UNITED NATIONS DEVELOPMENT ACCOUNT PROJECT

COVID-19
RESPONSE

JUNE 2021

# COVID-19
## Response and Recovery
## Mobilizing financial resources for development

DA-COVID-19 project led by Debt and Development Finance Branch, Division on Globalization and Development Strategies (DDFB/DGDS)

UNITED NATIONS
UNCTAD

# Achieving Global Carbon Neutrality Together with Economic Development

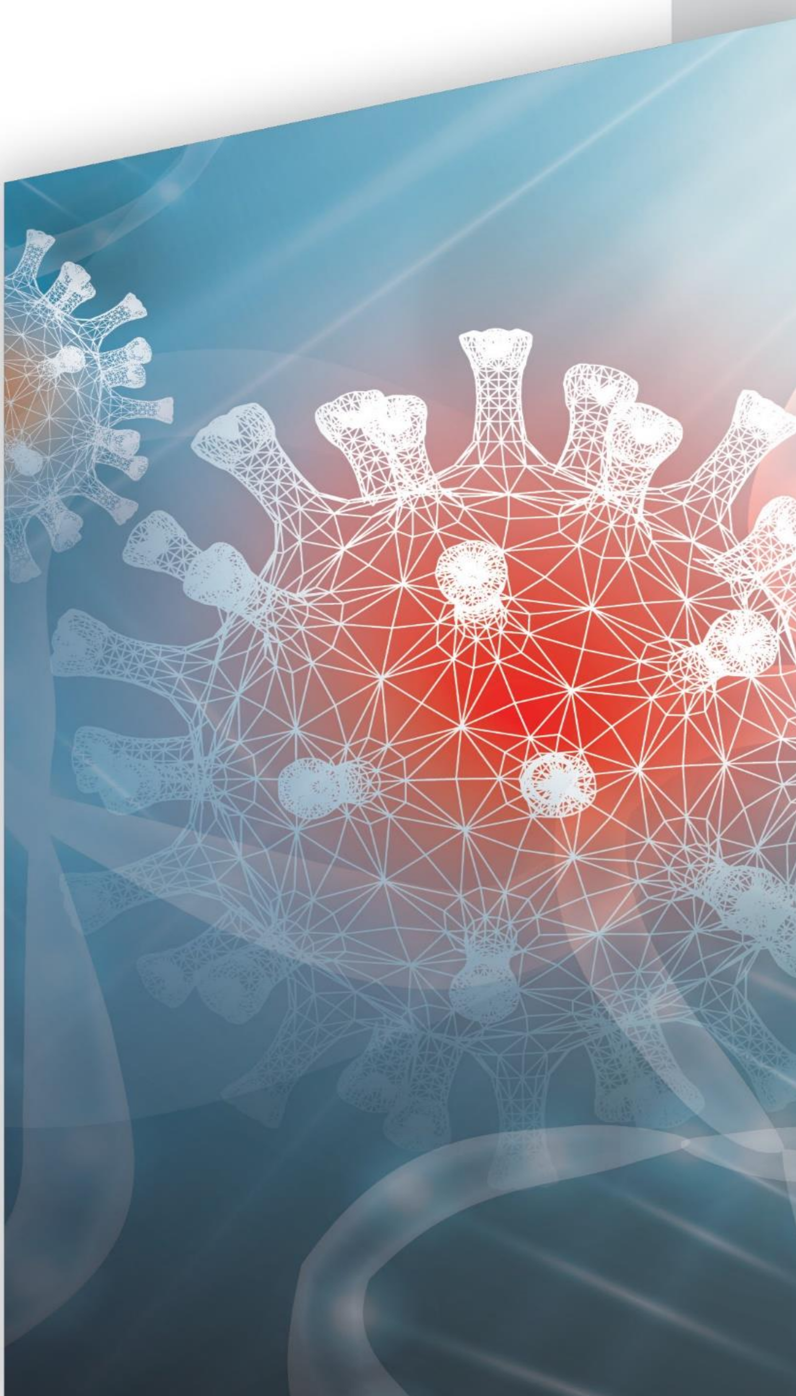
## Technical Note

**Francis Cripps**

President of Alphametrics Co. Ltd

Thailand

JUNE 2021



## About the COVID-19 Response and Recovery project

This paper is an output from the project "Response and Recovery: Mobilising financial resources for development in the time of COVID-19", which is co-ordinated by the Debt and Development Finance Branch of UNCTAD and jointly implemented with ECA, ECLAC and ESCAP. This project is one of the five UN Development Account short-term projects launched in May 2020 in response to the COVID-19 crisis.

The project aims to enable low-income and middle-income developing countries (LICs and MICs) from Africa, Asia-Pacific, and Latin America and the Caribbean to diagnose their macro-financial, fiscal, external financial and debt fragilities in the global context, and design appropriate and innovative policy responses to the COVID-19 pandemic leading toward recoveries aligned with the achievement of the Sustainable Development Goals (SDGs).

# Contents

# I. Introduction

This note reports work to prepare a baseline scenario and two alternative scenarios for analysis of finance and development issues facing developing countries in the aftermath of the COVID19 crisis. The scenarios have been prepared using an updated version of the world databank (WD 13.3) covering the period 1970 to 2019 and a modified version of the UN Global Policy Model (GPM 6.82) expanded to represent eleven developing countries that are not members of the G20. The databank and model have been updated to reflect estimates of the economic and financial impact of the pandemic as of end-November 2020.[1]

The baseline assumption, here described as '**Business As Before**', reflects established pre-COVID trends and impacts of the COVID crisis on trade, investment, employment, budget deficits and debt on the assumption that governments strive to recoup budget losses and bring debt down towards pre-crisis levels through the 2020's.

The first alternative scenario adds major policy changes aimed at achieving a global carbon-neutral transformation by mid-century. Innovations in this scenario, '**Market-Driven Decarbonization**', include accelerated trends of energy efficiency and reduced carbon-intensity with taxes and other regulatory mechanisms cutting demand for fossil fuels (which are the main source of emissions) to a level at which production would scarcely remain profitable.

The third scenario, here termed the '**Alternative Development Scenario'**, includes three elements that in combination could help to overcome development problems associated with the first two scenarios.

(i) **Concerted Decarbonization** through a programmed transition to achieve an orderly reduction in fossil fuel extraction and distribution, based on stable producer prices. The aim of this initiative is to match reductions in demand and supply of fossil fuels without violent fluctuations in the price at which fossil fuels are traded.

(ii) **Regional Development**, which promoting closer economic cooperation among economies in five geographic regions (South America, Africa, South-East Asia, West and Central Asia, and South Asia). The purpose is to advance development-oriented ‘de-globalization’, reducing economic and financial dependence on developed economies.

(iii) **Containment of Financialization** to avoid destabilizing build-up of external financial liabilities as growth of developing economies recovers and goes forward in coming decades.

To facilitate evaluation of longer-term consequences the scenarios have been extended to 2040, allowing time for implementation of policy changes that have far-reaching consequences for business and daily life and taking account of delayed, S-curve responses as people and institutions take advantage of new products and services and costs fall.

[1] Initial updates of the databank and model with historical data for 1970 to 2019 and projected outcomes for 2020 and 2021 were prepared in July 2020 under a prior contract.

# II. Outputs

The rationale, assumptions, results and policy implications of the three scenarios are described in a working paper.[2] The working paper includes tables B1-6 for the Business As Before scenario, E1-4 for Market-Driven Decarbonization, A1-3 for the Alternative Development Scenario and F1-2 comparing financial outcomes for developing countries under the three scenarios.

Tables in the working paper have been prepared in an Excel workbook G30s.xlsx using a GPM download of series for all three scenarios for 2010 to 2040 (see the Data worksheet).

Another Excel workbook, G30g.xlsx, contains graphs of the same series for 19 developing economies and 9 developed economies covering the period 2000 to 2040.

The scenarios may be reviewed in full detail in the EViews workbook ADS.wf1 where series are distinguished by suffix _0 for Business as Before, _1 for Market-Driven Decarbonization and _2 for the Alternative Development Scenario. Detailed analytical tables for each scenario are also available in html format in G30a.zip.[3]

# III. Data sources

Historical data for 1970 to 2019 are taken from the GPM databank (WD13.3) updated with 2019 estimates based on latest available data from UNSD, IMF, WB and other selected sources up to end-November 2020. Adjusted series for G20 member countries and two country groups (Caribbean and 'Other West Asia') compiled by UNCTAD staff in the preparation of the Trade and Development Report 2020 have been used to improve historical estimates of primary and secondary income distribution.

Standard GPM programs for data preparation and econometric estimation of behavioural equations have been used with minor modifications to resolves issues arising from extension of the model to include eleven additional developing countries in South America, Africa and South and East Asia.

Projection of the impact of the pandemic in 2020 and 2021 relies largely on UNCTAD estimates for G20 member countries and WEO, ILO and other sources for non-G20 countries and country groups. The projection incorporates a range of behavioural shocks with extended impact beyond 2021. The assumed shocks, imputed through an ‘alignment’ programme, capture known disruptions on activity and trade, as well as emergency policy measures taken by most world countries.

The ‘alignment’ programme fills-in the current period while official annual data is not yet published. It includes additional tuning assumptions for Iran (sanctions), Nigeria (additional oil export revenue) and Viet Nam (correction of estimated trends of energy demand and trade). These adjustments are maintained in scenarios.

[2] Terry McKinley "GPM Alternative Development Strategy", January 2021.

[3] Tables can be opened directly from the zip file by selecting the folder for a country or group and clicking on htm files to display them in an internet browser.

The initial version of the model with projections up to 2021 was prepared in June and July 2020 under a Phase 1 contract. Subsequent adjustments in this Phase 2 contract take full account of database updates (WD13.3) and 2020-21 alignment targets and shocks for G20 countries in the COVID period and aftermath notified by UNCTAD in August 2020. Revisions to model equations and assumptions for 2020-21 after that point are the responsibility of the consultant.

# IV. Scenario specifications

Technical specification of model projections from 2022 onwards relies on the following inputs:

(a) exogenous demographic trends

(b) model identities and behavioural equations with estimated coefficients and error variance (same for all scenarios). This includes add factors carried forward from shock profiles imputed to generate the 'alignment' with the current period.

(c) behavioural adjustments for the BaB scenario which reflect the policy shifts discussed above, aiming at re-instating austerity and labour market flexibilization policies that followed from similar crisis episodes in the past. Likewise, the Market-Driven Decarbonization scenario and the Alternative Development Scenario include scenario-specific changes in policy stances as described further below. Programmed adjustments take two main forms:

(i) additions or subtractions to add factors for specific behavioural equations[4]

(ii) imposed targets to be achieved by modification of add factors in specified behavioural equations [5].

## 4.1 Business As Before scenario

Conservative GDP growth targets 2022-40 are set for all countries and country groups, achieved by adjustment of savings, investment spending and government service spending. Growth targets are broadly consistent with UNCTAD assumptions for the post-COVID period.

Baseline GDP growth assumptions and other targeted outcomes are not inherited by other scenarios. What does carry across by default is the value of computed behavioural adjustments required to achieve the given targets. Different outcomes in other scenarios are achieved by reversing or modifying adjustments brought across from the baseline scenario.

Although GDP growth rates in the Business As Before scenario are pre-determined, tuning is necessary to ensure plausible outcomes for the balance of payments and internal income distribution. This

[4] Add factors are specified as constants or trend values modifying the intercept of a behavioral equations for a specific country or country group.

[5] Targets are specified as constant or time-series values to be taken by a single variable or an expression such as the ratio of two variables or growth rates of a variable or ratio. Annual convergence to a target value may be 100% or partial (less than 100%) and a target may itself be specified as a ceiling or floor.

tuning is performed by direct adjustment of add factors for relevant equations and countries. In some cases the tuning by adjustment of add factors seeks to reflect the impact of 'new normal' patterns of production and exchange. In other cases it is required to correct unrealistic projections for individual countries affected by erratic movements of historical data recorded in UN and IMF databases. Tuning adjustments for the Business As Before scenario are listed in Table 1. Considering the number of countries and country groups represented in the model and the number of behavioural variables that can have significant impact on projected outcomes, the scope of tuning in this exercise is quite limited. Further tuning might be advisable after review with country experts.

The baseline tuning of add factors carries through directly into other scenarios and does not affect comparison between them.

**Table 1: Business As Before: country-specific tuning adjustments**

| *Topic* | *Adjustment* | *Countries / country groups* |
|---|---|---|
| exports of primary products | negative | Ethiopia, Tanzania |
| | positive | Iran, Other Africa, Other South America |
| exports of manufactures (market share) | negative | Mexico, Chile, Germany, Italy, Korea, Japan |
| | positive | Indonesia, Congo DR |
| exports of services | negative | Ethiopia, Tanzania, Turkey, North Africa, Viet Nam |
| | positive | Iran |
| external financial flows | negative | United Kingdom |
| | positive | China, Viet Nam |
| fiscal policy and investment | deflationary | Brazil, Viet Nam |
| | expansionary | Argentina, Congo DR, Iran, Korea, North Africa |
| government revenue | negative | Nigeria, Saudi Arabia |
| other adjustments | world | short/medium term depression of commodity prices |
| | Nigeria | increased oil revenue |
| | Iran | restricted oil export revenue |
| | Pakistan | reduced cost of oil and gas imports |
| | Mexico | increased government transfer spending |
| | Viet Nam | increased energy consumption, increased imports of manufactures and services |

## 4.2 Market-Driven Decarbonization scenario

This scenario inherits behavioural adjustments from the Business As Before scenario as explained above. Behavioural innovations in this scenario include the following:

(a) changed trends in response to rising awareness of climate change commencing 2022 with increased intensity from 2024 through to the early 2030s. The following behavioural changes are assumed to apply in all countries and country groups:

- reduced energy demand (increased efficiency of energy use)

- increased supply of non-carbon energy (including biomass)

- reduced intensity of $CO_2$ emissions arising from fossil fuel usage

(b) reduced carbon energy (fossil fuel) supply in China, India, Indonesia, Australia, Canada, Other West Asia and Other Europe from 2022 onwards

(c) acceleration of the above trends, reduced supply of fossil fuels and further reductions in $CO_2$ emissions driven by price incentives such as carbon tax, subsidies for carbon-saving technologies and equivalent regulatory measures. Such incentives and regulatory standards are assumed to be applied with increasing intensity up to the mid 2030's.

The combined effect of all the above is to reduce global $CO_2$ emissions in 2030 by little over 10% and 40% in 2040 relative to the level in 2019. The annual reduction in global emissions accelerates from 2.5% in 2030 to 6% per year in 2040. The scenario pictures a huge change relative to Business as Before where $CO_2$ emissions are projected to continue increasing in most countries with more than 2% annual GDP growth. But the scenario also brings the price of oil down to around $20 per barrel as demand for fossil fuels dries up with heavy losses for developing economies that currently depend on fossil fuels as a major source of export revenue - in particular Nigeria, Iran and Saudi Arabia.

## 4.3 Alternative Development Scenario

Tuning adjustments and behavioural changes including a rising carbon tax modelled in the Business As Before and Market-Driven Decarbonization scenarios are carried through into the third scenario which introduces further behavioural changes and policy shifts that could potentially overcome development problems brought up by the two former scenarios.

**Concerted decarbonisation**

To reduce the severe impact of a contracting market for fossil fuels, the Alternative Development Scenario assumes global cooperation of producers and distributors to reduce supply without cutting the price of oil below a level of around 65$ per barrel. This provides interim relief for economies that are heavily dependent on fossil fuels as a source of export income although they will not be able to avoid rapid reductions in volume and hence revenue as decarbonization gathers momentum in the 2030's. All countries are assumed to participate in this programme to the extent that they produce coal, oil or gas, whether or not they are exporters.[6]

**Regional Development Groups**

Developing countries in each part of the world are assumed to cooperate with neighbouring states through membership of five regional groups listed in the table.

[6] The allocation of supply quotas would be a major issue in its own right. For simplicity we have assumed that reductions in supply are allocated in proportion to the historical volatility of fossil fuel production in each country.

**Table 2: Regional Development Groups**

| *Development Group* | *Member States* |
|---|---|
| South America | Argentina, Brazil, Chile, Other South America (country group) |
| Africa | Egypt, Other North Africa (country group), Ethiopia, Tanzania, Nigeria, Congo DR, South Africa, Other Africa (country group) |
| West and Central Asia | Turkey, Saudi Arabia, Iran, Other West and Central Asia (country group) |
| South Asia | Pakistan, India, Bangladesh, Other South Asia (country group) |
| South East Asia | Indonesia, Philippines, Viet Name, Other South East Asia (country group) |

For evaluation purposes we have also defined three groups of higher income countries - North and Central America (includes the Caribbean), Europe (includes Russia) and North Asia and Pacific (includes China) - although no new assumptions about regional cooperation are made in their case.

Countries that are members of a Regional Development Group are assumed to extend preferences for imports of manufactures from other countries in the same group with increased cross-border direct investment. The members of each group also concert increased spending on investment and government services.

To avoid high dependence on external creditors and investors each group is assumed to adopt a target limit on net external liabilities (i.e. liabilities less assets). Implicitly, members of the group agree to cooperate in resolving external vulnerabilities and take joint action to limit exposure of the group as a whole. Groups that start with net external liabilities above the limit (South America, Africa, South Asia) are assumed to restrict imports of manufactures and services to bring the ratio down to the target level. In the case of South America and South Asia the restrictions needed are temporary but the African group needs to maintain restrictions throughout the period up to 2040. The South East Asia group has no need to introduce restrictions as this group maintains a positive external position throughout.

The West and Central Asia group starts with a positive external investment position but risks crashing into the assumed limit on net liabilities in the late 2030's as the market for fossil fuel exports dries up. To mitigate this risk we have introduced a lower initial limit that requires restrictions on imports of manufactures and services to start sooner. [7]

Tuning adjustments have been made for two developing countries: Iran, to boost export revenue following an assumed end of sanctions; Pakistan, to reduce the high cost of imports of oil and manufactures in the baseline scenario.

### Containment of Financialization

The third set of policy changes introduced in the Alternative Development Scenario require action by developed countries. From the perspective of developing countries these changes are needed to provide expanding export markets and contain pressures on developing countries to finance economic growth by accumulation of unsustainable external debt or high-risk inflows of portfolio investment.

[7] The lower initial limit implies a more gradual imposition of import restrictions, avoiding the need for dramatic cuts when the ceiling is reached. The target ceiling for all groups has been set at 32% of GDP, roughly matching the current figure for South America and South Asia but somewhat lower than the current figure for Africa.

At the same time the policy changes have to be beneficial and within parameters that are acceptable to the developed countries that introduce them.

Firstly, high income countries are assumed to undertake a long-term increase in spending on investment and public services at a level which generates demand-led growth of real income ranging between 1.2% p.a. (United Kingdom) and 3.2% p.a. (Korea).

Secondly, current account surpluses are restrained in highly competitive but slow-growing countries by real exchange rate increases and increased imports of manufactures and services (Japan, Korea, EU, Russia, Chile, Viet Nam and Other South East Asia).

Taken together these changes achieve a global environment in which developing countries can expand trade and take advantage of products and services from developed countries without incurring large current account deficits.