions, and practices which outcomes dependent solely on governments' unilateral and souverain decisions. However, the SDG Push framework includes 3 out of the 13 indicators to assess progress towards SDG 10 including *the growth rates of household expenditure or income per capita among the bottom 40 per cent of the population and the total population (10.1.1)*, *the proportion of people living below 50 per cent of median income (10.2.1)*, and *the labour share of GDP (10.4.1)*. The CGE setting directly captures the first and third indicators while the second indicator is assessed by the MS model.

MODELING INCOME GROWTH AND DISTRIBUTION

Income growth and distribution is closely related to factors' endowment and their economic rewards. The CGE model includes various categories of factor and household to better capture the income distribution across the population. The categories of factor include agricultural land, other capital, and several types of labor. The latter are distinguished by residential area (urban and rural), age group (child, youth, adult), employment status (wage/salary and self-employed), skill category (skilled and unskilled) and gender (male and female). Households are split up by residential area (urban and rural), and by final consumption expenditure decile in each residential area. This categorisation allows the measurement of income growth and distribution across the decile categories and to facilitate the assessment of progress towards the target of indicator 10.1.1.

The CGE and MS models are linked through the earnings of various representative household categories and factor types. The MS model further distributes the revenue generated in the CGE model among individual households and individuals and allows an assessment of progress toward the target of indicator 10.2.1.

4.7 ENSURE SUSTAINABLE CONSUMPTION AND PRODUCTION PATTERNS (GOAL 12)

The SDG 12 is translated into 11 indicators (annexed Table 7). However, only the indicator related to fossil-fuel subsidies (12.c.1) is addressed by the macro-micro model. Fossil-fuel taxes and subsidies are expressed at fixed ad valorem rates in the standard CGE setting. On the production side, commodity basic prices are adjusted by production taxes and subsidies to generate producer prices. On the consumption side, commodity basic prices are adjusted by taxes, subsidies, and transaction costs to generate commodity market prices. The total amount of fossil-fuel subsidies adds up subsidies from both the production and consumption sides. The among is normalised by the level of GDP and the total national expenditure on fossil fuels to facilitate comparability across countries.

4.8 TAKE URGENT ACTION TO COMBAT CLIMATE CHANGE AND ITS IMPACTS (GOAL 13)

The global indicator framework uses 5 indicators to track progress towards SDG 13 (annexed Table A.8). Most of these indicators are related to policy measures that countries must put in place to combat climate change as well as the accompanying resources to support their implementation. The indicator related to CO2 emissions per unit of value added (indicator 13.2.2) is shared with SDG 9. Like for SDG 9, data on industries' Carbon Emission Intensity (CEI) are used to assess progress towards the target of SDG 13 under various scenario. Finally, the macro-micro model assesses 1 out of 5 indicators related to SDG 13 (Table 1).

4.9 STRENGTHEN THE MEANS OF IMPLEMENTATION AND REVITALIZE THE GLOBAL PARTNERSHIP FOR SUSTAINABLE DEVELOPMENT (GOAL 17).

SDG 17 aims at supporting the implementation and facilitating the monitoring of the 2030 Agenda of the United Nations. It is translated into 24 indicators which are related to financial and physical resources, and policies and institutions, including countries' statistical capacity and readiness (annexed Table A.9). The SDG Push captures 6 indicators related to financial and physical resources (Table 1), including *the total government revenue as a proportion of GDP (17.1.1)*, *the proportion of domestic budget funded by domestic taxes (17.1.2), foreign direct investment and official development assistance as a proportion of total domestic budget (17.3.1), the volume of remittances as a proportion of total GDP (17.3.2), the proportion of individuals using the Internet (17.8.1),* and *the macroeconomic dashboard (17.13.1)*.

The indicator related to access to Internet (17.8.1) is shared with SDG 9 and assessed by the MS model as discussed earlier. Several variables can be included in the macroeconomic dashboard. Roser and Ortiz-Ospina (2018) suggest that the following indicators should be tracked under the macroeconomic dashboard for cross-country comparability: the annual inflation of consumer prices, the gross public sector debt as a proportion of GDP, and the merchandise trade as a proportion of GDP. However, the macro-micro model only captures the trade openness indicator. The framework also captures total government revenue, domestic tax revenues, foreign direct investment, official development assistance, and remittances to facilitate the projection and assessment of indicators 17.1.1, 17.1.2, 17.3.1, and 17.3.2. Although many of the variables used to compute the later indicators are exogenous in the standard CGE setting, they belong to the input level variables in the results chain and, therefore, are subject to simulation shocks under the various scenarios.

A GAMS-based CGE model was developed and used to assess strategies for achieving the Millennium Development Goals (MDGs) in developing countries. The tool known as Maquette for MDG Simulations (MAMS) was co-developed by United Nations Department of Economic and Social Affairs (UN/DESA), United Nations Economic Commission for Latin America and the Caribbean (UN/ECLAC), United Nations Development Programme (UNDP), and the World Bank in late 2000 (Lofgren and Diaz-Bollina, 2010). MAMS was applied in several developing countries and lessons from these experiences would considerably benefit and improve the proposed SDG Push, particularly at the implementation stage which is country driven. When necessary, i.e. expressed by a country, complementary approaches, such as MAMS, would be useful to address SDGs not captured - or not sufficiently captured - by the framework.

Table 1: SDG Push Result Framework

Indicator	Metric	Target	Milestone, Cumulative 2015-2019	Milestone, Cumulative 2015-2021
End poverty in all its forms everywhere (Goal 1)				
Eradicate extreme poverty (1.1.1)	Share of individuals living below the 'International Poverty Line' of 1.90 international-$ per day.	By 2030 eradicate extreme poverty for all people everywhere, currently measured as people living on less than $1.90 a day	- 26.7%	- 40.0%
Halve population below national poverty line (1.2.1)	Percentage of the population living below the national poverty lines.	By 2030 reduce at least by half the proportion of population living in poverty in all its dimensions according to national definitions	- 13.3%	- 20.0%
Population in poverty according to national definitions (1.2.2)	Proportion of people who are poor according to the Multidimensional Poverty Index (MPI). The MPI weights ten indicators of deprivation in the context of education, health and living standards. Individuals are considered poor if deprived in at least one third of the weighted indicators	By 2030 reduce at least by half the proportion of population living in poverty in all its dimensions according to national definitions	- 13.3%	- 20.0%
Population covered by social protection floors / systems (1.3.1)	The percentage of the population participating in programs that provide old age contributory pensions (including survivors and disability) and social security and health insurance benefits (including occupational injury benefits, paid sick leave, maternity and other social insurance).	By 2030 achieve substantial coverage of the poor and the vulnerable	>	>
Government spending on essential services (1.a.2)	Proportion of total government spending on essential services (education, health, and social protection).	By 2030 Ensure significant mobilization of resources to implement programmes and policies to end poverty in all its dimensions	>	>

Source: United Nations, Department of Economic and Social Affairs (2021)
https://unstats.un.org/sdgs/indicators/indicators-list

Table 1: SDG Push Result Framework (Cont.)

Indicator	Metric	Target	Milestone, Cumulative 2015-2019	Milestone, Cumulative 2015-2021
End hunger, achieve food security and improved nutrition and promote sustainable agriculture (Goal 2)				
Prevalence of undernourishment (2.1.1)	Energy intake lower than an individual's requirements, taking into account their age, gender, height, weight and activity levels	End hunger by 2030, i.e. eliminate undernourishment for all	- 26.7%	- 40.0%
Prevalence of food insecurity (2.1.2)	Food Insecurity Experience Scale (FIES); Moderate food insecurity is generally associated with the inability to regularly eat healthy, nutritious diets. Severe food insecurity is more strongly related to insufficient quantity of food (energy)	Achieve food security by 2030, i.e. ending moderate and severe food insecurity for all	- 26.7%	- 40.0%
Prevalence of childhood stunting (2.2.1)	Being less than two standard deviations below the median height for age	By 2030 end all forms of malnutrition	- 26.7%	- 40.0%
Prevalence of childhood malnutrition - wasting or overweight (2.2.2)	Weight less than two standard deviations below the median for their height	By 2030 end all forms of malnutrition	- 26.7%	- 40.0%
Production per labour unit (2.3.1)	Ratio between value added in agriculture (constant 2010 US$) and number of people employed in agriculture	By 2030 double the average productivity of food producers	26.7%	40.0%
Income of small-scale food producers (2.3.2)	Average income of small-scale food producers	By 2030 double the average income of small-scale food producers	26.7%	40.0%
Agriculture orientation index (2.a.1)	Agriculture share of government expenditures, divided by the agriculture share of GDP	By 2030 Increase investment to enhance agricultural productive capacity	>	>
Official flows to agriculture (2.a.2)	Total development assistance for agriculture received by a given country each year	By 2030 Increase investment to enhance agricultural productive capacity	>	>
Agricultural export subsidies (2.b.1)	Value of agricultural export subsidies	Elimination of agricultural export subsidies by 2030	- 26.7%	- 40.0%
Food price anomalies (2.c.1)	Domestic food price volatility index, i.e. weighted-average of a basket of	By 2030 adopt measures to help limit extreme food price volatility	<	<

	commodities based on consumer or market prices.			

Source: United Nations, Department of Economic and Social Affairs (2021)
https://unstats.un.org/sdgs/indicators/indicators-list

Table 1: SDG Push Result Framework (Cont.)

Indicator	Metric	Target	Milestone, Cumulative 2015-2019	Milestone, Cumulative 2015-2021
Achieve gender equality and empower all women and girls (Goal 5)				
Time spent on unpaid domestic and care work (5.4.1)	Average daily number of hours spent on paid and unpaid domestic work combined (total work burden). The average is taken with respect to the entire relevant population, including those who devote no time to domestic work.	By 2030 recognize and value unpaid care and domestic work, and promote shared responsibility within the household and family	<	<
Mobile telephone ownership (5.b.1)	Proportion of individuals who own a mobile telephone, by sex	By 2030 enhance the use of enabling technology, in particular information and communications technology, to promote the empowerment of women	>	>
Promote inclusive and sustainable economic growth, employment and decent work for all (Goal 8)				
GDP per capita growth rate (8.1.1)	Annual percentage growth rate of GDP per capita based on constant local currency	At least 7 per cent gross domestic product growth per annum in the least developed countries through 2030	7% (1)	7% (1)
GDP growth rate per employed person (8.2.1)	Annual change in real gross domestic product (GDP) per employed person.	Achieve higher levels of economic productivity by 2030	>	>
Informal employment (8.3.1)	Employment in the informal economy as a percentage of total non-agricultural employment. This includes all jobs in unregistered and/or small-scale private unincorporated enterprises that produce goods or services meant for sale or barter	Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation by 2030.	<	<
Hourly earnings (8.5.1)	Earnings are defined as in-cash and in-kind payment to employees at regular intervals, for time worked or work done together with remuneration for time not worked, such as annual vacation, other type of paid leave or holidays.	By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value.	>	>
Unemployment rate (8.5.2)	Unemployment refers to the share of the labor force that is without work but available for and seeking employment.	By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities.	5% (2)	5% (2)
Youth employment, education and training (8.6.1)	Proportion of young people (aged 15-29) who are not in education, employment, or training (NEET)	Substantially reduce the proportion of youth not in employment, education or training.	<	<
Child labour (8.7.1)	Child employment (in those aged 5-17 years old) is defined based on the participation in economic activity for at least one hour in the reference week of the survey, measured across both sexes.	End child labour in all its forms by 2025.	- 26.7%	- 40.0%
Tourism contribution to GDP (8.9.1)	Tourism direct GDP is part of gross value added generated by tourism industries and other industries of the economy that directly serve visitors in response to internal tourism consumption.	By 2030, devise and implement policies to promote sustainable tourism that creates jobs and promotes local culture and products.	>	>

Note: (1) Average Annual Change; (2) 5% level or less by 2030.

Source: United Nations, Department of Economic and Social Affairs (2021)
https://unstats.un.org/sdgs/indicators/indicators-list

Table 1: SDG Push Result Framework (Cont.)

Indicator	Metric	Target	Milestone, Cumulative 2015-2019	Milestone, Cumulative 2015-2021
Build resilient infrastructure, promote sustainable industrialization and foster innovation (Goal 9)				
Manufacturing value added as a proportion of GDP and per capita (9.2.1)	Manufacturing sector's contribution to a country's total gross domestic product (GDP). Value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs in manufacturing production	By 2030, significantly raise industry's share of employment and gross domestic product, in line with national circumstances, and double its share in least developed countries.	26.7%	40.0%
Manufacturing employment as a proportion of total employment (9.2.2)	Manufacturing sector's employment as a share of the country's total employment. Employment refers to all persons of working age who, during a specified brief period, were in paid employment (whether at work or with a job but not at work) or in self-employment (whether at work or with an enterprise but not at work).	By 2030, significantly raise industry's share of employment and gross domestic product, in line with national circumstances, and double its share in least developed countries.	26.7%	40.0%
Proportion of small-scale industries in total industry value added (9.3.1)	Small-scall industries as a proportion of total industry value added	Increase the access of small-scale industrial and other enterprises, in particular in developing countries, to value chains and markets by 2030.	>	>
CO2 emissions per unit of value added (9.4.1)	Carbon dioxide (CO_2) intensity of economies measured in kilograms of CO_2 per $ of GDP (measured in international-$ in 2011 prices)	By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes.	<	<
Proportion of medium and high-tech industry value added in total value added (9.b.1)	The proportion of medium and high-tech industry (MHT) value added as a percentage of total manufacturing value.	Support domestic technology development, research and innovation in developing countries, including by ensuring a conducive policy environment for, inter alia, industrial diversification and value addition to commodities by 2030.	>	>
Proportion of population covered by a mobile network, by technology (9.c.1)	There are two technology types featured for this indicator: the number of mobile cellphone subscriptions (per 100 people), and the share of a given	Strive to provide universal and affordable access to the Internet in least developed countries by 2020	>	>

	population using the internet (on any device).			

Source: United Nations, Department of Economic and Social Affairs (2021)
https://unstats.un.org/sdgs/indicators/indicators-list

Table 1: SDG Push Result Framework (Cont.)

Indicator	Metric	Target	Milestone, Cumulative 2015-2019	Milestone, Cumulative 2015-2021
Reduce inequality within and among countries (Goal 10)				
Growth rates of household expenditure or income per capita among the bottom 40 per cent of the population and the total population (10.1.1)	The growth rate in the welfare aggregate of the bottom 40 percent is computed as the annualised average growth rate in per capita real consumption or income of the bottom 40 percent of the population in the income distribution in a country from household surveys	Progressively achieve and sustain income growth of the bottom 40 per cent of the population at a rate higher than the national average through to 2030.	>	>
Proportion of people living below 50 per cent of median income, by sex, age and persons with disabilities (10.2.1)	The share of the population living on less than half of the median national income is a measure that is useful for monitoring the level and trends in social inclusion, relative poverty and inequality within a country.	By 2030, empower and promote the social, economic and political inclusion of all, irrespective of age, sex, disability, race, ethnicity, origin, religion or economic or other status.	<	<
Labour share of GDP, comprising wages and social protection transfers (10.4.1)	Total compensation of employees given as a percent of GDP. It provides information about the relative share of output which is paid as compensation to employees as compared with the share paid to capital.	Adopt policies, especially fiscal, wage and social protection policies, and progressively achieve greater equality by 2030.	>	>
Ensure sustainable consumption and production patterns (Goal 12)				
Indicator 12.c.1- Amount of fossil-fuel subsidies per unit of GDP (production and consumption) and as a proportion of total national expenditure on fossil fuels.	Fossil-fuel pre-tax subsidies as a share of total gross domestic product.	By 2030 rationalize inefficient fossil-fuel subsidies that encourage wasteful consumption by removing market distortions, in accordance with national circumstances.	<	<
Take urgent action to combat climate change and its impacts (Goal 13)				

CO2 emissions per unit of value added (13.2.2)	Carbon dioxide (CO_2) intensity of economies measured in kilograms of CO_2 per $ of GDP (measured in international-$ in 2011 prices)	By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes.	<	<

Source: United Nations, Department of Economic and Social Affairs (2021)
https://unstats.un.org/sdgs/indicators/indicators-list

Table 1: SDG Push Result Framework (Cont.)

Indicator	Metric	Target	Milestone, Cumulative 2015-2019	Milestone, Cumulative 2015-2021
Revitalize the global partnership for sustainable development (Goal 17)				
Total government revenue as a proportion of GDP (Indicator 17.1.1)	Revenue is cash receipts from taxes, social contributions, and other revenues such as fines, fees, rent, and income from property or sales. Grants are also considered revenue but are excluded here.	Strengthen domestic resource mobilization, to improve domestic capacity for tax and other revenue collection across all countries by 2030.	>	>
Proportion of domestic budget funded by domestic taxes (Indicator 17.1.2)	Tax revenue refers to compulsory transfers to the central government for public purposes. Compulsory transfers such as fines, penalties, and most social security contributions are excluded.	Strengthen domestic resource mobilization, to improve domestic capacity for tax and other revenue collection across all countries by 2030.	>	>
Foreign direct investment (FDI), official development assistance and South-South cooperation as a proportion of total domestic budget (Indicator 17.3.1)	Foreign direct investment (FDI) refers to direct investment equity flows in an economy. It is the sum of equity capital, reinvestment of earnings, and other capital. This series shows net outflows of investment from the reporting economy to the rest of the world, and is divided by GDP.	Mobilize additional financial resources for developing countries by 2030	>	>
Volume of remittances (in United States dollars) as a proportion of total GDP (Indicator 17.3.2)	Personal remittances comprise personal transfers and compensation of employees. Personal transfers consist of all current transfers in cash or in kind made or received by resident households to or from non-resident households. Compensation of employees refers to the income of border, seasonal, and other short-term workers who are employed in an economy where they are not resident and of residents employed by non-resident entities.	Mobilize additional financial resources for developing countries by 2030	>	>
Proportion of individuals using the internet (Indicator 17.8.1)	All individuals who have used the Internet in the last 3 months are counted as Internet users. The Internet can be used via a computer, mobile phone, personal digital assistant, gaming device, digital TV etc.	Fully operationalize the technology bank and science, technology and innovation capacity-building mechanism for least developed countries, in particular information and communications technology.	>	>
Macroeconomic Dashboard	There are multiple variables which are included in the macroeconomic	Enhance global macroeconomic stability, including through	>	>

(Indicator 17.13.1)	dashboard, including merchandise trade as a proportion of GDP	policy coordination and policy coherence.		

Source: United Nations, Department of Economic and Social Affairs (2021) https://unstats.un.org/sdgs/indicators/indicators-list

5. SDG Status Assessment

The assessment consists of conducting a stocktaking of a country progress towards the sustainable development goals (SDGs). It provides basic information on country progress towards the SDGs which serves as the base for the prospective analysis.

The assessment starts with reviewing the progress made by a country over the period of 2015-2019 and evaluates its situation in 2019 with respect to each SDG. For every indicator of the SDG Push result framework (Table 1), the assessment identifies the metrics and targets, and collects existing data to describe the country status. The 2019 milestone is defined in terms of average or cumulative change and country performance against the milestone is assessed.

Since the first quarter of 2020, the COVID-19 pandemic has been affecting the global and national economies and has not left a single region of the world untouched. Because of the statistical delay constraint, our knowledge on the pandemic-related effects on many economic and social variables is still limited. Thus, partially available data and the SDG Push described in Section 2 are used at this step to examine the likely effect of the COVID-19 pandemic on an individual country progress towards the SDGs. This provides an assessment of the country status in 2020 and 2021 against the SDG targets and serve as a basis to design the SDG acceleration program. Individual country progress in 2020 and 2021 is assessed in three steps:

- **Step 1:** Available socioeconomic data for years 2020 and 2021 are gathered from the national and international statistical databases, e.g. the World Development Indicator database, and the World Economic Outlook database;
- **Step 2:** The Macro-Micro model is calibrated to available data for 2020 and 2021, i.e. the model replicates the data;
- **Step 3:** The levels of the selected SDG indicators are computed and progress against the 2020 and 2021 targets is assessed.

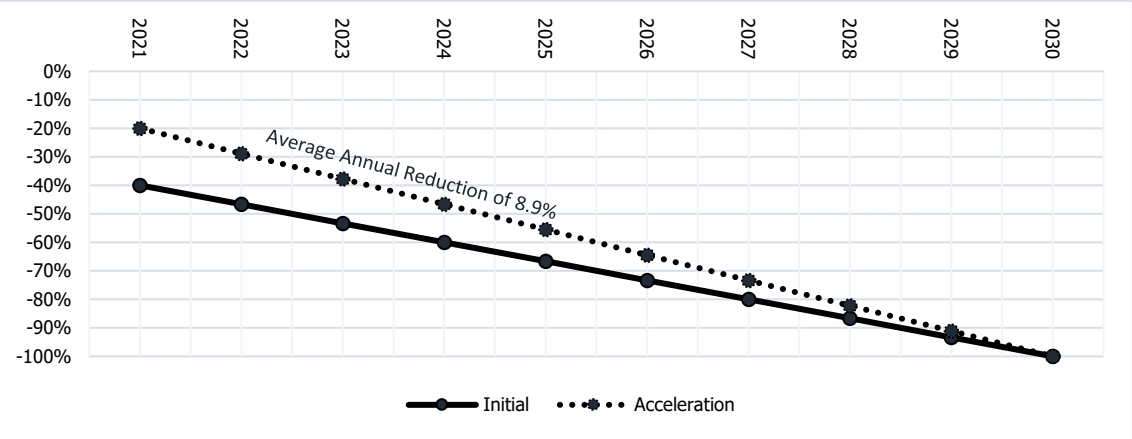
6. Setting Milestones to SDG Acceleration

The Sustainable Development Goals (SDGs) were set up in 2015 by the United Nations and are intended to be achieved by the year 2030 i.e. the targets are set to be met within 15 years. For instance, eliminating hunger by 2030 requires an average annual reduction of the hunger indicator by at least 6.7% compared to the value in 2015. Thus, a milestone of -40.0% is expected to be reached by 2021 (Figure 4).

When the actual value for an individual country reaches or exceeds the expected value or milestone, the indicator is on-track to achieving the goal in 2030. In that case, the actual value is equal or superior to the milestone set for 2021. In the contrary, when the actual value is lower than the 2021 milestone, the indicator is off-track to achieving the goal in 2030. For instance, a reduction of 20% of the hunger indicator between 2015 and 2021 is lower than the milestone of -40%. Thus, the 2030 goal can only be achieved by an average annual reduction of 8.9% of the hunger indicator between 2021 and 2030. This new milestone is higher than the initial milestone of 6.7%, indicating that the country must accelerate the implementation of the national strategy and programs to deliver on the SDGs.

The milestone set for the period 2015-2030, or initial milestone, remains relevant over the period of 2022-2030 for indicators that are on-track to achieving the SDGs. On the contrary, new milestones or acceleration milestones are set for indicators that are off-track to achieving the SDGs. The SDG acceleration milestones for the period of 2022-2030 are based on progress made between 2015 and 2021, and the individual country status in 2021. In the upcoming sections, the SDG Push result framework with the adjusted milestones is used to examine likely future trends in SDG indicators under various scenarios.

Figure 4: Example of Milestone to SDG Acceleration



Source: Author Computation.

7. Ensuring Policy Coherence

Policy coherence is an important issue to consider in developing the SDG Push to assess the likely future delivery on the SDGs. The issue to address at this stage is whether an individual country's vision and goals are coherent with its global commitments.

At the international level, countries are committed to various regional and global agendas, including the SDGs. At the national level, countries have been implementing multi-sectoral strategies that include strategic investment areas, and policy and institutional reforms to meet the targets set in their national development agenda. Both national and international agendas display a set of goals, indicators, and targets with some similarities and differences. To ensure the coherence between the national and international agendas, a mapping of goals, indicators and targets is undertaken to reconcile the two result frameworks.

In some cases, indicators or targets are not specified for the national agenda. Thus, the latter can borrow indicators or targets from the international agenda. In other cases, the national or international agendas simply specify directional targets, i.e. increase or decrease in the value of an indicator. Thus, numerical targets specified in any of the agenda is prioritized. When two different indicators are used to measure the same result, thus both indicators are considered in the result framework. In that case, the SDG Push result framework proposed in section 4 is expanded to include the national indicator. The global indicator framework is supposed to be complemented by indicators at the national level developed by Member States. The national and international agendas may use the same indicator with different timeline or target. Thus, the country should strive to meet the highest target to deliver on both agendas.

8. Scenario Building and Analysis

Prospective analysis is performed to examine likely future trends in SDG indicators under various scenarios that would reflect the realities of each country. The analysis provides useful information on country-specific investments, as well as policies and institutional arrangements that are needed to ensure that set goals and targets are achieved effectively and efficiently. Prospective analysis guides country SDG acceleration program which is designed to fill the gaps between the outcomes of the baseline and SDG Push Scenarios. The baseline scenario projects the historical trends of the economy while the SDG Push Scenario identifies the input requirements related to the possible and desired outcomes to be pursued under the SDG acceleration.

8.1 CONSTRUCTION OF THE BASELINE SCENARIO

Data on the historical trends and medium-term outlook of the economy are accessible through national and international databases. Twice a year, the International Monetary Funds (IMF) provides a six-year projection of key economic variables for (nearly) all countries. The latest report, released in October 2021, projects the national and global economies over the period of 2022-2026.

The baseline scenario builds on the IMF's projection of the national GDP, total investment, import and export volumes of goods and services, current account balance, government revenue and expenditures, and unemployment rate. The values for the period 2027-2030 are generated by extrapolation, i.e. assuming that 2022-2026 trends will continue.

The baseline calibration is validated through other economic variables such as the household final consumption expenditure and sectoral value added expressed in percent of GDP. The baseline calibration is validated when the results from the baseline simulation is comparable to the historical trends for these economic variables. Household final consumption expenditure and sectoral value added are accessible through the World Development Indicators (WDI) database, which is maintained by the World Bank.

8.2 CONSTRUCTION OF THE SDG PUSH SCENARIO

The implementation of the SDG Push scenario is based on a random selection and combination of values of input variables and parameters, i.e. Monte Carlo Simulation. The input variables and parameters include various public expenditures, tax receipts, and other macroeconomic variables, as well as parameters related to production, consumption, and external trade behavioral equations.[4] Thousands of SDG Push scenarios are implemented.

As the outcomes of these scenarios involve several SDG indicators (42), two scores are computed to facilitate their ranking: the effectiveness score and the efficiency score.

The effectiveness score measures the proportion of indicators advanced by the SDG Push scenario. When progress towards target is faster under the SDG Push scenario than the baseline scenario, the indicator is advanced by the SDG Push scenario. For instance, an effectiveness score of 80 percent with respect to the SDG Push result framework indicates that 8 out of 10 indicators are advanced by the SDG Push scenario.

[4] CGE models are structural models based on observed data captured through SAMs. Thus, a transformative change would imply a radical break with the historical pattern. The proposed simulation technique allows the adoption of more transformative strategies and policies.

The efficiency score considers the strength of the contribution by assessing progress against targets. The efficiency score measures the proportion of targets met under the SDG Push scenario. A target is met when the progress equals or exceeds the expected value. For instance, an efficiency score of 50 percent indicates that the SDG Push scenario contributes to meet 5 out of 10 targets of the result framework.

Finally, high ranked scenarios are selected based on their efficiency and effectiveness scores to assess progress on the SDG agenda as well as the national development agenda.

8.3 ASSESSMENT OF PROGRESS TOWARDS THE NATIONAL DEVELOPMENT GOALS

How does the SDG Push contribute to advance the national development agenda? This question is answered by assessing progress towards the national development goals under the baseline and SDG Push scenarios. The results framework of the national development agenda is used to conduct this assessment. It includes relevant information on goals, indicators, and targets, as well as the projection of the indicators under the baseline and SDG Push scenario. When the projection value is equal or superior (inferior) to the target value, the country is on-track (off-tack) to meeting the target set for the indicator. The number of indicators on-track is expected to be superior under the SDG Push scenario compared to the baseline scenario.

8.4 ASSESSMENT OF PROGRESS TOWARDS THE SUSTAINABLE DEVELOPMENT GOALS

The SDG Push result framework developed in section 4 is used to evaluate progress towards the SDG targets under the baseline and SDG Push scenarios. The latter is designed to meet as many SDG targets as possible and is expected to improve the country performance compared to the baseline scenario.[5] In addition to the goals and targets, the projected values of indicators under the baseline and SDG Push scenarios are included in the result framework. The color scoring method contributes to better visualize progress towards the SDG targets under the baseline and SDG Push scenarios.

- Green color for **target met** under the SDG Push scenario;
- Yellow color for **progress**, i.e. the SDG Push scenario is better than the baseline scenario;
- Red color for **no progress**, i.e. the SDG Push scenario is not better than the baseline scenario.

How many targets are met and indicators are improved under the SDG Push scenario? The answer to this question depends on country-specific status and progress made towards the SDGs over the period 2015-2021.

8.5 INTERVENTIONS AND INVESTMENTS PRIORITIZATION FOR SDG PUSH

The prospective analysis aims at facilitating the identification of key input variables and thus provides the basis for effective programming, tracking and implementation. Top ranked SDG Push scenarios are selected to extract relevant input data on public and private investments and other relevant economic parameters to be prioritized to advance the achievement of SDGs as well as to progress towards the national development goals. The milestones to advance towards the goals and targets of these agendas are

[5] In some cases, country policy makers would be interested in accelerating progress towards one or two critically important targets, while continuing to advance on the others.

defined to facilitate the tracking, monitoring, and reporting on progress, as well as to guide the formulation of country SDG acceleration program.[6]

[6] The model captures several SDG indicators in its set of input variables. However, these are not necessarily the complete or even the best available set of input variables as might be indicated by a causal analysis. Given that countries collect more complete and locally relevant data sets, these might make of more robust models.

9. Conclusion

The COVID-19 pandemic has caused an unprecedented disruption to people's lives and livelihoods around the world and spotlighted the urgency to act today. The SDG Push combines microeconomic and macroeconomic models to simultaneously address several sustainable development goals and targets. Its implementation at country-level will support the identification and prioritization of policy choices, needed investments, and development pathways that can accelerate the SDGs and support sustainable recovery from the COVID-19 pandemic.

The SDG Push combines a Computable General Equilibrium (CGE) model and a Micro-Simulation (MS) model in a top-down fashion. The MS model builds upon the flexibility of the reweighting approach to address several SDGs. The CGE model is grounded in the neoclassical small open economy framework and displays some peculiarities designed to capture simultaneously several sustainable goals and targets.

First, the CGE model is gender-sensitive and captures male and female unpaid time devoted to household domestic and care activities. Thus, SDG indicators related to unemployment, employment, and earnings are also made gender-sensitive in the result framework. In addition, as gender unpaid time is explicitly captured by the CGE model, it contributes to track progress towards SDG 5.

Second, the labor market segmentation follows the categorization of workers according to several criteria including gender (male and female), residential area (urban and rural), age (child, youth, and adult), work status (wage/salary and self-employed), and skill category (skilled and unskilled). The high disaggregation of workers and the labor market contributes to inform the distribution of income and, thus the linkage of the CGE model to the MS model.

Third, the CGE model features several industries. When required data are accessed, the small-scale industry and the medium and high-tech industry categories are highlighted to facilitate the tracking of indicators and targets related to SDG 9. In addition, the Carbon Emission Intensity (CEI) is associated with each industry and output to serve as a basis to assess industries' sustainability.

Fourth, households are defined according to the residential area (urban and rural) and the consumption expenditure decile category in each area. The high disaggregation of households within the CGE setting facilitates the analyses of income growth and income distribution and progress towards SDG 10.

Fifth, the main innovation brought by the framework is the assessment of the transformative changes that need to be adopted at a country-level to generate the expected results. This aspect is carefully designed in the construction of the SDG Push scenario and the implementation of the simulation shocks. The latter are applied to both the input variables and the parameters of the model. The implementation of the SDG Push scenario uses the Monte Carlo simulation technique - i.e., a random selection and combination of values of input variables and parameters.

Finally, the current design of the SDG Push tool is generic and yet to be customized to countries' needs at the implementation stage. When expressed by a country, complementary approaches can be used to address SDGs not captured - or not sufficiently captured - by the framework. Moreover, the framework is flexible enough to focus on a limited number of SDGs while assessing the impact of policy measures and investments on a greater number of SDGs.

The implementation of the SDG Push at country level requires access to relevant micro and macro data including: a Social Accounting Matrix (SAM), a household income and expenditure survey, and a time use survey. The SAM features relevant production factors, industries, and household categories as discussed above. It is made gender sensitive and extended to include male and female unpaid time using satellite accounts. The household income and expenditure survey includes relevant variables to link the macroeconomic model to the microeconomic model. The time use survey records the time use of men and women to various economic and noneconomic activities.

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Annex: Additional Tables

Table A.1: Indicators of Goal 1 - End poverty in all its forms everywhere

Target 1.1 - Eradicate extreme poverty	Indicator 1.1.1 - Proportion of population below the international poverty line.
Target 1.2 - Reduce poverty by at least 50%	Indicator 1.2.1 - Proportion of population living below the national poverty line. Indicator 1.2.2 - Proportion of population living in poverty in all its dimensions according to national definitions.
Target 1.3 - Implement social protection systems, and by 2030 achieve substantial coverage of the poor and the vulnerable.	Indicator 1.3.1 - Proportion of population covered by social protection floors/systems.
Target 1.4 - Equal rights to ownership, basic services, technology and economic resources	Indicator 1.4.1 - Proportion of population living in households with access to basic services. Indicator 1.4.2 - Proportion of total adult population with secure tenure rights to land.
Target 1.5 - Build resilience to environmental, economic and social disasters	Indicator 1.5.1 - Number of deaths, missing persons and directly affected persons attributed to disasters. Indicator 1.5.2 - Direct economic loss attributed to disasters in relation to global gross domestic product. Indicator 1.5.3 - Number of countries that adopt and implement national disaster risk reduction strategies. Indicator 1.5.4 - Proportion of local governments that adopt and implement local disaster risk reduction strategies.
Target 1.a - Mobilisation of resources to end poverty	Indicator 1.a.1 - Proportion of domestically generated resources allocated by the government directly to poverty reduction programmes. Indicator 1.a.2 - Proportion of total government spending on essential services (education, health and social protection).
Target 1.b - Pro-poor public spending	Indicator 1.b.1 - Pro-poor public social spending.

Source: United Nations, Department of Economic and Social Affairs (2021)
https://unstats.un.org/sdgs/indicators/indicators-list

Table A.2: Indicators of Goal 2 - End hunger, achieve food security and improved nutrition and promote sustainable agriculture

Target 2.1 - Universal access to safe and nutritious food	Indicator 2.1.1 - Prevalence of undernourishment (eliminating undernourishment for all, by 2030). Indicator 2.1.2 - Prevalence of moderate or severe food insecurity in the population (ending moderate and severe food insecurity for all, by 2030).
Target 2.2 - End all forms of malnutrition	Indicator 2.2.1 - Prevalence of stunting among children under 5 years of age. Indicator 2.2.2 - Prevalence of malnutrition among children under 5 years of age, by type (wasting and overweight).
Target 2.3 - Double the productivity and incomes of small-scale food producers	Indicator 2.3.1 - Volume of production per labour unit. Indicator 2.3.2 - Average income of small-scale food producers.
Target 2.4 - Sustainable food production and resilient agricultural practices	Indicator 2.4.1 - Proportion of agricultural area under productive and sustainable agriculture.
Target 2.5 - Maintain the genetic diversity in food production	Indicator 2.5.1 - Number of plant and animal genetic resources for food and agriculture secured in either medium- or long-term conservation facilities. Indicator 2.5.2 - Proportion of local breeds classified as being at risk, not at risk or at unknown level of risk of extinction.
Target 2.a - Invest in rural infrastructure, agricultural research, technology and gene banks	Indicator 2.a.1 - Agriculture orientation index for government expenditures. Indicator 2.a.2 - Total official flows (official development assistance plus other official flows) to the agriculture sector.
Target 2.b - Prevent agricultural trade restrictions, market distortions and export subsidies	Indicator 2.b.1 - Value of agricultural export subsidies (elimination of agricultural export subsidies by 2030).
Target 2.c - Ensure stable food commodity markets and timely access to information	Indicator 2.c.1 - Indicator of food price anomalies.

Source: United Nations, Department of Economic and Social Affairs (2021)
https://unstats.un.org/sdgs/indicators/indicators-list

Table A.3: Indicators of Goal 5 - Achieve gender equality and empower all women and girls

Target 5.1 - End discrimination against women and girls	Indicator 5.1.1 - Whether or not legal frameworks are in place to promote, enforce and monitor equality and non-discrimination on the basis of sex.
Target 5.2 - End all violence against and exploitation of women and girls	Indicator 5.2.1 - Proportion of ever-partnered women and girls aged 15 years and older subjected to physical, sexual or psychological violence by a current or former intimate partner in the previous 12 months, by form of violence and by age. Indicator 5.2.2 - Proportion of women and girls aged 15 years and older subjected to sexual violence by persons other than an intimate partner in the previous 12 months, by age and place of occurrence.
Target 5.3 - Eliminate forced marriages and genital mutilation	Indicator 5.3.1 - Proportion of women aged 20–24 years who were married or in a union before age 15 and before age 18. Indicator 5.3.2 - Proportion of girls and women aged 15–49 years who have undergone female genital mutilation/cutting.
Target 5.4 - Value unpaid care and promote shared domestic responsibilities	Indicator 5.4.1 - Proportion of time spent on unpaid domestic and care work, by sex, age and location.
Target 5.5 - Ensure full participation in leadership and decision-making	Indicator 5.5.1 - Proportion of seats held by women in (a) national parliaments and (b) local governments. Indicator 5.5.2 - Proportion of women in managerial positions.
Target 5.6 - Universal access to reproductive rights and health	Indicator 5.6.1 - Proportion of women aged 15–49 years who make their own informed decisions regarding sexual relations, contraceptive use and reproductive health care. Indicator 5.6.2 - Number of countries with laws and regulations that guarantee full and equal access to women and men aged 15 years and older to sexual and reproductive health care, information and education.
Target 5.a - Equal rights to economic resources, property ownership and financial services	Indicator 5.a.1 - Proportion of total agricultural population with ownership or secure rights over agricultural land, by sex; and (b) share of women among owners or rights-bearers of agricultural land, by type of tenure. Indicator 5.a.2 - Proportion of countries where the legal framework (including customary law) guarantees women's equal rights to land ownership and/or control.
Target 5.b - Promote empowerment of women through technology	Indicator 5.b.1 - Proportion of individuals who own a mobile telephone.
Target 5.c - Adopt and strengthen policies and enforceable legislation for gender equality	Indicator 5.c.1 - Proportion of countries with systems to track and make public allocations for gender equality and women's empowerment.

Source: United Nations, Department of Economic and Social Affairs (2021)
https://unstats.un.org/sdgs/indicators/indicators-list

Table A.4: Indicators of Goal 8 - Promote inclusive and sustainable economic growth, employment and decent work for all

Target 8.1 - Sustainable Economic Growth	Indicator 8.1.1 - Annual growth rate of real GDP per capita (at least 7 per cent gross domestic product growth per annum in the least developed countries through 2030).
Target 8.2 - Diversify, innovate and upgrade for economic productivity	Indicator 8.2.1 - Annual growth rate of real GDP per employed person.
Target 8.3 - Promote policies to support job creation and growing enterprises	Indicator 8.3.1 - Proportion of informal employment in non-agriculture employment.
Target 8.4 - Improve resource efficiency in consumption and production	Indicator 8.4.1 - Material footprint, material footprint per capita, and material footprint per GDP. Indicator 8.4.2 - Domestic material consumption, domestic material consumption per capita, and domestic material consumption per GDP.
Target 8.5 - Full employment and decent work with equal pay	Indicator 8.5.1 - Average hourly earnings of employees. Indicator 8.5.2 - Unemployment rate.
Target 8.6 - Promote youth employment, education and training	Indicator 8.6.1 - Proportion of youth (aged 15–24 years) not in education, employment or training.
Target 8.7 - End modern slavery, trafficking, and child labour	Indicator 8.7.1 - Proportion and number of children aged 5–17 years engaged in child labour.
Target 8.8 - Protect labour rights and promote safe working environments	Indicator 8.8.1 - Frequency rates of fatal and non-fatal occupational injuries. Indicator 8.8.2 - Level of national compliance with labour right.
Target 8.9 - Promote beneficial and sustainable tourism	Indicator 8.9.1 - Tourism direct GDP as a proportion of total GDP and in growth rate.
Target 8.10 - Universal access to banking, insurance and financial services	Indicator 8.10.1 – (a) Number of commercial bank branches per 100,000 adults and (b) number of automated teller machines (ATMs) per 100,000 adults Indicator 8.10.2 - Proportion of adults (15 years and older) with an account at a bank or other financial institution or with a mobile-money-service provider.
Target 8.a - Increase aid for trade support	Indicator 8.a.1 - Aid for trade commitments and disbursements.
Target 8.b - Develop a global youth employment strategy	Indicator 8.b.1 - Existence of a developed and operationalized national strategy for youth employment.

Source: United Nations, Department of Economic and Social Affairs (2021)
https://unstats.un.org/sdgs/indicators/indicators-list

Table A.5: Indicator of Goal 9 - Build resilient infrastructure, promote sustainable industrialization and foster innovation

Target 9.1 - Develop sustainable, resilient and inclusive infrastructures	Indicator 9.1.1 - Proportion of the rural population who live within 2 km of an all-season road. Indicator 9.1.2 - Passenger and freight volumes, by mode of transport.
Target 9.2 - Promote inclusive and sustainable industrialization	Indicator 9.2.1 - Manufacturing value added as a proportion of GDP and per capita (By 2030, double its share in least developed countries). Indicator 9.2.2 - Manufacturing employment as a proportion of total employment (By 2030, double its share in least developed countries).
Target 9.3 - Increase access to financial services and markets	Indicator 9.3.1 - Proportion of small-scale industries in total industry value added. Indicator 9.3.2 - Proportion of small-scale industries with a loan or line of credit.
Target 9.4 - Upgrade all industries and infrastructures for sustainability	Indicator 9.4.1 - CO2 emissions per unit of value added.
Target 9.5 - Enhance research and upgrade industrial technologies	Indicator 9.5.1 - Research and development expenditure as a proportion of GDP. Indicator 9.5.2 - Number of researchers (in full-time equivalent) per million inhabitants.
Target 9.a - Facilitate sustainable infrastructure development for developing countries	Indicator 9.a.1 - Total official international support (official development assistance plus other official flows) to infrastructure.
Target 9.b - Support domestic technology development and industrial diversification	Indicator 9.b.1 - Proportion of medium and high-tech industry value added in total value added.
Target 9.c - Universal access to information and communications technology	Indicator 9.c.1 - Proportion of population covered by a mobile network, by technology.

Source: United Nations, Department of Economic and Social Affairs (2021)
https://unstats.un.org/sdgs/indicators/indicators-list

Table A.6: Indicator of Goal 10 - Reduce inequality within and among countries

Target 10.1 - Reduce income inequalities	Indicator 10.1.1 - Growth rates of household expenditure or income per capita among the bottom 40 per cent of the population and the total population.
Target 10.2 - Promote universal social, economic and political inclusion	Indicator 10.2.1 - Proportion of people living below 50 per cent of median income
Target 10.3 - Ensure equal opportunities and end discrimination	Indicator 10.3.1 - Proportion of population reporting having personally felt discriminated against or harassed in the previous 12 months on the basis of a ground of discrimination prohibited under international human rights law.
Target 10.4 - Adopt fiscal and social policies that promotes equality	Indicator 10.4.1 - Labour share of GDP, comprising wages and social protection transfers.
Target 10.5 - Improved regulation of global financial markets and institutions	Indicator 10.5.1 - Financial soundness indicator".
Target 10.6 - Enhanced representation for developing countries in financial institutions	Indicator 10.6.1 - Proportion of members and voting rights of developing countries in international organizations.
Target 10.7 - Responsible and well-managed migration policies	Indicator 10.7.1 - Recruitment cost borne by employee as a proportion of yearly income earned in country of destination. Indicator 10.7.2 - Number of countries that have implemented well-managed migration policies. Indicator 10.7.3 - Number of people who died or disappeared in the process of migration towards an international destination. Indicator 10.7.4 - Proportion of the population who are refugees, by country of origin.
Target 10.a - Special and differential treatment for developing countries	Indicator 10.a.1 - Proportion of tariff lines applied to imports from least developed countries and developing countries with zero-tariff.
Target 10.b - Encourage development assistance and investment in least developed countries	Indicator 10.b.1 - Total resource flows for development, by recipient and donor countries and type of flow.
Target 10.c - Reduce transaction costs for migrant remittances	Indicator 10.c.1 - Remittance costs as a proportion of the amount remitted.

Source: United Nations, Department of Economic and Social Affairs (2021)
https://unstats.un.org/sdgs/indicators/indicators-list

Table A.7: Indicator of Goal 12 - Ensure sustainable consumption and production patterns

Target 12.1- Implement the 10-year sustainable consumption and production framework	Indicator 12.1.1- Number of countries with sustainable consumption and production (SCP) national action plans or SCP mainstreamed as a priority or a target into national policies.
Target 12.2- Sustainable management and use of natural resources	Indicator 12.2.1- Material footprint, material footprint per capita, and material footprint per GDP. Indicator 12.2.2- Domestic material consumption, domestic material consumption per capita, and domestic material consumption per GDP. Indicator 12.2.2- Domestic material consumption, domestic material consumption per capita, and domestic material consumption per GDP.
Target 12.3- Halve global per capita food waste	Indicator 12.3.1- Global food loss index.
Target 12.4- Responsible management of chemicals and waste	Indicator 12.4.1- Number of parties to international multilateral environmental agreements on hazardous waste, and other chemicals that meet their commitments and obligations in transmitting information as required by each relevant agreement. Indicator 12.4.2- Hazardous waste generated per capita and proportion of hazardous waste treated, by type of treatment.
Target 12.5- Substantially reduce waste generation	Indicator 12.5.1- National recycling rate, tons of material recycled.
Target 12.6- Encourage companies to adopt sustainable practices and sustainability reporting	Indicator 12.6.1- Number of companies publishing sustainability reports.
Target 12.7- Promote sustainable public procurement practices	Indicator 12.7.1- Number of countries implementing sustainable public procurement policies and action plans.
Target 12.8- Promote universal understanding of sustainable lifestyles	Indicator 12.8.1- Extent to which (i) global citizenship education and (ii) education for sustainable development (including climate change education) are mainstreamed.
Target 12.A- Support developing countries' scientific and technological capacity for sustainable consumption and production	Indicator 12.A.1- Amount of support to developing countries on research and development for sustainable consumption and production and environmentally sound technologies.
Target 12.B- Develop and implement tools to monitor sustainable tourism	Indicator 12.B.1- Number of sustainable tourism strategies or policies and implemented action plans with agreed monitoring and evaluation tools.
Target 12.C- Remove market distortions that encourage wasteful consumption	Indicator 12.C- Amount of fossil-fuel subsidies per unit of GDP (production and consumption) and as a proportion of total national expenditure on fossil fuels.

Source: United Nations, Department of Economic and Social Affairs (2021)
https://unstats.un.org/sdgs/indicators/indicators-list

Table A.8: Indicator of Goal 13 - Take urgent action to combat climate change and its impacts

Target 13.1: Strengthen resilience and adaptive capacity to climate-related disasters	Indicator 13.1.1 is the number of deaths, missing persons and directly affected persons attributed to disasters per 100,000 population. Indicator 13.1.2 is the number of countries that adopt and implement national disaster risk reduction strategies in line with the Sendai Framework for Disaster Risk Reduction 2015–2030. Indicator 13.1.3 is the proportion of local governments that adopt and implement local disaster risk reduction strategies in line with national disaster risk reduction strategies.
Target 13.2: Integrate climate change measures into policy and planning	Indicator 13.2.1 is the number of countries that have communicated the establishment or operationalization of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development. Indicator 13.2.2 Total greenhouse gas emissions per year
Target 13.3: Build knowledge and capacity to meet climate change	Indicator 13.3.1 is the number of countries that have integrated mitigation, adaptation, impact reduction and early warning into primary, secondary and tertiary curricula.
Target 13.A: Implement then UN Framework Convention on Climate Change	Indicator 13.A.1 is the mobilized amount of United States dollars per year between 2020 and 2025 accountable towards the $100 billion commitment.
Target 13.B: Promote mechanisms to raise capacity for planning and management	Indicator 13.B.1 is the number of least developed countries and small island developing States that are receiving specialized support, and amount of support, including finance, technology and capacity-building, for mechanisms for raising capacities for effective climate change-related planning and management.

Source: United Nations, Department of Economic and Social Affairs (2021)
https://unstats.un.org/sdgs/indicators/indicators-list

Table A.9: Indicator of Goal 17 - Revitalize the global partnership for sustainable development

Target 17.1: Mobilize resources to improve domestic revenue collection	Indicator 17.1.1 is total government revenue as a proportion of GDP. Indicator 17.1.2 is the proportion of domestic budget funded by domestic taxes.
Target 17.2: Implement all development assistance commitments	Indicator 17.2.1 is net official development assistance, as a proportion of the Organization for Economic Cooperation and Development (OECD) Development Assistance Committee donors' gross national income (GNI).
Target 17.3: Mobilize financial resources for developing countries	Indicator 17.3.1 is foreign direct investment (FDI), official development assistance and South-South cooperation as a proportion of total domestic budget. Indicator 17.3.2 is the volume of remittances (in United States dollars) as a proportion of total GDP.
Target 17.4: Assist developing countries in attaining debt sustainability	Indicator 17.4.1 is debt service as a proportion of exports of goods and services.
Target 17.5: Invest in least-developed countries	Indicator 17.5.1 is the number of countries that adopt and implement investment promotion regimes for least developed countries.
Target 17.6: Knowledge sharing and cooperation for access to science, technology and innovation	Indicator 17.6.1 is fixed Internet broadband subscriptions per 100 inhabitants.
Target 17.7: Promote sustainable technologies to developing countries	Indicator 17.7.1 is the total amount of approved funding for developing countries to promote the development, transfer, dissemination and diffusion of environmentally sound technologies.
Target 17.8: Strengthen the science, technology and innovation capacity for least-developed countries	Indicator 17.8.1 is the proportion of individuals using the Internet.
Target 17.9: Enhanced SDG capacity in developing countries	Indicator 17.9.1 is the dollar value of financial and technical assistance committed to developing countries.
Target 17.10: Promote a universal trading system under the WTO	Indicator 17.10.1 is the worldwide weighted tariff-average.
Target 17.11: Increase the exports of developing countries	Indicator 17.11.1 is developing countries' and least developed countries' share of global exports.
Target 17.12: Remove trade barriers for least-developed countries	Indicator 17.12.1 is the average tariffs faced by developing countries, least developed countries and small island developing States.
Target 17.13: Enhance global macroeconomic stability	Indicator 17.13.1 is the Macroeconomic Dashboard.

Target 17.14: Enhance policy coherence for sustainable development	Indicator 17.14.1 is the number of countries with mechanisms in place to enhance policy coherence of sustainable development.
Target 17.15: Respect national leadership to implement policies for the sustainable development goals	Indicator 17.15.1 is the extent of use of country-owned results frameworks and planning tools by providers of development cooperation.
Target 17.16: Enhance the global partnership for sustainable development	Indicator 17.16.1 is the number of countries reporting progress in multistakeholder development effectiveness monitoring frameworks.
Target 17.17: Encourage effective partnerships	Indicator 17.17.1 is the amount of United States dollars committed to (a) public-private partnerships and (b) civil society partnerships.
Target 17.18: Enhance availability of reliable data	Indicator 17.18.1 is the proportion of sustainable development indicators produced at the national level with full disaggregation when relevant to the target, in accordance with the Fundamental Principles of Official Statistics. Indicator 17.18.2 is the number of countries that have national statistical legislation that complies with the Fundamental Principles of Official Statistics. Indicator 17.18.3 is the number of countries with a national statistical plan that is fully funded and under implementation.
Target 17.19: Further develop measurements of progress	Indicator 17.19.1 is the dollar value of all resources made available to strengthen statistical capacity in developing countries. Indicator 17.19.2 is the proportion of countries that (a) have conducted at least one population and housing census in the last 10 years; and (b) have achieved 100 per cent birth registration and 80 per cent death registration.

Source: United Nations, Department of Economic and Social Affairs (2021)
https://unstats.un.org/sdgs/indicators/indicators-list