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IMF STAFF DISCUSSION NOTE

A Post-Pandemic Assessment of the Sustainable Development Goals: Background Notes

Country Case Studies

Macroeconomic Framework

Tax Capacity Estimates

Olusegun Akanbi, David Bartolini, Svetlana Cerovic, Hua Chai, Ricardo Fenochietto, Narine Nersesyan, and Roberto Perrelli

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Authors' E-mail Address:	OAkanbi@imf.org; DBartolini@imf.org; SCerovic@imf.org; HChai@imf.org; RFenochietto@imf.org; NNersesyan@imf.org; RPerrelli@imf.org;

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I. CASE STUDY RWANDA[1]

A. Development and Economic Trends

1. **Rwanda has made remarkable progress in social and economic development over the past two decades.** Since 1995, the country has experienced rapid and inclusive growth by incorporating the millennium development goals (MDGs) into its national development plans. GDP per capita more than tripled between 2000 and 2019. Poverty levels reduced fast, falling from 60 to 38 percent, and its human development score doubled between 1990 and 2019. Ultimately, Rwanda achieved all but one of its MDGs. Its current outcomes are above the median of peers in health, education, water and sanitation, and infrastructure (Figure 1). In particular, healthcare has benefited from extensive primary care by rural clinics and enrollment in education is nearly universal at the primary level, albeit less than 40 percent at the secondary level.

2. **Rwanda is strongly committed to ensuring that its 2030 sustainable development goals (SDGs) are understood and owned domestically and across stakeholders.** To this end, the authorities have developed a long-term strategy ("Vision 2050") aimed at achieving upper-middle-income status by 2035 (a per capita income of US$ 4,035) and high-income status by 2050 (a per capita income of US$ 12,476). The Vision is initially being implemented with a 2017–24 "National Strategy for Transformation" (NST1), into which the SDGs have been integrated. Specifically, prior to the COVID-19 pandemic, the strategy aimed to increase total annual investment from 23 percent of GDP in 2017 to 31 percent in 2024. Public investment, including the Government's part in public-private partnerships (PPPs), was set to increase gradually from 8.3 percent of GDP in 2017 to 9.9 percent in 2024. An important share of this increase would be directed towards education and health. The strategy also specifies that these increases would largely be funded from higher tax and non-tax revenues.

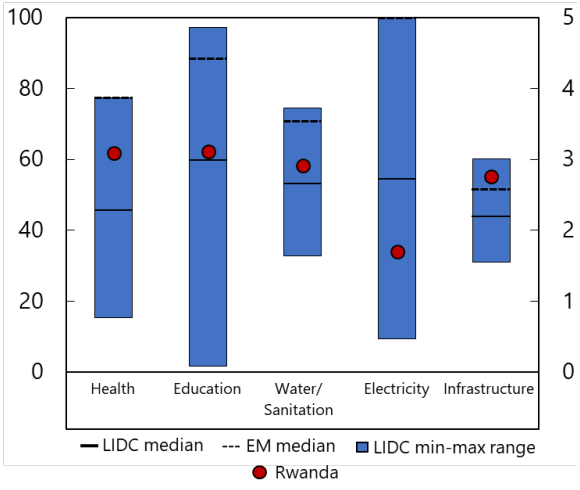
3. **The COVID-19 pandemic has worsened Rwanda's public finances and widened its development gaps.** Despite its remarkable progress on several fronts, Rwanda faced serious development challenges at the onset of the pandemic: Poverty remained high and nutrition indicators disappointed; stunting affected many children, hampering early childhood progress, and in turn affecting learning outcomes; access to qualified healthcare providers was low, and access to clean water and sanitation remained difficult. The electricity sector had excess on-grid capacity but

[1] Prepared by Roberto Perrelli (RPerrelli@imf.org). The analysis is based on the macroeconomic projection at the time of Rwanda's third PCI review (IMF 2021). Please see Duarte Lledo and Perrelli (2021) for more details of the analysis.

only 46 percent of households were connected to the grid. Based on those indicators and on a static costing model, Gaspar et. al. (2019) estimated Rwanda would need additional annual spending of 18.7 percent of GDP to achieve the 2030 SDGs in the critical areas of health, education, water and sanitation, roads, and electricity (Figure 2). The pandemic has widened Rwanda's 2030 SDGs gap to 21.3 percent of GDP per year according to staff's dynamic financing framework. More than ever, continuing Rwanda's track record of reform will be critical to narrow this gap and recover part of the output lost due to the pandemic.

Figure 1. Rwanda: Performance across Selected SDGs

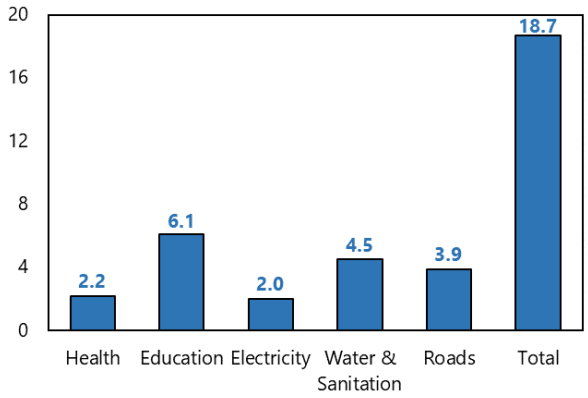
(Indices)



Source: Sachs et. al. (2020)

Figure 2. Rwanda: SDG Needs according to IMF Costing Mission

(Percent of 2030 GDP)



Source: Gaspar et. al. (2019)

B. SDG Financing: Pre-COVID Prospects

4. **In early 2020, Rwanda's economic performance was strong.** The authorities' policies were supported by the IMF's Policy Coordination Instrument (PCI) and focused on creating budget space for the implementation of Rwanda's NST1 while preserving fiscal sustainability (IMF 2019a).[2] The authorities also aimed at regaining momentum on domestic revenue mobilization and enhancing fiscal transparency. By the time of the PCI First Review, a booming construction sector, robust services activity, and strong agricultural output led staff to upgrade its 2019 real GDP growth rate estimate to 8.5 percent, and to project growth at about the same pace for the following years (IMF 2020a and Table 1). Inflation expectations were anchored around 5 percent. The overall fiscal

[2] Rwanda's PCI-supported program was approved in June 2019 (IMF 2019a) to support the implementation of the country's National Strategy for Transformation (NST). The four pillars of the PCI are: (i) creating budget space for the implementation of the NST while preserving fiscal and debt sustainability; (ii) improving fiscal transparency, including the identification and management of potential government liabilities, (iii) regaining momentum on domestic revenue mobilization; and (iv) supporting the implementation of the National Bank of Rwanda's new interest rate-based monetary policy framework.

deficit was within the adjusted program rule of 5.5 percent of GDP and public debt (including government guarantees) was projected to remain below the Eastern African Community debt convergence criterion of 50 percent of GDP in net present value (NPV) terms.[3]

Table 1. Rwanda: Selected Economic Indicators
(As of January 2020)

	2018	2019	2020	2021
	(Projected, in percent)			
Real GDP	8.6	8.5	8.0	8.0
Inflation (p.a.)	1.4	2.3	5.4	5.0
	(Projected, in percent of GDP)			
Revenues	24.1	23.6	23.1	22.9
Tax revenues	16.2	16.6	16.9	16.5
Grants	4.9	4.5	4.1	4.3
Other	3.0	2.5	2.1	2.1
Expenditures	28.8	31.9	29.0	29.2
Current	15.3	15.9	14.5	14.6
Capital	11.5	12.7	12.1	12.7
Interest	2.0	3.3	2.4	1.9
Overall balance	-4.7	-8.3	-5.9	-6.3
Excl. contingent. liab.	-5.0	-6.7	-5.7	-6.4
PV of total public debt incl. guarantees	40.9	44.5	43.1	42.9

Source: IMF Country Report No. 20/9, January 2020
Note: as of January 2020

5. **The authorities were committed to increase tax revenues.** Given Rwanda's investment needs and fiscal rule, mobilizing domestic revenue was necessary to pursue its sustainable development goals. The strategy was guided by IMF Technical Assistance (TA) on tax policies and revenue administration with a focus on: (i) streamlining tax incentives (mostly from VAT exemptions), (ii) improving tax compliance (boosting registration and intensifying the use of technology), and (iii) developing a Medium-Term Revenue Strategy (MTRS).

6. **Even so, Rwanda lacked a detailed plan to finance all its long-term development goals.** To meet its SDGs by 2030, Rwanda needed to invest 6.1 percent of GDP on education and 2.2 percent of GDP on health per year. Moreover, infrastructure investments of 4.5 percent of GDP on water and sanitation, 3.9 percent of GDP on roads, and 2 percent of GDP on electricity were required (Prady and Sy (2019) provide further details on the SDG costing exercise for Rwanda). Given the limited scope for revenue mobilization vis-à-vis the SDG needs and downward trends in official development assistance (ODA), the country would have to rely heavily on a combination of additional public borrowing and private sector participation, including though the "Compact with Africa" and the use of "de-risking" instruments. The authorities expected the costs of the NST1 to be shared (60-40) between the government and the private sector. Last, but not least, enhancing spending efficiency (e.g., through more intensive usage of technology) would also contribute to financing Rwanda's SDGs (IMF 2020a).

[3] The fiscal balance under the program, referred as the debt-creating fiscal balance, is defined as the overall balance excluding spending on materialized contingent liabilities already included in the DSA and UN peacekeeping operations. This program-based rule has been suspended and replaced at the outset of the pandemic by a tailored deficit path that accommodates budget needs to fight the pandemic and aims to bring nominal debt-to-GDP below 65 percent of GDP (see IMF Country Report No. 21/1). This debt anchor is deemed to keep the debt within safe levels taking into account Rwanda's history of domestic and external shocks and is consistent with the East African Community debt convergence criterion.

7. **Against this background, we calibrate a dynamic financing framework for Rwanda's sustainable development goals.** The pre-pandemic baseline projections are grounded on the global economic assumptions from the January 2020 World Economic Outlook (WEO) and the associated medium-term forecasts for Rwanda at that time. Likewise, the long-term fiscal projections are guided by Rwanda's Debt Sustainability Analysis at that juncture. The adoption of the January 2020 WEO vintage as the pre-COVID benchmark isolates the impact of the ongoing COVID-19 pandemic that has been reshaping Rwanda's economic outlook (section C).

8. **Before the pandemic and without any policy changes, it would take about 25 years for Rwanda to meet its SDGs**. Our dynamic financing framework scenarios suggest that Rwanda would meet its SDGs by 2045 in the baseline settings (Table 2). Implementing an MTRS that boosts revenues by 7 percent of GDP could shorten this period by 6 years. Reallocating 1 percent of GDP of public expenditures towards SDGs while increasing spending efficiency could cut it by 4 years. Combined, these fiscal measures could abridge Rwanda's SDG path by at least 8 years. If on the top of these fiscal measures the authorities could enact policies to attract private investment in development, say to reach the foreign direct investment pace observed in the top quartile of its peers' distribution, Rwanda would be able to meet its SDGs by 2035. In sum, active policies (fiscal measures and higher private sector participation in SDGs) could lessen Rwanda's SDG gap by more than a half. [4]

Table 2. Rwanda: Dynamic Financing Framework Scenarios, 2020-2050 (Pre-COVID)

Scenario	SDGs met by	Additional grants per year[1]	Per capita income[2]		Real GDP growth rate[3]		Public debt[1]	
			2030	2050	2030	2050	2030	2050
Pre-COVID Baseline	2045	0.0	1,332	3,893	7.6	7.3	53.6	53.5
Domestic revenue mobilization	2039	0.0	1,333	4,027	7.7	7.4	53.6	52.9
Spending shift	2041	0.0	1,406	5,297	8.7	8.4	51.7	48.3
All public measures	2037	0.0	1,410	5,153	8.9	8.5	51.5	48.6
Private sector participation	2044	0.0	1,375	4,267	8.2	7.6	52.5	52.1
Active policies without grants	2035	0.0	1,451	5,679	9.4	8.6	50.5	47.4
Only additional grants	2030	15.7	1,491	5,011	9.0	7.9	50.1	50.4
Public measures plus grants	2030	9.5	1,524	6,111	9.9	8.8	49.1	46.8
Active policies plus grants	2030	7.6	1,539	6,438	10.1	8.9	48.7	46.2

Source: IMF staff estimates. Notes: 1/ In percent of nominal GDP. 2/ In constant 2019 USD. 3/ In percent.

[4] It is noteworthy to explain that non-concessional resources (e.g. private sector investments on SDG infrastructure) often incur a cost on subsidies and therefore do not have the same impact as traditional grants.

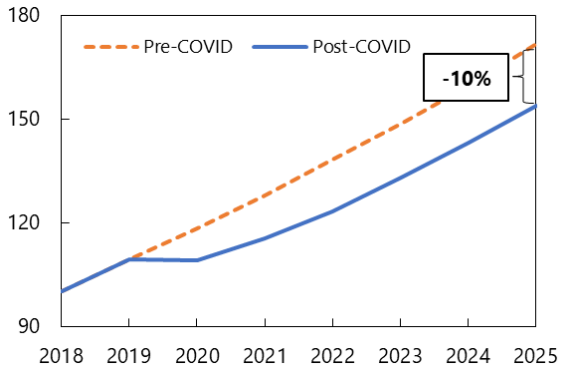
C. The COVID-19 Impact on Rwanda's Cyclical Position

9. **The pandemic hit Rwanda in mid-March 2020, compounding the effects of natural disasters (heavy rains) earlier in the year.** It dampened domestic activity and worsened balance of payments pressures with the disruption of international trade, business travel and tourism, leading to large losses of international reserves. The current account deficit widened due to drops in export receipts, remittances, and grants. Lower tax revenues and new spending pressures implied a large financing gap. The authorities requested IMF assistance in the form of direct budget support under the Rapid Credit Facility (RCF) to address urgent balance of payments needs (IMF, 2020b). The intensification of the crisis led Rwanda to request a second RCF (IMF 2020c). The country also received budget support and health-project resources from the World Bank and other international financial institutions during this period. Finally, Rwanda benefitted from debt relief under the IMF's Catastrophe Containment and Relief Trust.

10. **In response to the pandemic, the authorities launched an ambitious combination of social protection and economic support plans shielding vulnerable citizens and businesses.** On the revenue side, the authorities implemented temporary tax deferrals and personal income tax exemptions, softened tax arrears collection, and extended filing and payment deadlines for corporate income taxpayers. In addition, VAT refunds for small and medium enterprises were accelerated. On the expenditure side, cost-effectiveness, better targeting, and preventing crowding-out of other priority areas guided public spending decisions (Box 1).

Figure 3. Rwanda: Pandemic-Related Real Output Losses, 2018-2025

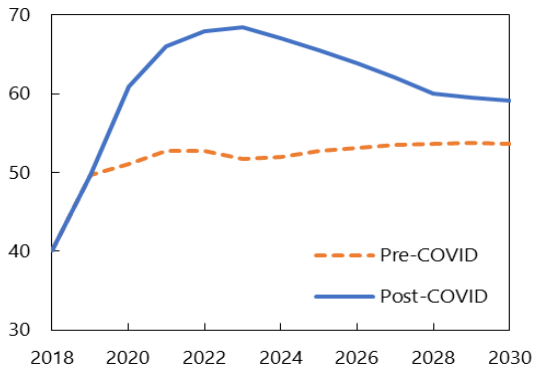
(Index, 2018=100)



Source: IMF staff calculations

Figure 4. Rwanda: Gross Nominal Public Debt

(Percent of GDP)



Source: IMF staff calculations

11. **Notwithstanding these measures, the pandemic reduced economic growth and worsened the fiscal stance, elevating Rwanda's public debt-to-GDP ratio.** Real GDP growth rate projections fell to -0.2 percent in 2020 and 5.7 percent in 2021 (from above 8 percent pre-COVID). Over the medium-term, the country is expected to close the output gap and gradually recovers its growth potential. However, this happens at a real GDP level that is on average ten percentage points lower than its pre-COVID trend (Figure 3). Gross public debt (excluding government guarantees) is set to end 2021 some 13 percentage points of GDP higher than in pre-COVID projections (Figure 4). Reflecting the post-pandemic outlook, the available fiscal space to invest in SDGs is expected to decline substantially over the medium and long terms.

Box 1. Rwanda's COVID-19 Crisis Response

Rwanda's swift response to the COVID-19 pandemic averted a full-blown health crisis**.** The government imposed a six-week lockdown and adopted innovative digital solutions for contact tracing, surveillance, prevention, and data visualization. Building on the pre-pandemic social protection architecture that was grounded on community-based identification and survey information, the authorities used an advanced social data collection and targeting system to support the most vulnerable groups. As a result, Rwanda recorded a limited number of cases and a low fatality rate (see further details in IMF 2020b and 2020c).

The authorities rolled out two major plans to tackle the pandemic impact on the economy. Rwanda's Social Protection Response and Recovery Plan provided door-to-door food distribution to vulnerable households, cash transfers to informal workers, temporary employment opportunities in labor-intensive public projects, and wider access to health and education services through the provision of subsidized tuition and school material and the construction of sanitation facilities. Rwanda's fiscal and quasi-fiscal support also included, inter alia, subventions to agricultural inputs, subsidized loans to firms in the most affected sectors, and credit guarantees and debt restructuring to firms with potential to recover from the pandemic.

Spending priorities were adjusted to attend higher demand for health and social protection. Pandemic-related health spending amounted to 1.4 percent of GDP in 2020, mostly allocated to the construction of quarantine facilities and acquisitions of drugs, medical and personal protection equipment. Social protection spending of 0.2 percent of GDP focused on cash transfers and food distribution. To minimize contagion, the authorities invested on sanitation and water facilities in low-income neighborhoods.

D. SDG Financing: Post-COVID Gap and Policy Measures

12. **We estimate the pandemic has widened Rwanda's financing gap to meet its 2030 SDG targets by 5.6 percentage points of GDP.** More than half of it is explained by the lower post-pandemic nominal GDP level. The permanent output loss widens the financing gap to meet some of the SDG targets: specifically, as infrastructure needs (such as the length of the road network or the

power generation capacity) remain unchanged, the SDG spending on infrastructure will consume a larger share of the country's post-pandemic (lower) GDP.[5]

13. **Rwanda's fiscal space to invest in SDGs is set to decline 2.4 percent of GDP per year relative to pre-pandemic levels** (Figure 5)**.** Lower tax and non-tax revenues are expected to reduce fiscal space by 1.3 percent of GDP while higher interest expenses will absorb another half percent of GDP over the decade (Table 3). Conversely, lower non-SDG spending (1.3 percent of GDP) and higher ODA flows relative to the smaller size of the economy (0.3 percent of GDP) almost entirely offset these forces. The decisive factor for the reduced fiscal space is the need to implement a backloaded but more stringent consolidation than expected before the country was hit by the pandemic. Excluding policy lending, the 2020-2030 average overall fiscal deficit is projected to narrow from 4.7 percent of GDP in the pre-COVID baseline scenario to 2.5 percent of GDP post-COVID projections.

Table 3. Rwanda: Additional Grants Needed to Meet 2030 SDGs

	Percent of GDP		
	Pre-COVID	Post-COVID	Difference
Additional grants needed	15.7	21.3	5.6
of which: Health & Education	4.8	5.9	1.2
Infrastructure	11.0	15.4	4.4
Total change			**5.6**
Effect of lower nominal GDP			**3.2**
Effect of lower fiscal space			**2.4**
of which: change in revenues (-)			1.3
change in fiscal balance			2.2
change in interest expenses			0.5
change in non-SDG spending			-1.3
change in subsidies for private investment			0.0
change in identified grants (-)			-0.3

Source: IMF staff estimates.

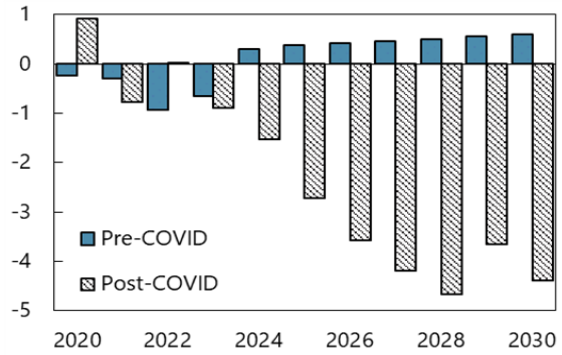
14. **In the post-COVID era, debt sustainability objectives may delay Rwanda's pace to meet its SDGs.** The backloaded fiscal consolidation (with narrower fiscal deficits over and beyond the medium term) aims to safeguard Rwanda's debt sustainability. Even if part of the fiscal constraint could be temporarily lifted with additional public borrowing, the authorities are committed to bring Rwanda's public debt below 50 percent of GDP (in net present value terms), to meet the debt convergence criterion of the Eastern African Community. Therefore, to attend development needs, the authorities are considering an ambitious medium-term revenue strategy to raise up to 7 percentage points of GDP between 2023 and 2029 (gains of up to 1 percentage point per year on the top of the baseline projections), which could in turn be mostly invested in SDGs (Figure 6). The

[5] The impact of the recession is somewhat less pronounced on the health and education needs as those largely consist of salaries that gradually adapt to the smaller size of the economy.

MTRS yields are based on a recent IMF Technical Assistance mission that examined Rwanda's tax policies and revenue mobilization potential.

Figure 5. Rwanda: Impact of Pandemic on SDG Fiscal Space, 2020-2030

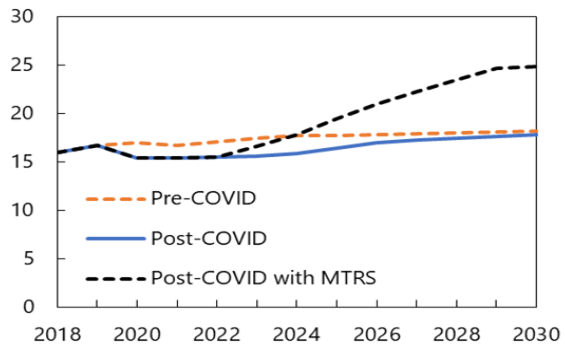
(Percent of GDP)



Source: IMF staff calculations

Figure 6. Rwanda: Impact of MTRS on Tax Revenues, 2018-2030

(Percent of GDP)



Source: IMF staff calculations

15. **The pandemic has delayed Rwanda's ability to meet its SDGs by about 5 years and substantially reduced its projected long-term per capita income.** Under current policies, Rwanda would meet its SDGs right after 2050. In a counterfactual analysis we estimate that, if the country were able to mobilize all funding needed to close its pre-COVID SDG financing gap by 2030, Rwanda would be able to meet its SDGs by 2035 in the post-COVID environment (i.e., 5 years later previously). Besides this effect, the pandemic is associated with a projected decline of 18 and 26 percent in Rwanda's 2030 and 2050 per capita income, respectively (Table 4).

Table 4. Rwanda: Dynamic Financing Framework Scenarios, 2020-2050 (Post-COVID)

Scenario	SDGs met by	Additional grants per year[1]	Per capita income[2]		Real GDP growth rate[3]		Public debt[1]	
			2030	2050	2030	2050	2030	2050
Post-COVID baseline settings	>2050	0.0	1,089	2,893	7.2	6.5	59.2	58.6
Domestic revenue mobilization	2044	0.0	1,088	3,073	7.2	6.7	59.2	57.1
Spending reallocation to SDGs	2050	0.0	1,144	4,019	8.2	7.9	57.1	52.1
Combined fiscal measures	2041	0.0	1,145	4,294	8.3	8.1	57.0	51.0
Private sector participation	>2050	0.0	1,124	3,323	7.8	7.0	57.8	55.9
Active policies w/o addtl grants	2040	0.0	1,179	4,601	8.8	8.4	55.8	50.1
Baseline plus additional grants	2030	21.3	1,254	4,451	9.0	8.1	53.8	51.5
Fiscal measures plus grants	2030	15.6	1,284	5,443	9.8	8.7	52.8	48.5
Active policies plus grants	2030	13.7	1,296	5,436	10.0	8.8	52.4	48.6

Source: IMF staff estimates.
Notes: 1/ In percent of nominal GDP. 2/ In constant 2019 USD. 3/ In percent.

16. **Against this background, we assess the impact of the MTRS and several other policy measures that could help to narrow Rwanda's SDG financing in the post-pandemic era.** The scenario analysis is based on the authorities' policies laid out in December 2020 (IMF 2021) and long-term macroeconomic forecasts using our dynamic financing framework for sustainable development. This exercise not only provides a useful comparison to the pre-COVID results discussed in Section B. but it also sheds light on the challenges that have emerged with an unforeseen, exogenous shock of historical proportions like the COVID-19 pandemic.

17. **Ambitious fiscal measures to promote sustainable development have turned even more critical.** For instance, enacting a medium-term revenue strategy that raises the total revenues-to-GDP ratio 7 percentage points above the baseline during 2023-29 could fulfill about one fifth of Rwanda's SDG gap in the post-pandemic projections, shortening its development path by 6 years or more. Reallocating one percentage point of GDP in public expenditures towards SDGs and boosting spending efficiency to the level of peers could provide valuable support as well. Together, these fiscal measures could cover more than one quarter of Rwanda's 2030 SDG financing gap, helping the country to meet its SDGs by 2041.

18. **The importance of private investment and additional resources to finance Rwanda's SDGs could not be overstated.** Once the economy recovers, if the country were to bring its annual foreign direct investment in line with the top quartile of its peers' distribution, it could gradually attract an extra 2¾ percent of GDP of private resources, which in turn could cover up to one tenth of Rwanda's 2030 SDG financing gap. Altogether, active policies that combine fiscal measures and higher private sector participation could fulfill more than one third of Rwanda's post-pandemic SDG financing gap, enabling the country to meet its SDG targets by 2040. Nevertheless, even in the scenario with active policies, the pledge to meet its SDGs by 2030 would require about 13¾ percentage points of GDP in additional resources annually until then.

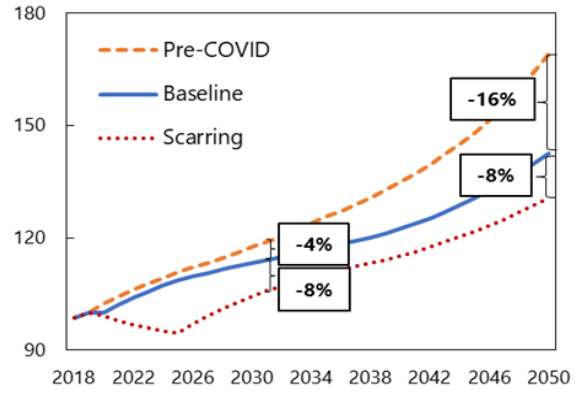
E. SDG Financing: The Perils of Scarring

19. **The pandemic may leave lasting wounds in Rwanda's economy.** Economic scarring may be associated with schooling interruptions, protracted unemployment due to skills mismatches, technological disruptions that lead to a permanent decline in contact-intensive sectors, and lower returns to spending on education due to social distancing. To capture those, we calibrate three parameters of the endogenous growth model in Rwanda's dynamic financing framework: the human capital depreciation rate, the elasticity of new human capital formation to education spending, and the human capital diffusion parameter. We conjecture that economic scarring accelerates human capital depreciation and lowers the elasticity of new human capital formation to education spending

for about five years, and with lasting negative spillovers to total factor productivity growth (for details on Rwanda's scarring scenario, see Duarte Lledo and Perrelli, 2021). In these circumstances, Rwanda's stock of human capital could end the decade one-quarter lower than pre-COVID projections (Figure 7) and its real GDP growth rate could drop below 6 percent (Figure 8).

Figure 7. Rwanda: Impact of Scarring on Human Capital, 2018-2050

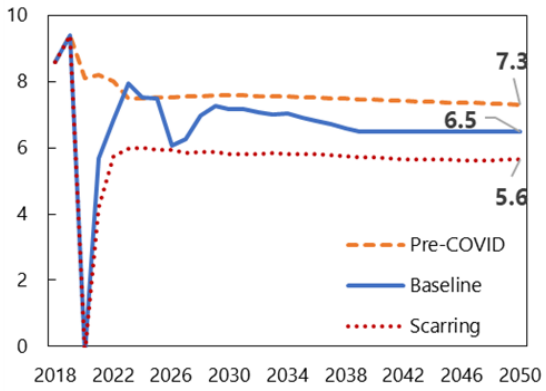
(Index, 2019= 100)



Source: IMF staff calculations

Figure 8. Rwanda: Impact of Scarring on Real GDP Growth, 2018-2050

(Percent)



Source: IMF staff calculations

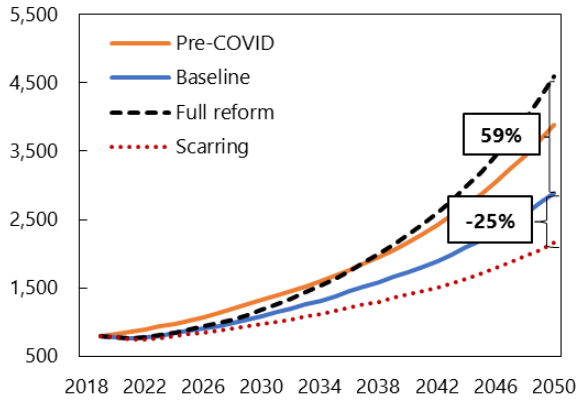
20. **With scarring, Rwanda's 2030 SDG gap would widen by a further 1.6 percentage points of GDP.** The scarring would entail adjustment costs for firms and workers, including through costly resource reallocation across sectors and exit of discouraged workers from the labor force (IMF 2020d). These factors could reduce productivity and delay a firm economic recovery. Sluggish growth would be associated with reduced revenues, further compressing fiscal space for investment in SDGs. Following the decomposition presented in Section D, we estimate this illustrative scarring situation could lead to additional financing needs of 1.6 percentage points of GDP, mostly due to higher infrastructure needs (relative to the smaller size of the economy), pushing Rwanda's 2030 SDG financing gap to near 23 percent of GDP per year.

21. **To cope with potential scarring, Rwanda should promote policies that decisively support its SDGs.** The illustrative scarring has the potential to gradually shave about one quarter of Rwanda's projected per capita income in the long run (Figure 9). Enacting active policies would more than offset these losses, eventually pushing Rwanda's per capita income above pre-pandemic projections. The pursuit of SDGs through active policies would have an even larger impact on Rwanda's stock of human capital per worker, substantially offsetting any pushback from pandemic scarring (Figure 10). Such finding is critical because human capital per worker is a key source of Rwanda's long-term economic growth. Thus, besides the fiscal measures, the provision of

appropriate conditions for private investment in areas that lack attractiveness and adequate public resources, such as health and education, should be seen as a priority in Rwanda's development strategy.

Figure 9. Rwanda: Impact of Scarring on Per Capita Income, 2018-2050

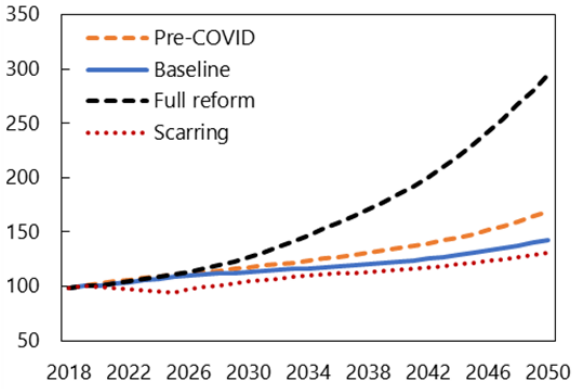
(2018 US dollars)



Source: IMF staff calculations

Figure 10. Rwanda: Impact of Scarring on Human Capital, 2018-2050

(Index, 2019=100)



Source: IMF staff calculations

F. Concluding Remarks

22. **The COVID-19 pandemic has substantially widened Rwanda's SDG financing gap.** Staff estimates the country will need additional resources in the order of 21¼ percent of GDP per year to meet its SDGs by 2030 (the target year originally envisaged by the United Nations). This compares with 15.7 percent of GDP per year using pre-COVID data and staff's dynamic financing framework for sustainable development. Rwanda's additional SDG financing gap could be about 1½ percent of GDP larger in a scenario with long-term economic scarring.

23. **The widening of Rwanda's SDG financing gap due to the pandemic can be mostly attributed to lower GDP and reduced fiscal space.** The pandemic is expected to impose output losses on the tune of 10 percent in real terms, which translates into additional SDG needs of 3.2 percent of GDP per year until 2030 (mostly due to higher infrastructure costs relative to the smaller size of the economy). Rwanda's strong commitment to safeguarding debt sustainability entails a backloaded adjustment that substantially narrows the country's overall deficit relative to pre-COVID projections. The tighter fiscal stance reduces Rwanda's fiscal space to invest in SDGs by approximately 2.4 percentage points of GDP per year, further decelerating its development progress.

24. **In the post-pandemic era, Rwanda will need active policy measures to attract private resources to support its SDGs.** The pandemic brough to the fore the value of mobilizing domestic revenues and reallocating resources to areas with the highest impact on development. The authorities should swiftly implement an MTRS and reallocate expenditures accordingly. Boosting public spending efficiency would help Rwanda to achieve higher per capita income in the long run. Attracting private investment to SDG projects will be crucial. Altogether, these actions could fulfill more than one third of Rwanda's post-pandemic SDG financing gap.

II. CASE STUDY NIGERIA[6]

25. **Nigeria has made progress in social and economic development over the last two decades.** Since 2000, the Federal Government of Nigeria (FGN) has adopted the Millennium Development Goals (MDGs) and embedded them within its national development agenda. Progress was made in several areas, such as reducing extreme poverty from 66 percent in 1996 to 46 percent in 2010, improving health indicators on maternal and child health, and lowering infection rate of HIV/AIDS. This progress was supported by strong economic growth, averaging 7.7 percent per year between 2000 and 2014, increasing public resources. However, at the end of the MDG period in 2015, only one goal had been achieved, and rapid population growth led to regresses in some areas. For example, the number of citizens without access to basic sanitation increased by 18 million between 2000 and 2015.

26. **Nigeria has embraced the 2015 SDG agenda to address long-term social and economic challenges.** The Economic Recovery and Growth Plan (ERGP) 2017–2020 gives prominence to economic, social and environmental issues. It includes initiatives to improve access and quality of healthcare and education and emphasizes investment in infrastructure. A special office within the presidency was established responsible for coordination, planning, communications, and advocacy around the SDGs agenda. The federal government has included specific programs to support the SDGs in the budget. The nation is recognizing that an all-government approach (including federal, state, and local governments) is required to make progress on the SDGs.

27. **Nevertheless, Nigeria still faces serious development gaps.** Just half of the student-age population is enrolled in school. Healthy life expectancy is 54.4 years, placing Nigeria among the bottom countries in the world. Some 54 percent of the population is connected to an electricity grid, that collapses frequently. Roads are in precarious condition. Less than 4 percent of the population has access to safely managed water. Overall, Nigeria's indicators of human and physical capital are worse than countries with lower GDP per capita, and the country ranked 160 out of 166 countries on the Sustainable Development Report's SDG index (UN, 2020). In all, the country faces major challenges to achieve 12 of the 17 SDG goals by 2030 (Figure 11)[7], with the performance in 3 out of 5 SDG areas below LIDCs' median (Figure 12).

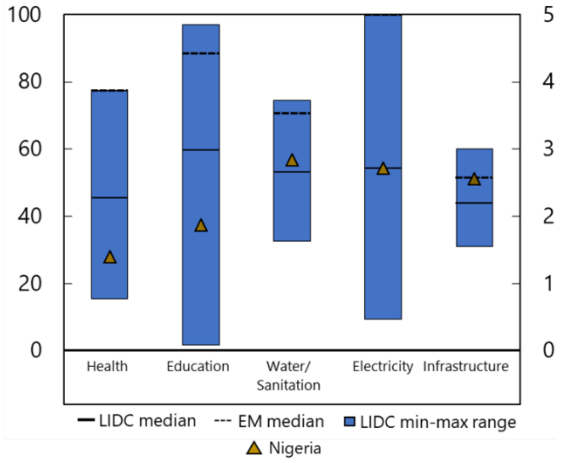
[6] Prepared by Olusegun Akanbi (OAkanbi@imf.org) and Hua Chai (HChai@imf.org). The analysis is based on the macroeconomic projection at the time of the October 2020 World Economic Outlook (IMF, 2020d). Please see Akanbi and Chai (2021) for more details of the analysis.

[7] Sustainable Development Report 2020 Country Profile.

Figure 11. Nigeria: Status of SDGs, 2020

Source: Sustainable Development Report 2020, Nigeria country profile.

Figure 12. Nigeria: Selected Sustainable Development Goals (SDGs) Performance



Source: Sachs et. al. (2020)

A. Pre-Pandemic Development Policies

28. **Before the onset of the COVID-19 pandemic, Nigeria's economy was transitioning to a low oil price equilibrium with rising vulnerabilities.** Recovery from an oil price shock that triggered a 2016 recession was continuing but at a slow pace. At 2.3 percent in 2019, real GDP growth remained firmly below population growth. Inflation had risen to 12 percent by end-2019 and was expected to stay elevated over the medium term. The

Table 5. Nigeria: Selected Economic Indicators

(As of January 2020)

	2018 Act.	2019 Est.	2020 Projection	2021
	(Annual percentage change)			
Real GDP (at 2010 market prices)	1.9	2.3	2.5	2.5
Consumer price index (annual average)	12.1	11.4	13.4	11.4
	(Percent of GDP)			
Total revenues and grants	8.5	8.0	8.5	8.1
Of which: oil and gas revenue	4.6	3.7	3.8	3.2
Of which: non-oil revenue	4.0	4.2	4.7	4.9
Total expenditure and net lending	12.8	13.0	13.1	13.0
Overall balance	-4.3	-4.9	-4.6	-4.9
Non-oil primary balance	-7.2	-7.1	-6.6	-6.2
Public gross debt	27.0	29.5	31.1	33.1

Source: IMF staff estimates.

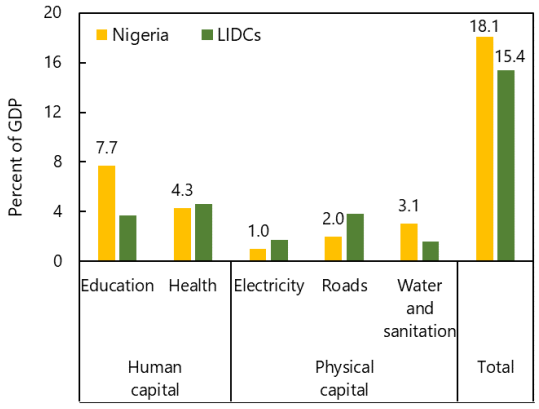
overall general government fiscal deficit widened to about 5 percent of GDP reflecting declining oil prices. Public debt, although on a rising trend, was moderate at below 30 percent of GDP in 2019, and was expected to remain below 40 percent of GDP in the medium term (Table 5). Nevertheless, due to weak revenue mobilization, more than half of FG's revenue is absorbed by interest payments, significantly constraining its capacity to finance needed spending. Dwindling international reserves, low tax revenue, inadequate infrastructure and governance weakness are major vulnerabilities constraining growth.

29. **Financing Nigeria's development goals is challenging.** Using the static costing model, developed in Gaspar *et. al.* (2019), Soto *et. al.* (2020) estimate additional annual spending needs between now and 2030 of 18 percentage points of projected 2030 GDP to achieve the SDGs in the critical areas of health, education, water and sanitation, roads, and electricity (Figure 13).[8] Nigeria's additional spending needs are higher than the average of low-income and developing countries, particularly on education, water and sanitation. Financing these spending needs is a formidable challenge. Room for additional borrowing is limited given Nigeria's vulnerability with debt servicing. In addition to more private sector participation, significant increases in domestic revenue mobilization are essential to meet the financing needs.

Figure 13. Nigeria: Spending in Critical SDG Sectors

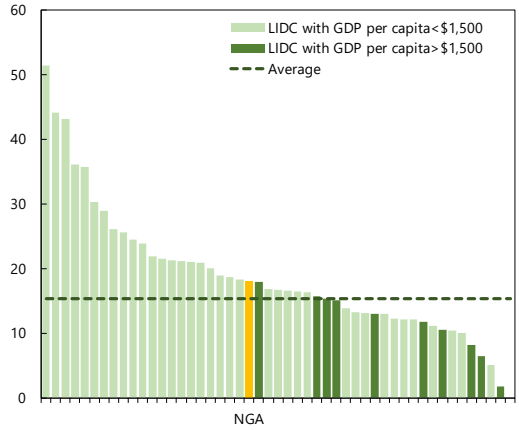
By Sector

(Percent of 2030 GDP)



In Low-Income and Developing Countries

(Percent of 2030 GDP)



Source: IMF staff calculations.

30. **The authorities plan to increase revenues from 7 percent of GDP in 2019 to 15 percent of GDP in the medium term to create fiscal space for priority spending.** Given Nigeria's public investment needs, mobilizing domestic revenue is key to pursue its sustainable development goals.

[8] We follow the costing methodology developed in Gaspar et. al. (2019), that expresses the SDG needs in terms of 2030 GDP, the target year for achieving the SDGs.

The authorities' strategy has been guided by the Strategic Revenue Growth Initiatives (SRGI), announced in January 2019, which included initiatives to improve tax collection, broaden the tax base, reform the VAT, and improve compliance. Some of these initiatives, such as an increase in the standard VAT rate and higher and broader excises were introduced through the Finance Bill 2019. Additional reforms are needed to achieve the authorities' medium-term revenue target, including further reforming the VAT, increasing rates and broadening base of excise taxes, reducing tax expenditure, and enhancing tax administration to increase tax compliance. Implementing reforms in line with the SRGI and recommendations from development partners (including the IMF) has proven challenging given Nigeria's limited capacity.

31. **Against this macroeconomic background, we calibrate a fully dynamic financing framework for Nigeria's sustainable development goals.** The pre-pandemic baseline assumes no additional policy measures beyond those already implemented before the onset of the pandemic and those embedded in the WEO projections. The framework is grounded on January 2020 World Economic Outlook data and staff's medium-term projections while the long-term debt path (2026-2050) is guided by staff's Debt Sustainability Analysis. The choice of the January WEO as the cut-off date is aimed to separate the pre-pandemic situation from more recent events that re-shaped Nigeria's outlook (section B). The baseline envisages a gradual pickup in growth rate to 4–4½ percent—reflecting long-term trends—and limited improvement in revenue collection. Inflation is assumed to stabilize at 11 percent. SDGs spending by the government is assumed to remain on its 2019 level, while the private sector is expected to maintain the same spending on health and education and contribute an additional 0.7–1 percent of GDP in infrastructure investment (Table 6). Additional investment is assumed to stop once the SDGs are reached.

Table 6. Nigeria: Pre-COVID Baseline Scenario

	2019	2020	2030	2050
	(Percent of GDP)			
Real GDP growth	2.2	2.5	3.5	4.5
Inflation (percent)	11.4	13.0	11.0	11.0
Public sector				
Total revenue	7.9	8.2	8.4	9.5
Total expenditure	12.6	12.8	12.9	12.9
o.w. SDG spending	3.9	4.3	4.4	4.3
health and education	1.8	2.3	2.3	2.3
infrastructure	2.2	1.9	2.0	2.0
subsidies for private investm	0.0	0.1	0.1	0.0
Overall fiscal balance	-4.8	-4.6	-4.5	-3.3
Public debt	29.1	31.3	50.3	38.1
Private sector				
Private financing	9.0	9.7	9.7	10.0
health and education	9.0	9.0	9.0	9.0
infrastructure	0.0	0.7	0.7	1.0
Total financing for SDGs	12.9	13.8	13.8	14.0

Source: IMF staff estimates.

32. **Under these assumptions, Nigeria will not be able to meet its SDGs without identifying a substantial amount of additional resources every year.** Under the baseline, spending on health and education would stay at about half of the level required to achieve the SDGs by 2030, and the stock of water, sanitation and power infrastructure would increase but reach only ⅓rd of the target level. To meet the SDGs by 2030, Nigeria would need additional grant-like (i.e., interest-free, non-repayable) resources of 16 percent of GDP every year (Table 7, scenario A). We estimate that, for

every five-year extension on the SDGs planning horizon, the amount of unidentified grants declines by 1.2 percent of GDP on average. Even if extending the target horizon to 2050, Nigeria would still require additional annual resources of 11 percent of GDP per year to meet its SDGs (Table 7, scenario E).

Table 7. Nigeria: Long-Term Macro Projections – Pre-COVID Scenarios, 2020 - 2050

		Additional grants	Per capita income[2]		Real GDP growth rate[3]		Public debt[1]	
Scenario	SDGs met by	per year[1]	2030	2050	2030	2050	2030	2050
A	2030	16.2	2,647	4,044	4.2	4.3	49.7	38.1
B	2035	14.9	2,638	4,183	4.2	4.2	49.8	37.8
C	2040	13.7	2,628	4,322	4.2	4.2	49.8	37.3
D	2045	12.5	2,615	4,430	4.2	4.3	49.9	36.7
E	2050	11.4	2,600	4,446	4.2	4.7	50.1	36.4

Source: IMF staff estimates.

B. The COVID-19 Crisis and post-pandemic development

33. **The COVID-19 pandemic is having a major impact on economic activity in Nigeria**. Following a modest expansion in the first quarter of 2020, real GDP declined by 6 percent (y/y) in the second quarter. The contraction was driven by sharp declines in the oil price together with COVID-related lockdowns that majorly impacted the non-oil economy. The economy continued to contract in the third quarter albeit at a slower pace. Despite weak domestic demand, both headline and core inflation have been on upward trends amidst supply shortages resulting from the lockdown. Headline inflation reached 15.8 percent in end-October 2020, while the unemployment rate reached 27 percent in the second quarter, with youth unemployment increasing to 41 percent. The Federal Government adopted a revised budget in July in response to the pandemic with budgeted oil price at $28 per barrel (compared to $57 in the original budget), removal of fuel subsidies, and reprioritization of spending to make room for a N500 billion (approx. USD 1.3 billion) COVID-19 support package. The nine-months fiscal outturn shows sizable underperformance in non-oil revenues, while oil revenues held up thanks to a modest recovery in oil price. Deficit financing has relied on external borrowing, including disbursements under the IMF's Rapid Financing Instrument (RFI), and domestic issuance taking advantage of below-inflation effective interest rates on treasury instruments and increased legal borrowing limits.

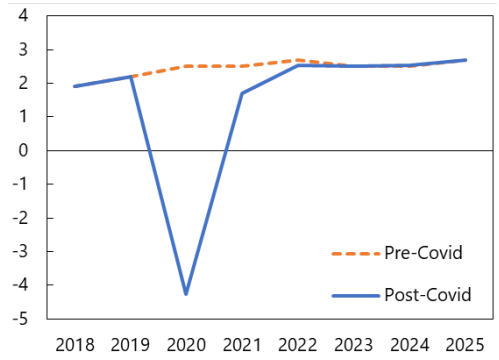
34. **Staff's forecasts point to a temporary growth contraction and widening of the fiscal deficit.** In its October 2020 WEO projection, staff revised 2020 real GDP growth to -4.3 percent (from 2.5 percent), with a recovery to the medium-term growth rate of 2.5 percent growth in 2022. As a result, output loss by 2025 is projected to be significant at 9 percent (Figure 14). The fiscal

deficit is expected to widen from 4.8 to 6.0 percent of GDP in 2020, primarily due to revenue loss and COVID-related spending. Public debt is projected to increase to 35 percent of GDP in 2020 but remain below 40 percent of GDP over the medium term, benefiting from the favorable interest rate–growth differential. A global resurge of the pandemic with negative impacts on oil prices poses the largest risk to this medium-term outlook.

Figure 14. Nigeria: Economic Impact of COVID-19

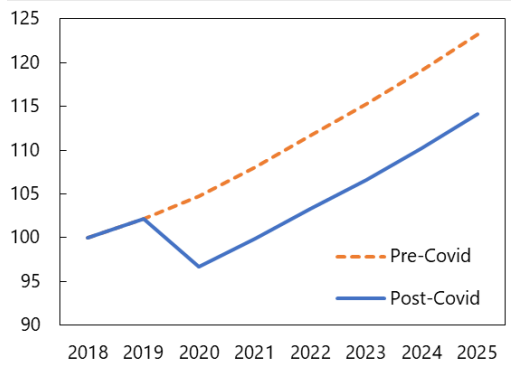
Growth Dynamics

(Percent Change)



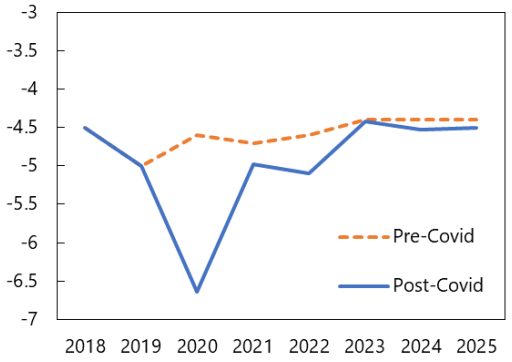
Pandemic-related Output Losses, 2018-2025

(Index, 2018=100)



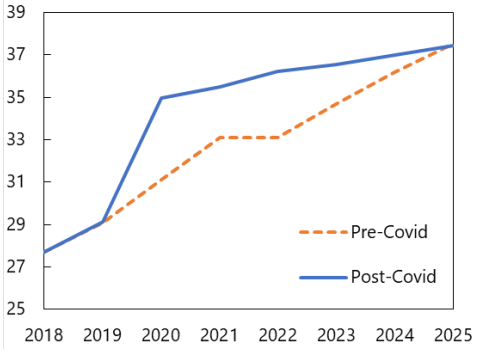
Overall Deficits

(Percent of GDP)



Public Debt

(Percent of GDP)



Source: IMF staff estimates

35. **Against this background, we assess the impact of the COVID-19 crisis on Nigeria's development path toward its SDGs.** We do this through scenario analysis based on WEO October 2020 data and forecasts, contrasting these with the pre-COVID scenarios discussed above. While the COVID-19 crisis is still evolving, this October vs January 2020 comparison serves as a proxy for the immediate impact of the pandemic on Nigeria's development path. The post-COVID baseline envisages a gradual pickup in long-run growth rate to 3½ percent by 2030 (½ percentage point lower than in the pre-COVID baseline), and a convergence to the pre-COVID long run growth rate of 4½ percent by 2050, reflecting long-lasting damages to the economy caused by the pandemic, which is also manifested in less financing from the private sector. Fiscal revenue, although significantly lower in the near-to-medium term relative to the baseline, is expected to converge to the levels in pre-COVID baseline by 2030. Public debt is expected to surge in 2020 but converge to the pre-COVID level by 2025 mainly due to lower projected interest rates in the medium term (Table 8).

Table 8. Nigeria: Post-COVID Baseline Scenario

	2019	2020	2030	2050
		(Percent of GDP)		
Real GDP growth	2.2	-4.3	3.5	4.5
Inflation (percent)	11.4	12.9	11.0	11.0
Public sector				
Total revenue	7.9	5.9	8.5	9.7
Total expenditure	12.6	11.9	12.9	12.9
o.w. SDG spending	3.9	2.2	4.3	4.2
health and education	1.8	1.0	2.0	2.0
infrastructure	2.2	1.1	2.2	2.2
subsidies for private investment	0.0	0.1	0.1	0.0
Overall fiscal balance	-4.8	-6.0	-4.4	-3.3
Public debt	29.1	35.0	56.0	46.0
Private sector				
Private financing	9.0	7.0	8.7	10.0
health and education	9.0	6.3	8.0	9.0
infrastructure	0.0	0.7	0.7	1.0
Total financing for SDGs	12.9	27.3	12.8	14.1

Source: IMF staff estimates.

36. **The pandemic significantly sets back Nigeria's path towards its SDGs.** As in the pre-COVID baseline, Nigeria will not be able to meet its SDGs without identifying a substantial amount of additional resources. In order to meet its SDGs by 2030, the pandemic implies a further increase of these additional annual resource needs by 2.1 percentage points, increasing from 16.2 to 18.3 percent of GDP every year between now and 2030. (Table 9 scenario A1). This increase reflects reallocation of SDGs spending toward COVID-related non-SDG areas in 2020, lower public resources in the medium term (0.4 percent of GDP) due to lower revenues in the near term and lower oil prices in the medium term, as well as reduced availability of private sector financing due to weakened economic activity (1.2 percent of GDP). It also reflects additional ambition needed on infrastructure (0.5 percent of GDP), where spending needs reflect the additional roads, grids and water sanitation needed for development—a number that remain constant in nominal Naira terms and hence comprises a larger share of post-COVID GDP.[9] Looked at differently, even if the annual funding for

[9] Recurrent spending on health and education, in contrast, consists largely of salaries, which over time scale with GDP.

development of 16 percent of GDP needed to achieve the SDGs in the pre-COVID world remains available, after the pandemic it will take 6 more years for Nigeria to reach its SDGs.

37. **Damage from the COVID-19 pandemic, if lasting longer than expected, would set back the path toward the SDGs even further.** A scarring scenario is calibrated where real GDP growth remains 25 percent lower than the baseline. When such scarring occurs, additional resources of about 21 percent of GDP per year would be needed to achieve SDGs by 2030 (Table 9, Scenario B1).

C. Policies to Achieve the SDGs

38. **Comprehensive reform efforts on multiple fronts are needed to significantly increase domestic resources to meet SDGs.**

- **Tax reforms.** Further mobilizing tax revenue requires increasing the VAT rate from 7.5 percent to at least 10 percent by 2022 and 15 percent by 2025, increasing rates and broadening the base for excises (e.g., fuel and telecom airtime), streamlining tax incentives and exemptions, and tackling tax evasion and avoidance. Key tax administration priorities include developing a high-integrity taxpayer register, improving filing and arrears management, and continuing ongoing reforms in customs administration, with the objective of doubling Nigeria's very low tax compliance rates (e.g., 25% for VAT) over the medium term. A Medium-Term Revenue Strategy (MTRS) should be put in place to guide these reforms. Reform efforts should continue beyond the medium term to steadily increase revenue collection efficiency.

- **Oil sector reform**. Moving to a flexible exchange rate would increase the Naira value of Nigeria's oil revenue. In addition, reforming the policy, institutional and regulatory framework for the petroleum industry – including the fiscal regime – is essential to fully realizing the potential of the sector. Adoption of the Petroleum Industry Bill, expected in 2021Q2, would help revamp the regulatory structure, realign fiscal terms, and attract more investment in the oil sector and hence boost oil revenue in the long run.

- **SOEs and public spending efficiency reform.** Nigeria's SOEs sector is sizable and inefficient. Improving financial oversight and governance of SOEs through enhanced transparency and efficiency could lead to higher profitability and hence public sector revenues. Nigeria's public investment efficiency is among the lowest in the world, with an estimated gap relative to the frontier at 77 percent (Seiwald *et. al.* 2019). Strengthening institutions governing project appraisal, selection and management is important to enhance the effectiveness of spending and reduce resources required to achieve SDGs.

- **Private sector participation.** Given the sheer size of Nigeria' SDG needs, the contribution of private sector to SDG projects is indispensable. The authorities should thus enhance efforts to strengthen the PPP framework and provide appropriate conditions for private investors to step up their participation in areas that lack attractiveness and cannot count on adequate public resources. Much of this investment will have to come from abroad. Pursuing reforms that bring Nigeria in line with peers would increase foreign direct investment by 3.5 percent of GDP by 2030, which we assume would be available for spending in health, education and infrastructure.

39. **These reforms would significantly boost progress but achieving the SDGs by 2030 would still require substantial additional grants.**

- The tax revenue reforms (MTRS) are expected to deliver tax revenue gains of 5.6 percent of GDP by 2030 (including import-related revenue gain from exchange rate movement of 0.5 percent of GDP) relative to the post-COVID baseline. Additional non-tax revenue gain of 1 percent of GDP is also estimated from exchange rate movement. Under the assumption of continuing reform, total revenue is expected to further increase to 17.2 percent of GDP by 2050, with tax revenue accounting for about 11 percent of GDP. This is consistent with tax revenue potential estimates in the literature (Section VI, Fenochietto 2013, IMF 2017) which suggest that a non-oil tax capacity for a country with Nigeria's economic structure and per capita income levels would be around 16 to 18 percent of GDP. While a significant share of this revenue increase needs to be saved to achieve fiscal balance by 2025 and address Nigeria's fiscal vulnerabilities, it would still reduce the need for additional resources to achieve the SDGs by 2030 by 4.2 percent of GDP to 14 percent of GDP (Table 9, Scenario C1). Without any of these resources, the SDGs would not be met even by 2050 (Table 9, Scenario C). In the absence of fiscal consolidation, tax revenue reform could bring down external grant requirement to 11.2 percent of GDP (Table 9, Scenario D1).
- Oil sector reforms are expected to increase revenue by about 2.2 percent of GDP by 2030 relative to the post-COVID baseline, divided between additional revenue of 1.1 percent of GDP from exchange rate liberalization and 1.1 percent of GDP from reform to the fiscal regime. This would reduce the need for external grant to achieve SDGs by 2030 to 15.7 percent of GDP (Table 9, Scenario E1).
- Reforms of the SOEs are expected to increase public sector revenue by 1 percent of GDP by 2030 relative to the baseline. This brings down the need for external grants to achieve SDGs by 2030 to 15.3 percent of GDP (Table 9, Scenario F1).[10]

[10] This scenario also captures the revenue impact of exchange rate depreciation of 1.5 percent of GDP by 2030 and includes gradual long-term improvements in public investment efficiency.

- Assuming Nigeria could increase FDI to be in line with peers, the country could mobilize an additional 3.5 percent of GDP in private sector funding. If these funds were to be spent on SDG-related projects, the additional resources required to meet the SDGs by 2030 would decline to 15.6 percent of GDP (Table 9, Scenario G1).

Table 9. Nigeria: Long-term Macro Framework Projections - Post-COVID Scenarios, 2020-2050

Scenario	SDGs met by	Additional grants per year[1]	Per capita income[2]		Real GDP growth rate[3]		Public debt[1]	
			2030	2050	2030	2050	2030	2050
A. Post-COVID Baseline	>2050	0.0	2,218	3,440	3.5	4.5	59.0	46.1
A1. Post-COVID Baseline + Grants	2030	18.3	2,443	3,733	4.3	4.2	56.0	46.0
B. (Downside)	>2050	0.0	2,027	2,373	2.2	3.2	56.1	59.7
B1. (Downside)	2030	20.7	2,239	2,628	3.1	3.0	53.2	59.5
		With Balanced Budget						
C. Reform-MTRS	>2050	0.0	2,327	4,106	4.4	4.6	39.6	17.9
C1. Reform-MTRS + Grants	2030	14.0	2,530	4,353	5.2	4.4	37.4	17.8
		With Baseline Deficit						
D. Reform-MTRS	>2050	0.0	2,354	4,225	4.6	4.6	60.3	64.8
D1. Reform-MTRS + Grants	2030	11.2	2,518	4,419	5.2	4.5	58.2	65.2
		With Baseline Deficit						
E. Reform-Oil Sector	>2050	0.0	2,212	3,487	3.8	4.3	60.1	61.5
E1. Reform-Oil Sector + Grants	2030	15.7	2,411	3,731	4.7	4.0	57.5	61.7
		With Baseline Deficit						
F. Reform-SOEs and Efficiency	>2050	0.0	2,260	4,232	4.2	5.2	59.3	56.6
F1. Reform-SOEs and Efficiency + Grants	2030	15.3	2,538	4,563	5.6	4.5	55.6	57.5
		With Baseline Deficit						
G. Reform-Private Sector	>2050	0.0	2,242	4,026	4.1	5.0	61.9	64.1
G1. Reform-Private Sector + Grants*	2030	15.6	2,440	4,255	4.8	4.8	59.2	64.9
		With Balanced Budget						
H. Reform-Full	2043	0.0	2,321	5,074	4.7	5.7	39.4	15.8
H1. Reform-Full + Grants	2030	11.9	2,544	5,288	5.8	5.6	36.9	15.8
I. Reform-Full(with Donor Support)	2036	0.0	2,354	5,438	5.4	7.7	38.9	15.3
I1. Reform-Full(with Donor Support) + Grants	2030	8.2	2,513	5,580	6.0	7.6	37.1	15.3

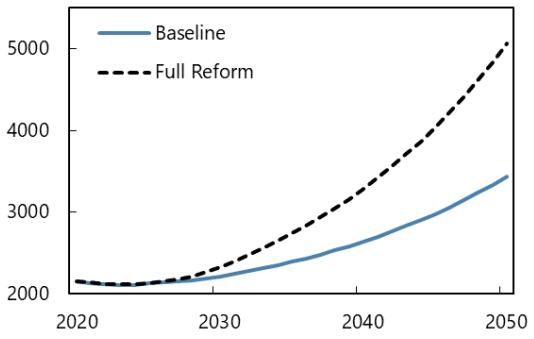
Source: IMF staff estimates

40. **Taken together, these reforms would allow Nigeria to meet its SDGs even in the absence of additional financing, albeit with a significant delay.** If Nigeria successfully implements all these reforms, while achieving budget balance, it could raise its total revenue to 17.2 percent of GDP by 2030 and 19.7 percent of GDP by 2050 (with tax revenue at 11.7 percent of GDP), and meet its SDGs target by 2043, without any external grants (Table 9, Scenario H). By 2030, Nigeria would be able to fill 38 and 37 percent of its SDGs gap in infrastructure and education and health targets respectively. The investment in SDGs boosts incomes, thus reducing poverty, and significantly increases human capital, illustrating the truly transformative effects of reform (Figure 15, 16). However, even with all these reforms, meeting the SDGs by 2030 would still require additional resources of about 12 percent of GDP annually (Table 9, Scenario H1). On the other hand, if donor countries would gradually increase their development aid to the of GNI UN target of 0.7 percent,

and these additional funds would be distributed equally (according to GDP) over all low-income developing countries, and Nigeria would pursue all reforms above, the country would be able to meet its SDGs by 2036 (Table 9, Scenario I). In this scenario, additional grants of 8.2 percent of GDP per year would be needed to meet the SDGs by 2030 (Table 9, Scenario I1).

Figure 15. Nigeria: GDP Per Capita

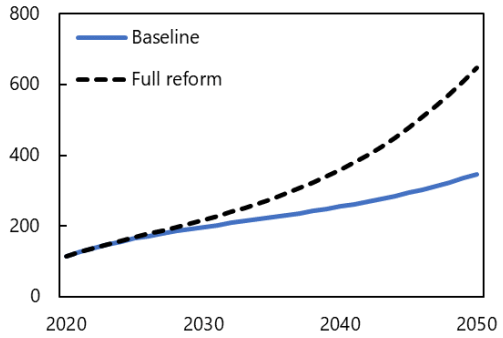
(Constant 2019 US dollar)



Source: IMF staff estimates.

Figure 16. Nigeria: Human Capital Per Worker

(Index, 2019=100)



Source: IMF staff estimates.

D. Concluding Remarks

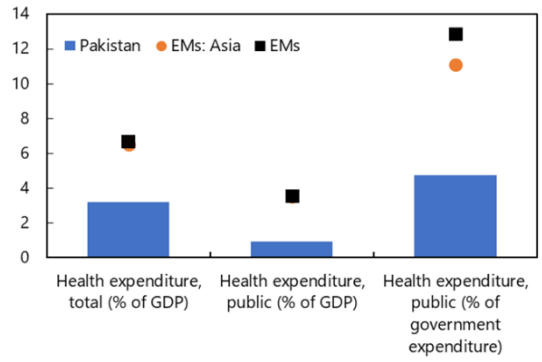
41. **The COVID-19 pandemic has substantially widened Nigeria's financing gap to achieve its SDGs.** Applying our novel long-term macro framework indicates that, under current policies and identified resources, Nigeria would require additional resources of more than 18 percent of GDP per year (versus some 16 percent of GDP per year in the pre-COVID projections) to meet its SDGs by 2030. This implies additional financing needs of some 2 percentage points of GDP per year due to the pandemic.

42. **In the post-pandemic world, Nigeria will need to intensify its efforts in multiple fronts to advance its SDGs agenda.** The authorities should swiftly implement reforms to further mobilize oil and non-oil revenue, improving SOE governance and spending efficiency, and promoting private sector participation, in line with the SRGI, ERGP and advice from development partners. With these policies in place the country could achieve its SDGs even in the absence of additional external grant-like funding, albeit 13 years behind schedule in 2043. The welfare implications are huge, with human capital per worker projected to double by 2050 if all proposed reforms are implemented, while GDP per capita would more than double.

III. CASE STUDY PAKISTAN[11]

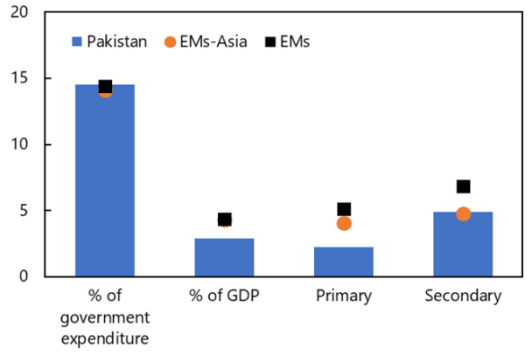
43. **Pakistan achieved mixed economic and development results in last two decades**. After an impressive performance in the first 20 years after independence in 1947, the country entered a period of instability and experienced very volatile stop-and-go growth. Over the last two decades growth averaged 4.3 percent—well below South Asia's average of 6.5 percent—with short periods of faster growth soon being followed by downturns, on the back of unbalanced policies and unfinished reforms amidst geopolitical tensions and a challenging security situation. Together with fast population growth (2.3 percent on average in last twenty years) this led to a modest increase in real GDP per capita from US$820 in 2000 to US$1,185 in 2019. Progress in achieving the Millennium Development Goals was limited. Despite the mixed growth performance, Pakistan's poverty headcount (measured using the national poverty line) fell from 64 percent in 2000 to 24 percent in 2015, while its human development index increased from 0.45 in 2000 to 0.56 in 2018, placing it at 152 of 189 countries and territories.[12]

Figure 17a. Pakistan: Health Expenditure



Source: IMF, FAD, Expenditure Assessment Tool

Figure 17b. Pakistan: Government Education Expenditure



Source: IMF, FAD, Expenditure Assessment Tool

44. **Pakistan's public spending on physical and human capital has been low.** A vulnerable fiscal position and episodes of high debt prevented the government from allocating sufficient resources to development spending. Capital expenditure averaged 3.7 percent of GDP over the last 20 years and was frequently cut when rising vulnerabilities called for fiscal consolidation. On the other hand, public spending on education gradually increased over time, but at 2.3 percent of GDP in 2019, it remained low compared to peers and insufficient to address the needs of a young

[11] Prepared by Svetlana Cerovic (SCerovic@imf.org). The analysis is based on the macroeconomic projection at the time of the October 2020 World Economic Outlook (IMF, 2020d).

[12] UNDP Human Development Report 2019.

population (Figure 17b). Public spending on health averaged 0.9 percent of GDP in last eight years, reaching 1.1 percent of GDP in 2019, still well-below comparator countries (Figure 17a).

45. **Pakistan affirmed its strong commitment to the 2030 Agenda for Sustainable Development from the very beginning.** The authorities incorporated the SDGs in their own national development agenda in 2016 and designed a comprehensive SDG framework, which was approved in March 2018. Pakistan's long-term development agenda, provincial development strategies and five-year plans are all aligned with the SDGs. To oversee the implementation of the framework, the authorities established special SDGs units and a Parliamentary Task Forces at national and provincial levels. To take stock of progress on this ambitious agenda, they conducted the first Voluntary National Review (VNR) in 2019.

46. **Despite some progress, Pakistan's current performance in key SDG sectors is well below its peers**. The 2019 VNR highlighted progress in several areas, including poverty and child stunting, transparency and accountability, and gender equality and women's empowerment. The primary gross enrollment rate increased significantly over the last 15 years, and there was a gradual improvement in average years of schooling, resulting in an increase in adult literacy rate from 55 percent in 2011 to 59 percent in 2017. Access to basic sanitation facilities increased to 73 percent of the population, compared to 36 percent in 2018. Still, Pakistan's current performance in education, health, electricity, and water and sanitation—as measured by the SDG indices of each sector—is well below the median for Emerging Market and Developing Economies (EMDEs)[13]. Moreover, on its performance in education and water & sanitation, Pakistan has fallen behind Low-Income Developing Countries (LIDCs) (Figure 18a). A recent UNDP Sustainable Development Report indicates that major challenges remain in meeting 11 out of 17 SDGs, ranking Pakistan 134 of 160 countries.

47. **Against this background, achieving Pakistan's SDGs is challenging, and requires substantial resources**. Pakistan has one of the youngest population in the world—two thirds of Pakistanis are under 30 years old, and more than two fifths are below the age of 17—underscoring the need for improved education and job creation. With almost 23 million children aged 5-16 out of school, Pakistan is among the nine countries that have the world's largest out-of-school population.[14] According to the WB Human Capital Index (HCI), on current policies, a Pakistani child born today is expected to be only 40 percent as productive as could be with proper education, with far worse performance in lagging regions and in particular lagging outcomes for girls.[15] Only 44

[13] Brollo et al, 2021

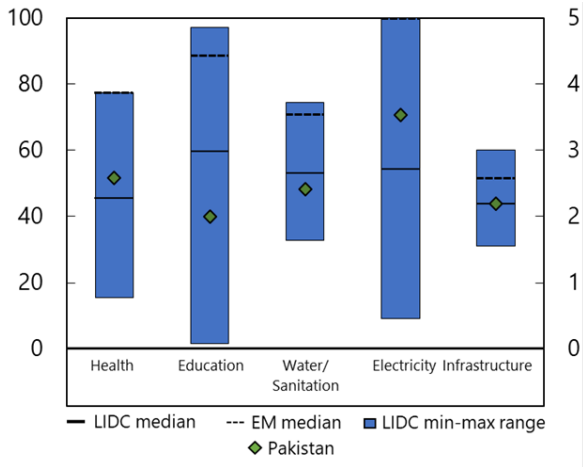
[14] Pakistan – National Education Policy Framework 2018

[15] Program Document Report No PGD140, The World Bank, 2020

percent of the population has access to non-contaminated drinking water, and 77 percent of the population has access to the electricity grid. Brollo et. al. (2021) estimate that achieving the SDGs in critical sectors – health, education, roads, electricity infrastructure and water and sanitation – would require additional annual spending of about 16.1 percent of GDP in 2030, with particularly large spending requirements on health and education (Figure 18b).

Figure 18a. Pakistan: Performance Across Selected SDGs

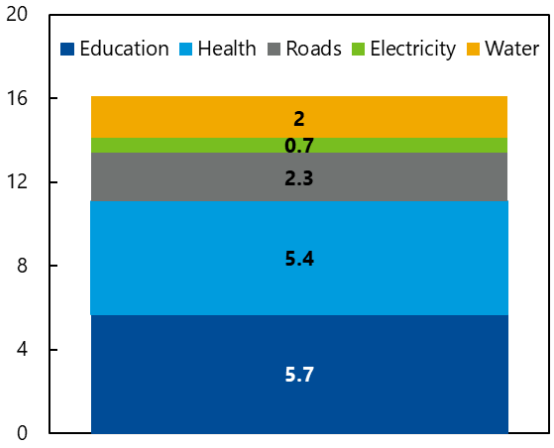
(Indices)



Source: Sachs et. al. (2020)

Figure 18b. Pakistan: Spending Needs, Country-Specific and Standard Methodology Estimates

(Percent of GDP in 2030)



Source: Brollo et al (2021)

A. Pre-Pandemic Development Policies

48. **Prior to the COVID-19 pandemic, Pakistan was on track to reverse its macro imbalances and strengthen the economy**. Supported by an IMF Extended Fund Facility (EFF) since July 2019, Pakistan embarked on policies and reforms to stabilize its economy and lay the basis for sustainable growth. The key elements of the EFF program include: (i) a decisive fiscal consolidation mostly through ambitious revenue mobilization, to reduce public debt and build resilience; (ii) a flexible market-determined exchange rate to restore competitiveness and build official reserves; (iii) energy sector reforms to eliminate quasi-fiscal losses and encourage investment; (iv) expanded social spending and strengthened safety nets to support the most vulnerable and (v) structural reforms through strengthening institutions, and promoting an investment-friendly environment. The authorities achieved remarkable results during the first six month of the EFF program. Assuming continued steady implantation of reforms, growth was projected at 2.4 percent of GDP in FY 2020, 3

percent in FY 2021 and 5 percent over the medium term. [16] Inflation was expected to gradually decrease to the State Bank of Pakistan's 5-7 percent target range in late FY 2021.

49. **Fiscal consolidation was based on an ambitious revenue mobilization plan, which would also create space to support social and development spending**. To address large fiscal and debt vulnerabilities, the authorities are committed to undertake tax reforms to broaden the tax base through the elimination of concessions and exemptions, improvement in progressivity of PIT and through greater inter-provincial harmonization and coordination of sales tax. Prior to COVID-19, these measures were expected to generate additional 4 percent of GDP in tax revenues by 2023 and place general government debt (including guarantees) on a firmly declining path. Moreover, higher revenue would open space for a gradual increase in social and infrastructure spending that is critical for Pakistan's development. The first six months of the implementation of these policies showed positive results, with domestic tax revenues increasing by 25 percent y-o-y and the general government registering a primary surplus of 0.7 percent of GDP.

50. **To understand the impact of the crisis on development, we first calibrate our new SDG financing framework to Pakistan's reform agenda reflecting the pre-pandemic macroeconomic environment**. Our pre-pandemic baseline scenario assumes continued implementation of reforms outlined in the EFF-supported program, and is based on January 2020 WEO data and IMF staff medium-term projections. As such, the baseline envisaged a reduction in the fiscal deficit supported by revenue mobilization, and gradual increase of available resources for SDG financing. The calibration of the baseline assumes that available public resources for SDGs are allocated equally between infrastructure and health and education needs.

51. **In the pre-pandemic environment Pakistan was not able to meet the SDGs even by 2050 without notable additional financing**. The results indicate that under the pre-COVID baseline scenario health and education spending would have reached only 40 percent of its target by 2030. The remaining gap on infrastructure would be lower, with the capital stock reaching ¾ of the required stock. To be able to reach the SDGs by 2030, prior to the pandemic, Pakistan would have needed additional resources of 8 percent of GDP each year between now and 2030 (Table 10, Scenario "Baseline+grants"). [17] Even if the horizon to reach the SDG is extended beyond 2030, the need for additional resources remains significant, and in 2050 amounts to 4.4 percent of GDP per year (Table 10, Scenario A - D).

[16] The fiscal year runs from July 1 to June 30.

[17] This amount of additional resources would increase spending on SDGs to the spending requirements estimated by Brollo et. al. (2021).

Table 10. Pakistan: Long-Term Macro Framework Projections—Pre-COVID Scenarios, 2020-2050

Scenario	SDGs met by	Additional grants per year[1]	Per capita income[2] 2030	Per capita income[2] 2050	Real GDP growth rate[3] 2030	Real GDP growth rate[3] 2050	Public debt[1] 2030	Public debt[1] 2050
Baseline	>2050	0.0	2,233	7,913	5.0	5.0	50.0	40.2
Baseline+grants	2030	8.0	2,315	8,122	5.0	5.0	48.8	40.0
Scenario A	2035	6.9	2,317	8,263	5.0	5.1	48.8	39.8
Scenario B	2040	5.9	2,319	8,364	5.0	5.1	48.7	39.5
Scenario C	2045	5.1	2,321	8,411	5.2	5.2	48.6	39.3
Scenario D	2050	4.4	2,312	8,371	5.3	5.3	48.7	39.3

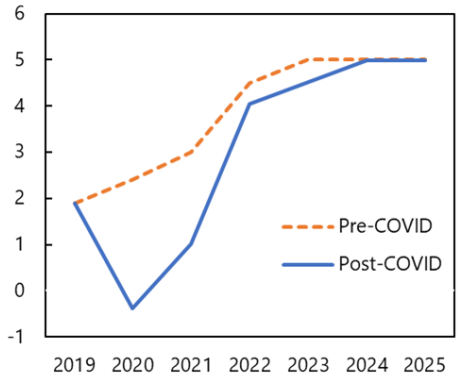
Source: IMF staff estimates
1/ In percent of nominal GDP.
2/ In constant 2019 USD. Once the SDGs are met, additional grants in the model return to 0, impacting income and growth going forward
3/ In percent.

B. The Covid-19 Crisis and Post-Pandemic Development

52. **The economic impact of the Covid-19 pandemic has been significant.** The rapid spread of the virus in last four months of the FY 2020 brought economic activity to a near halt. As a result of containment and mitigation measures, and the global fall-out from the pandemic, real GDP is provisionally estimated to have contracted by 0.4 percent in FY20, compared to previously expected growth of 2.4 percent. The manufacturing and services sectors have been particularly badly affected. Public finances came under pressure from the sudden increase in mitigation-related expenditures and a decline in tax revenues. The government's primary fiscal deficit widened by 1 percentage point of GDP relative to pre-pandemic projections. Still, given that pandemic impacted only four months of the FY 2020, some gains achieved during the year were preserved and primary deficit narrowed by 1.8 percentage points compared to previous year.

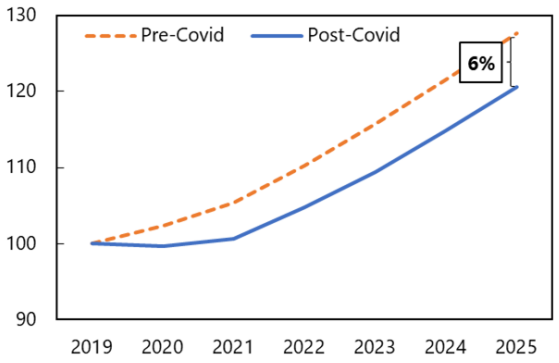
53. **In response to the shock, the authorities implemented a timely and decisive fiscal and monetary stimulus package worth 2.8 percent of GDP.** The fiscal package mostly focused on supporting the most vulnerable, including daily wage workers, through the expansion of social programs, and providing stimulus for businesses and economy. The central bank cut its policy rate by 625 basis points and deployed initiatives to safeguarding financial stability. The authorities' response was supported by emergency funding from international financial institutions and the G20 Debt Service Suspension Initiative (DSSI).

Figure 19a. Pakistan: Real GDP Growth
(Percent)



Sources: IMF staff projections

Figure 19b. Pakistan: Pandemic-related Output Losses
(Index, 2019=100)



Sources: IMF, *World Economic Outlook*, January and October 2020

54. **While the economy is showing early signs of improvement, the near-term recovery is expected to be subdued**. On the back of concerted actions by the authorities, signs of recovery started to emerge after the easing of reported COVID-19 cases allowed them to lift lockdowns and start reopening the economy. Real GDP growth is expected to recover to 1 percent in FY 2021, and to return to pre-pandemic trajectory of 4½-5 percent annual growth over the medium term. Still, the real GDP level will remain below pre-pandemic projections, implying a permanent output loss of almost six percentage points (Figure 19b).

55. **The pandemic has pushed SDG goals further out of reach.** With subdued recovery and the pandemic still evolving, the pace of reforms, including on tax policy, inevitably slowed, as the focus has shifted to address immediate needs and mitigate socio-economic impact of the shock. The wider fiscal deficit of 0.6 percent of GDP on average over the next ten years will only partly accommodate revenue losses (1.1 percent of GDP), and higher interest payment (0.2 percent of GDP). As a consequence, fiscal space available

Table 11. Pakistan: Additional SDGs Financing Needs

	Percent of GDP		
	Pre-COV	Post-COV	Difference
Total Unidentified Financing Needs	8.0	9.0	1.0
of which: health and education	6.3	6.5	0.2
infrastructure	1.6	2.4	0.8
Decomposition of change: Pre- and Post-COVID			
Total change			**1.0**
Denominator effect (i.e. effect on infrastructure of GDP			**0.2**
Lower available nominal amounts			
Private Resources			**0.0**
Public Resources			**0.8**
of which: change in revenue 1/			1.1
change in the deficit			-0.6
change in interest expense			0.2
change in non-SDG spending			0.1
change in subsidies for private investment			0.0
change in identified grants			0.0

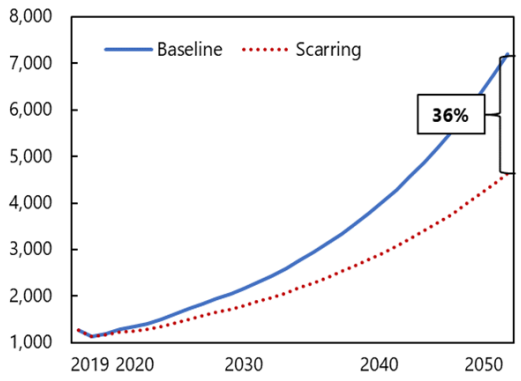
Sources: IMF staff estimates

for financing SDGs has shrunk (Table 11). Under these circumstances, Pakistan would not be able to meet its SDGs within the next 30 years (Table 12, baseline scenario) without finding additional resources for development. At 9 percent of GDP per year, resources required to meet the target by 2030 would be 1 ppt higher each year than envisaged pre-COVID. This implies that even if the country was able to finance the necessary additional spending that was required pre-COVID-19, the same amount of resources would help achieve the goals in the post-COVID environment only by 2034, and the country will now need to invest an additional 1 percent of GDP annually to meet the SDGs by 2030. As our baseline scenario assumes the implementation of reforms outlined in the EFF, any slippages or delays of those reforms would further undermine the performance in SDGs.

56. **To assess an even longer possible impact of the pandemic on the economy, we simulated a downside scenario.** Under this scenario, the prolonged interruptions in reopening of the economy could inflict a longer lasting consequences on income and growth. We simulate the scarring through lower accumulation of human capital that could happen for several reasons – interruptions to employment precluding more people to accumulate work experience leading to deterioration of general skills, less effective schooling due to disruptions and long-distance learning, and more difficulties of new graduates to enter the labor market. The downside scenario assumes that growth rate remains at ¾ of its pre-pandemic potential. Under such assumptions, accumulation of human capital in a long run would be 13 percent lower compared to the baseline, leading to a drop in income per capita by 36 percent (Figures 20a and 20b). Financing required to meet the SDG by 2030 would further increase to 9.9 percent of GDP per year.

Figure 20a. Pakistan: Scarring, GDP per capita

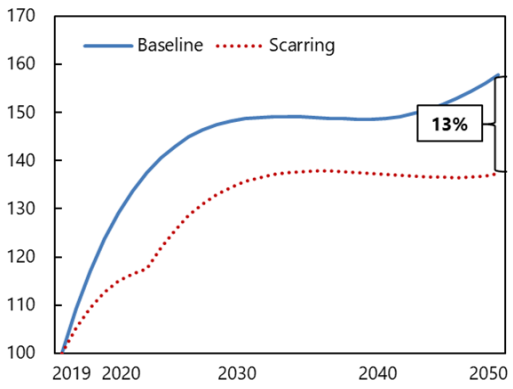
(Constant 2019 US dollar)



Source: IMF staff estimates

Figure 20b. Pakistan: Scarring, human capital stock

(Index, 2019=100)



Source: IMF staff estimates

C. Policies to Achieve the SDGs

57. **Pakistan needs to pursue comprehensive reforms to generate resources to make sustained progress towards the SDGs.** In addition to ensuring macroeconomic stability to create an environment for stronger growth, the reforms should focus on creating additional fiscal space and attracting private investment.

- **Further revenue mobilization efforts are crucial for Pakistan to create fiscal space**. Tax revenues have been historically low, and, at 11.8 percent of GDP as of 2018/2019, they are insufficient to ensure a sound fiscal position and the financing of priority expenditures. Tax revenues in Pakistan are about ⅔rds of the estimated potential, suggesting that there is room for improvement.[18] The authorities recognize the importance of revenue mobilization, and they remain committed to reforms in this area. Our baseline scenario therefore already includes an increase in tax revenues by 3.2 percent of GDP over 2000-2023, in line with the revised IMF projections. Full harmonization of sales tax across federal and provincial levels, further broadening of the tax base to include the agricultural sector, and expanding the services tax base and strengthening the property tax system would provide additional resources. Such reforms should be complemented by strengthening revenue administration. An additional 2 percent of GDP in revenue mobilization between 2024 and 2026 (inclusive), would help reduce the existing financing gap by 1.9 ppt on average (Table 12, Scenario "MTRS+grants").

Table 12. Pakistan: Long-Term Macro Framework Projections—Post-COVID Scenarios, 2020-2050

		Additional grants	Per capita income[2]		Real GDP growth rate[3]		Public debt[1]	
Scenario	SDGs met by	per year[1]	2030	2050	2030	2050	2030	2050
Baseline	>2050	0	2,041	7,209	5.0	5.0	58.5	43.5
Baseline+grants	2030	9.0	2,160	7,479	5.1	5.0	56.3	43.3
MTRS+grants	2030	7.2	2,142	7,430	5.1	5.1	56.6	43.3
SOEs+grants	2030	7.8	2,149	7,466	5.0	5.1	56.5	43.2
Private Financing+grants	2030	7.1	2,186	9,191	5.6	6.3	55.7	39.4
Efficiency+grants	2030	8.8	2,199	8,270	5.4	5.6	55.5	41.5
All Reforms	2045	0.0	2,121	9,591	5.9	6.9	56.8	38.2
All Reforms+grants	2030	3.9	2,196	9,889	6.3	6.9	55.3	38.0

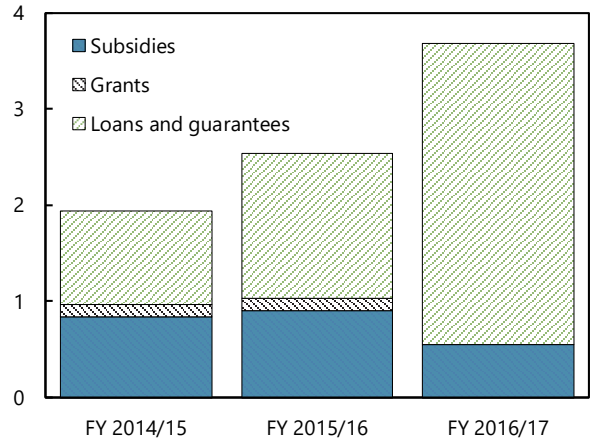
Source: IMF staff estimates
1/ In percent of nominal GDP.
2/ In constant 2019 USD.
3/ In percent.

[18] Redesigning Pakistan's Tax System, IMF, December 2019 (IMF, 2019b)

- **Reforming the energy sector and other inefficient SOEs would help unlock additional resources and boost economic growth** (Figure 21). Structural weaknesses in the energy sector have long remained unaddressed, becoming a heavy burden on already strained fiscal resources through quasi-fiscal losses, and causing frequent electricity outages, thus becoming a major impediment to faster and more stable growth. In addition, energy subsidies of around 0.5-1 percent of GDP are poorly targeted. Beyond the energy sector, losses in other large SOEs are also high and continue to accumulate. Following IMF (2018) we assume that better management of SOEs assets would contribute to a gradual improvement in Pakistan's fiscal position of 1 percent of GDP by 2030 while a comprehensive energy sector reform could half energy sector subsidies. These reforms could reduce the SDG funding gap by 1.3 ppt (Table 12, Scenario "SOEs+grants").

Figure 21. Pakistan: Government Support to SOEs

(Percent of GDP)



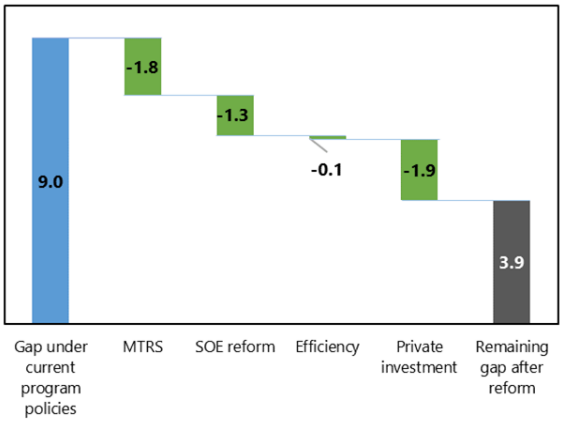
Source: Government of Pakistan, Annual SOE Report

- **Attracting more private investment and improving the efficiency of spending.** At less than 1 percent of GDP, FDI inflows in Pakistan are very low, and total private investment of 13 percent of GDP is below peer countries. Pakistan needs to attract more private investment to stimulate growth and ensure SDG financing in critical areas. In that respect, current efforts to attract large investments into transport and energy sector through China-Pakistan Economic Corridor (CPEC) have great potential, provided strong public investment management to mitigate potential risks is in place. To spur private investment, Pakistan needs to press ahead with reforms to ensure stable macro-economic environment, strengthen governance and institutions, improve the business climate through simplifying procedures and regulations, including streamlining the FDI approval process and the process of paying taxes. Moreover, it needs to ensure a viable set of projects with transparent and accessible information through improved investment planning and project preparation. We assume that these policies and further reform would be able to raise FDI in Pakistan to the average of its peers. This would imply a gradual increase of 3.7 percent of GDP in private financing over next 10 years, and would narrow the existing financing gap by 2 ppt (Table 12, Scenario "Private Financing+grants"). Improving efficiency of public spending would further reduce the gap by 0.3 ppt (Table 12, Scenario "Efficiency+grants").

58. **The implementation of such ambitious reform will allow Pakistan to meet its SDG eventually, albeit more than a decade beyond the 2030 target date**. Given the magnitude of the existing gap, additional funding of 3.9 percent of GDP would still be needed each year (Table 12, Scenario "All Reforms+grants") to achieve the goals by 2030. Extending the horizon beyond 2030 show that Pakistan would be able to meet its SDGs without additional funding by 2045 (Table 12, Scenario "All Reforms"). The main challenge facing Pakistan are significant needs in recurrent health and education spending. Performance on the infrastructure side is notably better, and a strong reform push would make the infrastructure goals achievable by 2032. Reforms could cover more than half of the financing gap to meet the development goals by 2030 (Figure 22).

Figure 22. Pakistan: Additional Financing Needs in Policy Levers

(Percent of GDP)

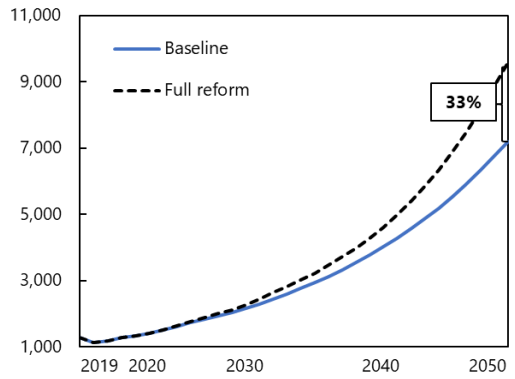


Source: IMF staff calculations
Note: The chart shows the marginal impact of different reforms, applied sequentially.

59. **The reforms would have a large positive impact on development over the long run**. Despite the remaining financing gap, the implementation of reforms would create space for more spending on human and capital investment, which would in turn translate into higher economic growth. This would help improve living standard and reduce poverty. Our model simulations indicate that implementation of comprehensive reforms beyond those already assumed in the baseline scenario would lift the income per capita over the long-term period by 33 percent (Figure 23a), and generate additional accumulation of human capital of 38 percent (Figure 23b).

Figure 23a. Pakistan: Impact of Reforms: GDP per capita

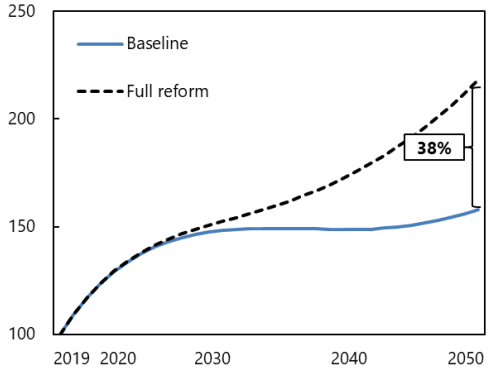
(Constant 2019 US dollar)



Source: IMF staff estimates

Figure 23b. Pakistan: Impact of Reforms: human capital stock

(Index, 2019=100)



Source: IMF staff estimates

D. Concluding Remarks

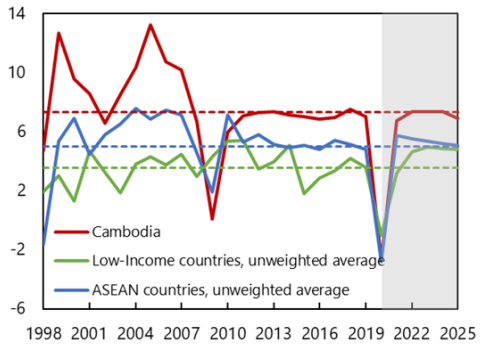
60. **Pakistan has fallen behind its peers in SDG performance and substantial reforms and financing resources are needed going forward.** The past growth was volatile and underpinned by low investment in physical and human capital, placing Pakistan in a very challenging position toward achieving its SDGs, in particular those related to health and education. Our long-term model shows that under the current policies, country will need 9 percent of GDP in additional financing each year to close the existing performance gaps by 2030.

61. **Key to Pakistan's success going forward is its ability to implement ambitious and decisive reforms.** Such reforms could create a stable macroeconomic environment and mobilize resources for the country's large development needs. The efforts should be focused on advancing domestic revenue mobilization, tackling the weaknesses in energy sector, reforming SOEs, and improving the business climate to attract private investment. Our analysis demonstrates the substantial long-term benefit of the acceleration of such reforms.

IV. CASE STUDY CAMBODIA[19]

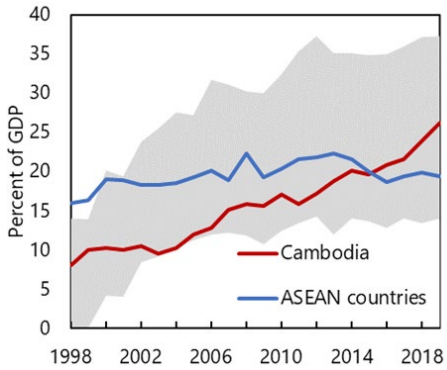
62. **Cambodia ranks among the fastest growing economies in Southeast Asia averaging real GDP growth of 7.3 percent over the last two decades,** following the end of the internal conflict in 1998. Cambodia's performance stands out in comparison with low-income countries, as well as its ASEAN regional peers (Figure 24).[20] Ongoing revenue reforms—not least through strengthened tax administration—allowed for notable progress, with total government revenue more than tripling over the past two decades (Figure 25). This remarkable performance allowed for dramatic reductions in poverty. Over the course of the last two decades, the Gini coefficient was brought down from 0.41 to 0.29—the lowest in the region.[21] Consumption levels of the bottom 40 percent of population grew twice as fast as those of the top 60 percent, and extreme poverty was practically eradicated by 2020.

Figure 24. GDP growth: Cambodia vs. comparators



Source: IMF, *World Economic Outlook*
Notes: Dashed lines show respective averages over the reported period. Projections after 2020.

Figure 25. General Government Revenue: Cambodia vs. comparators



Source: IMF, *World Economic Outlook*
Notes: Shaded area represents the interquartile range of low-income countries (WBG country classification).

63. **Public investment, boosted by private sector involvement in all priority SDG sectors, allowed for significant progress towards Cambodia's SDG targets.** Cambodia is among the few countries where private investment in infrastructure accounts for a larger share of the total capital stock than public investment (Figure 26)[22]. This strong private participation has played a key role in

[19] Prepared by Narine Nersesyan (nnersesyan@imf.org). The analysis is based on the macroeconomic projection at the time of the October 2020 World Economic Outlook (IMF, 2020d). Please see Nersesyan (2021) for more details of the analysis.

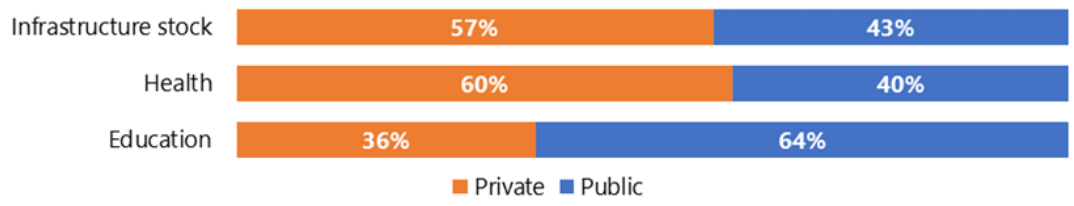
[20] ASEAN—the Association of Southeast Asian Countries—includes Brunei Darussalam, Cambodia, Indonesia, Lao P.D.R., Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam.

[21] Cambodia VNR (2019)

[22] See, for example, World Bank (2017).

supporting the country's commitments towards SDG infrastructure targets. Almost 75 percent of Cambodia's population had access to electricity by 2018. Based on the rural access index, 81 percent of the rural population had access to decent roads. Access to clean water and sanitation is available to 54 percent of population (Figure 27).

Figure 26. Cambodia: Private Sector participation in SDG sectors



Sources: World Bank (2017), Cambodian authorities

64. **At 5.5 percent of GDP (2018), private sector participation in health and education is also high (Table 13 and Figure 26).** Public spending on health has doubled and public spending on education has tripled over the last decade to catch up with the level of private sector investment in these sectors, reaching 5.4 percent of GDP in 2019 (Table 13). [23] With that, Cambodia positioned itself as one of the top ten most improved countries in the world based to UNDP's Human Development Index score.[24] Still, the Sustainable Development Report 2020 ranks Cambodia at 106 out of 160 countries, due in part to the quality of and insufficient access to health and education.[25]

65. **The Cambodian authorities are fully committed to meeting their development targets by 2030.** In 2018, they designed the Cambodia Sustainable Development Goals (CSDG) framework, which incorporated nationally-relevant targets and indicators, and conducted a voluntary evaluation of the progress.[26] The CSGD framework has been incorporated into the county's National Strategic Development Plan 2019–2023 (NSDP), which makes an explicit commitment to invest more in the development of infrastructure, education, and health. As part of the NSDP, line ministries have adopted relevant national targets, along with corresponding estimates of spending needs and their financing sources.

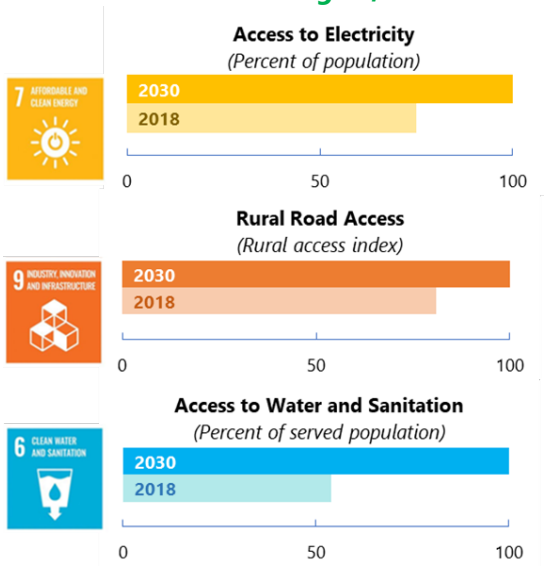
[23] Cambodia VNR op. cit..

[24] UNDP Human Development Index data.

[25] Sustainable Development Report (2020).

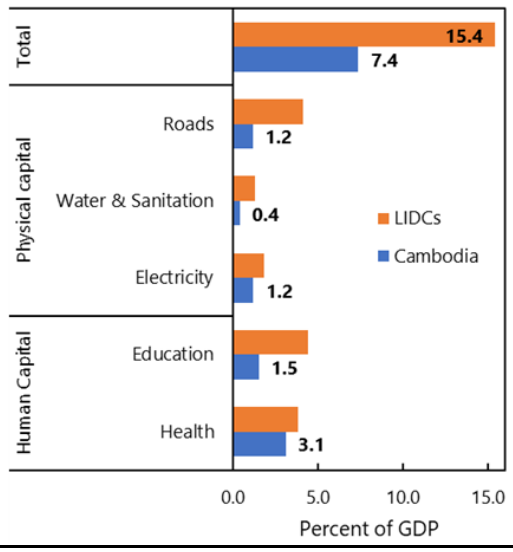
[26] Cambodia VNR, op. cit.

Figure 27. Cambodia: Select SDG infrastructure targets, 2018



Source: Zdzienicka (2020)

Figure 28. Cambodia: Spending needs in priority SDG sectors



Source: IMF staff calculations, based on Gaspar et. al. (2019)

66. **Channeling additional resources towards priority spending will support progress towards delivering the 2030 agenda for sustainable development**. Zdzienicka (2020) estimates additional annual spending needs to achieve the 2030 SDGs in the critical areas of health, education, water and sanitation, roads, and electricity at 7.4 percentage points of projected 2030 GDP (Figure 28). About two-third of this should be directed towards strengthening human capital, including annual spending of 3.1 percent of GDP in heath and 1.5 percent of GDP in educational services. The remaining one-third should be channeled to build physical capital, including 1.2, 0.4 and 1.2 percent of GDP to roads, water and sanitation, and the electricity sector, respectively. Cambodia's total required SDG spending is less than a half of the average for its low-income and developing country peers (Figure 28), with the difference especially pronounced in physical capital, where Cambodia's needs are less than 40 percent of the average for low-income and developing countries.

A. Pre-Pandemic Development Policies

67. **Before the COVID-19 pandemic, a stable macroeconomic environment and strong growth, fueled by garment exports, tourism and construction, enabled significant progress towards SDG targets.** Despite an increase in both debt and Public-Private Partnerships (PPPs) to finance needed infrastructure, public debt has been hovering around 30 percent of GDP, suggesting Cambodia is at low risk of debt stress (Table 13). Inflation remained subdued despite robust domestic demand and a surge in imports. Ongoing revenue reforms allowed for remarkable revenue

performance over the last two decades (Figure 25). However, a rapidly rising public payroll has been wielding some pressure on the fiscal position. Looking forward, the authorities have adopted a new 5-year Revenue Mobilization Strategy to sustain revenue growth, envisioning both tax policy and revenue administration reforms. In this respect, Cambodia is planning to (1) strengthen the property taxes bases through updates of real-estate valuations; (2) develop comprehensive excise tax legislation, reviewing excise bases and rates; (3) improve the efficiency of the tax system by eliminating inefficient tax incentives and exemptions; (4) redesign the investment incentives framework to support capital-intensive private sector participation; and (5) reform the personal income tax to better support inclusions and fairness considerations (IMF, 2019c). Further modernization and re-engineering of tax business processes and strengthening institutional structures will go a long way in improving tax administration effectiveness.

Table 13. Cambodia: Selected Economic Indicators

(As of January 2020)

	2019	2020	2030	2050
	(Percent of GDP)			
Real GDP growth	7.0	6.8	5.8	4.5
Inflation, percent	2.0	2.0	2.0	2.0
Public sector				
Total revenue	23.9	23.7	25.0	30.7
Total Expenditures	24.6	24.7	27.0	32.7
SDG spending	8.3	8.4	11.0	16.2
health and education	5.4	4.9	5.5	15.5
infrastructure	3.0	3.5	5.5	0.7
Overall balance	-0.8	-1.0	-2.0	-2.0
Public debt	28.6	28.4	32.2	41.5
Private sector				
Private financing	5.6	5.6	5.2	5.2
health and education	5.5	5.5	5.0	5.0
infrastructure	0.1	0.1	0.2	0.2
Total SDG financing	13.9	14.0	16.2	21.4

Sources: IMF, *World Economic Outlook*, and IMF staff projections

68. **While significant progress towards meeting SDG targets was achieved, the Cambodian authorities clearly acknowledged remaining challenges.** To achieve its SDGs by 2030, additional spending will have to be channeled into priority SDG sectors, especially education and health, as well as physical infrastructure. With the government's commitment to keep external public debt below its debt ceiling, SDG spending needs are planned to be financed by strengthening revenue performance, increasing private sector participation in priority sectors, containing and recalibrating non-SDG spending, and not least, active involvement from international donors.[27]

69. **A dynamic macroeconomic framework is calibrated to assess policy options for Cambodia's funding of its SDG needs.**[28] The pre-pandemic baseline framework is grounded in the January 2020 World Economic Outlook data and IMF staff projections. The choice of the January WEO as the cut-off date is aimed to separate the pre-pandemic situation from more recent events that re-shaped Cambodia's outlook (section C).

[27] The annual debt ceiling is set by the Ministry of Economy and Finance for each budgetary cycle.

[28] See Nersesyan, 2021

70. **Under current policies, it would take about 18 years for Cambodia to meet its SDG targets.** The baseline scenario indicates that Cambodia can meet its SDGs by 2038 (Table 14, "Baseline"). To meet the SDG targets by 2030 additional financing at around 6.9 percent of GDP per year will be needed (Table 14, "Baseline + Grants").

71. **The need for additional funds could be reduced substantially if Cambodia undertakes an ambitious reform agenda.** For instance, the completion of an ambitious medium-term revenue strategy to boost tax revenue by 3 percentage points of GDP over the course of 5 years (2022-2027)—if implemented—could shorten the achievement of SDG goals by 4 years (Table 14, "MTRS"). Reallocating 1 percent of GDP from existing current and capital non-SDG spending towards SDG priorities could save 2 years (Table 14, "Spending reallocation"). Channeling additional private sector participation into priority SDG sectors—where private investment in the order of 2 percent of GDP is shared equally between infrastructure and health and education sectors—would allow to meet SDGs by 2036 vs. 2038 under baseline scenario (Table 2, "Additional private investment"). The combination of fiscal measures with additional private investment into SDG sectors could shorten the achievement of SDG targets by 6 years (Table 14, "Baseline + Fiscal + Private Invest"), with Cambodia meeting SDG targets by 2032 without any additional resources.[29] With implementation of active policy reforms, the need for additional funds is reduced to 2.3 percent of GDP per year between now and 2030 (Table 14, "Baseline + Fiscal + Private Invest + Grants").

Table 14. Cambodia: Long-Term Macro Framework Projections—Pre-COVID Scenarios, 2020-2050

		Additional grants	Per capita income 2/		Real GDP growth rate 3/		Public debt 1/	
Scenario	SDGs met by	per year 1/	2030	2050	2030	2050	2030	2050
Baseline	2038	0.0	2,586	4,823	5.8	4.5	32.2	41.5
MTRS	2034	0.0	2,621	5,107	6.0	4.6	31.9	40.5
Spending reallocation	2036	0.0	2,593	4,875	5.8	4.5	32.1	41.3
Additional private investment	2036	0.0	2,613	5,096	6.0	4.7	31.9	40.5
Baseline + Fiscal + Private Invest	2032	0.0	2,653	5,632	6.3	5.1	31.6	38.4
Baseline + Grants	2030	6.9	2,793	5,275	6.6	4.4	30.7	41.0
Baseline + Fiscal + Private Invest + Grants	2030	2.3	2,722	5,796	6.6	5.0	31.1	38.4

Source: IMF staff, based on the dynamic macroeconomic framework on SDG financing.
1/ In percent of nominal GDP.
2/ In constant 2019 USD.
3/ In percent.

[29] Non-concessional resources (e.g., private sector investments on SDG infrastructure) necessarily incur a cost and therefore do not have the same impact as traditional grants.

B. The Covid-19 Crisis

72. **The COVID-19 pandemic has had a significant impact on Cambodia economic activity due to the disruption in international trade, particularly exports of garment, and a collapse in tourism.** GDP is projected to decline by 2.8 percent in 2020; total revenues are projected to come out 2.1 percent of GDP lower y-o-y, widening the budget deficit by 1.6 percentage points, with total public debt estimated to stand 3.1 percent of GDP higher than projected prior to the pandemic (Table 15). Even when economic growth is assumed to recover over the medium-term, the pandemic-induced permanent output loss is projected to reach 6 percent by 2025 (Figure 29).

Table 15. Cambodia: Macroeconomic Indicators

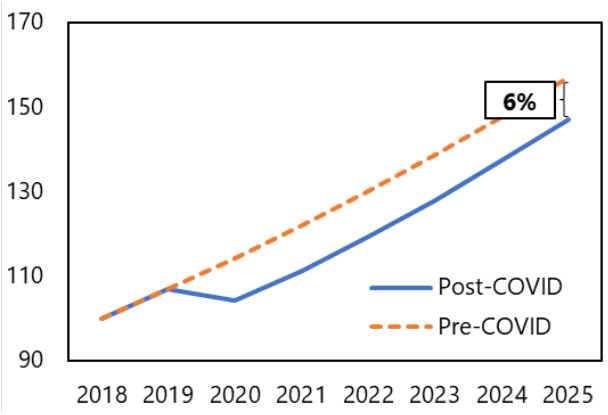
(As of October 2020)

	2019	2020	2030	2050
	(percent of GDP)			
Real GDP growth	7.0	-2.8	5.8	4.5
Inflation, percent	2.7	2.5	2.0	2.0
Public sector				
Total revenue	23.9	21.6	24.6	29.1
Total Expenditures	24.6	24.0	26.6	31.1
SDG spending	8.3	7.7	10.5	14.8
health and education	5.4	7.2	5.3	13.9
infrastructure	3.0	0.5	5.3	0.8
Overall balance	-0.8	-2.4	-2.0	-2.0
Public debt	28.6	31.5	34.2	38.0
Private sector				
Private financing	5.6	5.6	5.2	5.2
health and education	5.5	5.5	5.0	5.0
infrastructure	0.1	0.1	0.2	0.2
Total SDG financing	13.9	13.3	15.7	20.0

Sources: IMF, *World Economic Outlook*, and IMF staff projections

Figure 29. Cambodia: Pandemic-related output losses

(Index, 2018=100)



Sources: IMF, *World Economic Outlook*, January and October 2020

73. **Predictably, the COVID-19 pandemic has a significant impact on Cambodia's SDG financing needs, widening the annual resource gap from 6.9 to 8.1 percent of GDP** (Table 16, "Baseline + Grants"). In large part, this is explained by the permanent output loss discussed above. Lower levels of economic activity will necessarily reflect in lower public resources in the medium term—0.6 percent of GDP on average. Further, with lower output, infrastructure needs—which reflect the fixed volume of additional roads, and electricity grids, water, and sanitation infrastructure needed to reach the SDGs—increase as a share of (now lower) GDP. The additional annual funding of 6.9 percent of GDP that was sufficient for Cambodia to meet its SDGs before the pandemic is no longer adequate in the post-pandemic state of the economy. With the same amount of additional funding, Cambodia could meet its SDG targets in 2031 in the post-COVID state, indicating that, *ceteris paribus*, COVID-19 is responsible for delaying Cambodia's development agenda by a full year.

74. **Without continuing policy reforms, Cambodia will meet its SDG targets by 2041 in the post-pandemic environment** (Table 16, "Baseline"). To gauge the impact of continuing reforms along the line of what the authorities have achieved in the past, several policy changes are simulated, estimating their impact on Cambodia's ability to generate additional resources for development. The authorities could continue strengthening their revenue mobilization capacity by broadening the taxation bases and furthering tax administration reforms. The implementation of an ambitious medium-term revenue strategy generating an additional 3 percentage points of GDP of tax revenue between 2022 and 2027 would allow Cambodia to meet its SDG targets by 2035 (Table 16, "MTRS"). Under this scenario, the need for additional financing to meet the SDGs by 2030 drops from 8.1 to 6.2 percent of GDP annually. Reallocating 1 percent of GDP from existing non-SDG current and capital spending towards SDG priorities, for instance by rationalizing the public wage bill, permits meeting SDG targets by 2037 (Table 16, "Spending reallocation") and reduces the additional financing needs from 8.1 to 7.3 percent of GDP.

75. **In addition, the Cambodian authorities could pursue further reform to encourage even larger private sector participation.** With a historically strong private sector that allowed for private capital stock accumulation in excess of the public capital stock, the increased involvement of the private sector in reaching SDG targets is not far-fetched, but rather signals a continuation of policies that have been successful in the past. Under a scenario where the private sector gradually invests an additional 2 percent of GDP in SDG priority sectors—shared equally between investment in infrastructure and the health and education sectors—the SDG time horizon is shortened to 2037 (Table 16, "Additional private investment"). The required additional financing to meet SDGs by 2030 decreases from 8.1 to 7.1 percent of GDP as a result.

Table 16. Cambodia: Long-Term Macro Framework Projections—Post-COVID Scenarios, 2020-2050

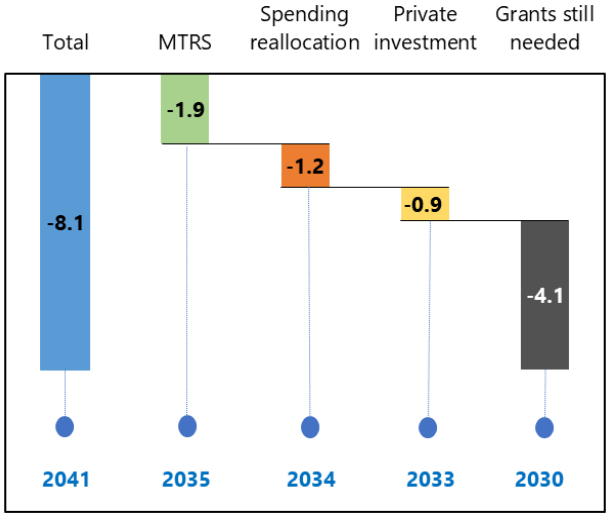
		Additional grants	Per capita income 2/		Real GDP growth rate 3/		Public debt 1/	
Scenario	SDGs met by	per year 1/	2030	2050	2030	2050	2030	2050
Baseline	2041	0.0	2,468	4,607	5.8	4.5	34.2	38.0
MTRS	2035	0.0	2,503	4,894	6.1	4.7	33.9	36.9
Spending reallocation	2037	0.0	2,475	4,662	5.8	4.5	34.2	37.8
Additional private investment	2037	0.0	2,493	4,870	6.0	4.7	34.0	36.9
Baseline + Fiscal + Private Invest	2033	0.0	2,533	5,353	6.3	5.2	33.6	35.0
Scarring	2046	0.0	2,218	3,456	4.2	3.7	36.7	42.7
Baseline + Grants	2030	8.1	2,695	5,118	6.7	4.4	32.4	37.3
Baseline + Fiscal + Private Invest + Grants	2030	4.1	2,646	5,644	6.8	5.3	32.7	34.7
Scarring + Grants	2030	9.3	2,446	3,900	5.2	3.6	34.5	41.6

Source: IMF staff, based on the dynamic macroeconomic framework on SDG financing.
1/ In percent of nominal GDP
2/ In constant 2019 USD
3/ In percent

76. **Combining the additional private SDG spending with the fiscal measures discussed above shows a truly transformational impact.** It would allow Cambodia to generate enough resources to meet its SDG targets by 2033, even in the post-pandemic world (Table 16, "Baseline + Fiscal + Private invest"). Predictably, under this scenario the additional financing needed to reach its SDGs by 2030 reduces substantially, to 4.1 percent of GDP per year (Table16, "Baseline + Fiscal + Private Invest + Grants").

77. **To show the marginal effects of active policies, the structural policy options above were sequenced, assessing their impact on both the timetable of achieving SDGs as well as the required additional funding to meet the goals by 2030.** First, the revenue mobilization strategy is simulated (Figure 30). With additional 3 percentage points of revenue mobilized over the course of five years (2022-2027), the time horizon of meeting SDGs is shortened, with SDG targets achieved by 2035 instead of 2041 in the baseline. The need for additional funds is reduced by 1.9 percent of GDP. Second, *in addition to MTRS*, the spending reallocation is achieved with reorientation of spending priorities from non-SDG to SDG expenditures. With additional spending of 1 percentage point of GDP directed to SDGs, the timetable is shortened further, to 2034. The funding needs are also reduced, by 1.2 percent of GDP a year. Third, *adding to these reforms*, an increase in private sector participation in the SDG sectors is simulated.[30] With that, Cambodia is able to meet SDG targets by 2033, even in the challenging post-pandemic environment. The need for additional resources is further diminished, by 0.9 percent of GDP. If additional funding in the amount of 4.1 of GDP becomes available, Cambodia can meet its SDG targets by 2030.

Figure 30. Cambodia: Sequencing of active policy options

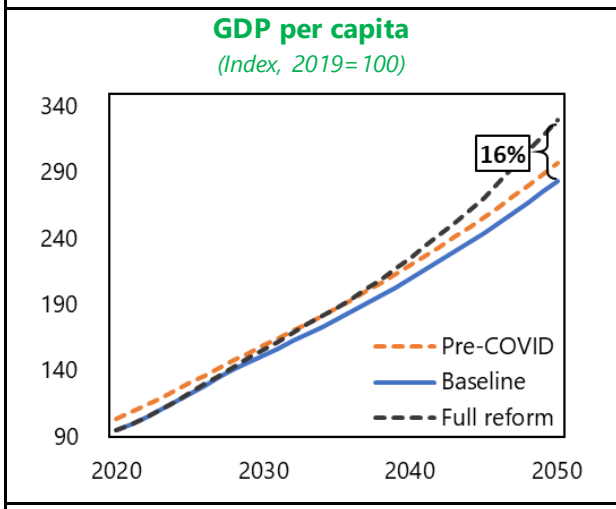


Source: IMF staff estimates

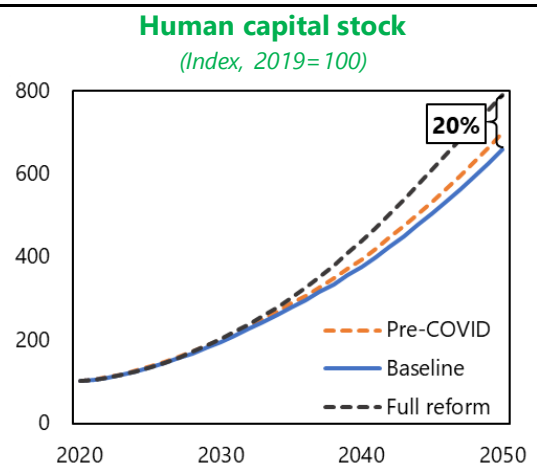
78. **The importance of active reform polices is further illustrated by their longer-term impact on key macro-economic variables (Figure 31).** Indeed, sustained reforms implemented in the post-COVID environment allow the country to overcome the negative pandemic-induced shock on key development indicators in the long-term. Continuing policy reforms along the lines discussed above will increase per capita incomes by 16 percent and human capital by 20 percent by 2050 (Figure 31).

[30] Additional 2 percentage points of private investment—equally shared between investment in infrastructure and Health and Education sectors is simulated.

Figure 31. Cambodia: Long Term Impact of Active Policies on Key Macroeconomic Variables



Source: IMF staff estimates.



Source: IMF staff estimates.

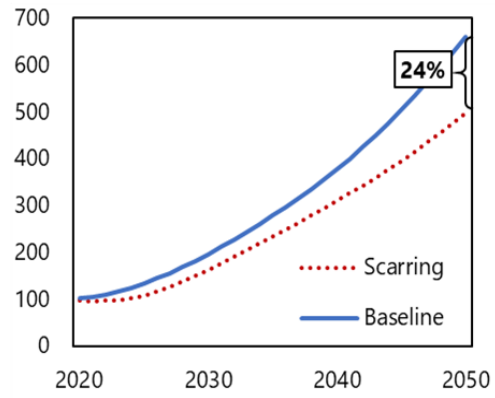
79. **A possible longer-term scarring effect of COVID-19 on Cambodia's SDG targets was also simulated.** Firm closures, especially the closures of small and medium enterprises—the backbone of Cambodian economy which employs more than two-thirds of the working age population and generates about 60 percent of GDP—is one of the key possible scarring factors[31]. The closure of enterprises and resulting unemployment affects the level of workers' skills and longer-term employability. Schooling disruption and inefficiencies related to virtual or absent schooling add to the labor quality deterioration. Post-pandemic graduates might have more difficulties in entering the labor market. Combined, these factors would depress human capital, and ultimately, the productive capacity in Cambodia. A simulation of long-term scarring effect, where long-term potential growth returns to just 75 percent of pre-pandemic levels caused by scarring of the human capital stock (Figure 32) and lower total factor productivity—reduces per capita income by some 31 percent by 2050 (Figure 32) and pushes up the additional financing needs from 8.1 percent of GDP to 10.3 percent of GDP per annum.

[31] See, for example, Chhea (2019), or Baily (2008).

Figure 32. Cambodia: COVID-19 Scarring

Human capital stock

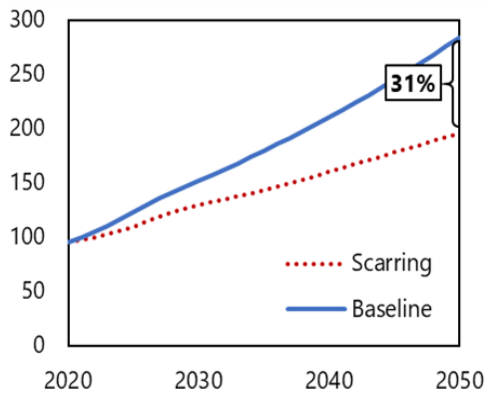
(Index, 2019=100)



Source: IMF staff estimates

GDP per capita

(Index, 2019=100)



Source: IMF staff estimates

C. Concluding Remarks

80. **While Cambodia can rely largely on its own efforts to advance its SDG agenda, additional financing by development partners is desirable.** Based on the simulations above, Cambodia should adopt a three-prong approach to achieve is development goals. First, its strong revenue mobilization efforts should continue. In this respect, the authorities should focus on tax policy reforms to broaden the tax base, improve efficiency and fairness of the tax system, and strengthen fiscal governance by furthering tax administration reforms. Second, a prudent fiscal stance should be continued with respect to non-development current spending, restraining it in favor of additional spending directed towards development needs—priority infrastructure investment, as well as spending on health and education. Third, Cambodia must continue reforms that facilitate economic transformation and further incentivize private sector involvement in priority SDG sectors. In this respect, investment promotion and facilitation, addressing financial sector vulnerabilities, encouraging SME development, trade facilitation, and labor market reforms will go a long way. With reform in all these areas continuing, the country could appeal to the international community to fill the remaining gap in order to be able to meet its commitment of reaching the sustainable development goals by 2030.

V. THE MACROECONOMIC FRAMEWORK[32]

This annex details the macroeconomic framework used to evaluate financing development strategies to achieve the SDGs. In developing this framework, the overriding objective is to ensure macroeconomic consistency while maintaining flexibility and tractability, to make it user friendly and enable it to capture country-specific circumstances. The framework centers on the roles of the public and private sector to generate funding to achieve SDGs in five key areas (education, health, roads, electricity, water and sanitation). The framework is dynamic with annual projections up to 2050, which allows assessment of both a path towards the SDGs and its impact on long-term development. Given this long-term focus, it abstracts from business-cycle fluctuations and monetary developments. The framework consists of a set of accounting identities throughout the real, fiscal, and external sectors to ensure macroeconomic consistency. In addition, the framework models some key economic relationships, such as between tax capacity and economic growth, and employs a production function to ensure that output growth is consistent with investment in physical and human capital as well as with demographic trends.[33] In the following each sector is described in detail.

A. The Real Sector

Production

81. **The interaction between output growth and investment decisions is modelled through an augmented neoclassical growth model where different types of capital interact with labor.** The model follows the Debt, Investment and Growth (DIG) model developed by the IMF to address the public investment-growth nexus and fiscal adjustments in low income countries and emerging economies (Buffie et al., 2012, Berg et al. 2012) . Following Buffie et. al., (2012), the production function includes public capital K_G, private capital K_P, and labor:

$$Y = AK_G{}^{\beta}K_P{}^{\alpha}L^{1-\alpha} \qquad (1)$$

where the parameter $\beta \in (0,1)$ is the output elasticity of public capital, $\alpha \in (0,1)$ the private capital share of output, and $A > 0$ represents total factor productivity. The production function features increasing returns to scale, a common assumption in the literature on human capital (Atolia et. al. 2019, Buffie et. al., 2020). In this specification, public and private capital as well as labor are complementary, thus investing in one type of capital raises the returns to investment in the other type of capital. The distinction between public and private capital lies mainly in the type of projects

[32] Prepared by David Bartolini (DBartolini@imf,org). Please see Bartolini and Hellwig (2021) for further details.

[33] The five SDG sectors are aggregated into two categories: current spending (health and education) and capital spending (roads, electricity, water and sanitation).

they encompass. For instance, roads and water treatment plants can be thought of as public resources (measured by K_G), while factories and farm equipment can be regarded as private resources (measured as K_P).[34]

82. **Although public capital is mainly financed with public resources, there are cases in which private resources can finance public projects.** For instance, this is the case in public-private partnerships (Irwin et al., 2018). To capture the possibility of public goods financed with private resources, public capital is distinguished in bankable and non-bankable capital. Non-bankable public capital, $K_{G,public}$ is exclusively financed with public resources while bankable public capital, $K_{G,private}$, is financed also with private resources. The production function hence becomes

$$Y = A(K_{G,public} + \theta K_{G,private})^{\beta} {K_P}^{\alpha} L^{1-\alpha} \qquad (2)$$

This specification allows for more efficient management of privately-owned infrastructures through an efficiency parameter $\theta \geq 1$ (see IMF, 2015). Changing the financing of public infrastructure from public to private (while holding everything else equal) hence only changes output due to increased efficiency.

83. **Finally, the production function is modified to account for the human capital embedded in labor (Mankiw, 1995),**

$$Y = A(K_{G,public} + \theta K_{G,private})^{\beta} {K_P}^{\alpha} \left[L \left(\frac{H}{L} \right)^{\sigma} \right]^{(1-\alpha)} \qquad (3)$$

where H is human capital and $\sigma > 0$ is the parameter which determines how human capital transforms into effective labor. Effective labor is the work force L scaled by the average human capital of a worker $\frac{H}{L}$. The labor force follows an exogenous path (a given share of active population at any point in time), while human capital is endogenously determined (see section below on human capital accumulation).

Physical Capital Accumulation

84. **The stock of physical capital in the economy increases with investment and declines with depreciation.** We use the standard accumulation equation for both public and private capital,

$$K_{it} = (1 - \delta_{ik}) K_{i(t-1)} + \epsilon I_{it} \qquad i = G, P \qquad (4)$$

where I_{it} is the amount invested in either public or private capital, and $0 < \epsilon \leq 1$ represents the efficiency of transforming investment spending into effective capital –i.e., the possibility that some resources are wasted or used for projects that are never completed. Investment in public capital includes also non-SDG capital spending (i.e., spending on public infrastructures outside of the SDG

[34] Note that K_G, K_P and L comprise the entire physical and human capital stock in the economy, including both SDG-related and non-SDG-related capital.

focus), and privately financed bankable investment. The depreciation rate can be different between public and private capital, δ_K, δ_P, but it is the same for bankable and non-bankable public capital. This is because the distinction is mainly in terms of financing option not the nature of the capital.

Human Capital Accumulation

85. **The accumulation of human capital follows a different rule.** As in Atolia et. al. (2019), the stock of human capital H accumulates through schooling and improvements in health, represented by $\xi > 0$, and diffuses gradually into the economy as new cohorts enter the labor force.[35] Human capital therefore follows the accumulation law

$$H_t = (1 - \delta_h)H_{t-1} + \omega\xi_{t-1} \qquad (5)$$

where human capital decreases with depreciation δ_h, and increase with previous period schooling at a rate $\omega \in (0,1)$, representing the rate at which students move into the labor force. The amount of human capital generated though schooling and health follows the following accumulation law

$$\xi_t = (1 - \omega)\,\xi_{t-1} + \left[(e * h)^{\phi} * n^{\gamma}\right]_{t-1} \qquad (6)$$

where h is the total annual nominal amount of spending on health and education. This translates into new human capital according to an efficiency parameter $e > 0$, with elasticity $\phi > 0$. The amount of human capital generated through schooling depends also on the share of school-age population, n, where $\gamma > 0$ is the elasticity of schooling to the share of students in the population.

Data

86. **Most of the exogenous variables in the real sector come from the IMF World Economic Outlook database and the IMF FAD database on public investment.** The parameters of the production function can be adjusted according to each country specification, the default values are indicated in Table 17. Their choice is driven by reference to the literature whenever possible and by authors' discretion in the other cases (Bartolini and Hellwig, 2021, provides a sensitivity analysis on the choice of the parameters). Country specific population projections are taken from the United Nations' World Population Prospects (UN, 2019).

Private Saving and Investment

87. **The domestic private sector receives gross earnings (the output produced in the economy, net of interest and dividend payments to foreign creditors and investors) and private transfers from abroad.** The private sector pays taxes and potentially receives some subsidies as incentive for investments in bankable public infrastructure. Households save a constant fraction of their disposable income, which they can lend to the government or invest in (private)

[35] Human capital can also increase through on-the-job training, but we abstract from this component.

capital. For simplicity, households are not forward-looking, and the saving rate is exogenously determined. Private investment can also be financed through external borrowing and FDI. The path of external private borrowing, FDI, and the rates of return of these activities are exogenously determined (IMF WEO database).

B. The Fiscal Sector

88. **The fiscal balance determines the amount of resources available for SDG spending by the government, according to the following identity**:

$$SDG\ resources = Revenue - (NonSDG)\ Expenditure - Net\ public\ lending \quad (7)$$

Revenue consists of tax, non-tax revenues, and grants. The tax-to-GDP ratio increases with real per capita GDP growth, with an exogenously Determined elasticity. This captures in a simple way the build-up of tax capacity as economies develop. By contrast, non-tax revenue and grants follow an exogenously determined path, based on information from countries' authorities and WEO projections. Therefore, tax revenue is the key variable in the framework, as it links the fiscal and the real sector: output growth generates income which is taxed. The overall deficit is also exogenously determined, and it is financed by borrowing externally or domestically. The amount of net domestic borrowing is exogenously determined, with net external borrowing as residual. Financing terms are also exogenous (see Table 18).

Table 17. Production Function Technology: Parameter Assumptions

Parameter	
Production technology	
β (elasticity of public capital)[1/]	0.15
α (private capital share of output)[1/]	0.50
θ (efficiency gain from privately managed infrastructure)[2/]	0.15
σ (elasticity of labor productivity w.r.t. education)[1/]	0.70
Physical capital accumulation	
private capital depreciation[2/]	0.05
public capital depreciation[2/]	0.05
Human capital accumulation	
human capital diffusion parameter[2/]	0.09
human capital depreciation[1/]	0.05
φ (elasticity of new human capital w.r.t. education spending)[2/]	0.54
γ (elasticity of new human capital w.r.t. students)[2/]	0.51

Sources: 1/ Atolia et. al. (2019); 2/ Authors' assumptions

Table 18. Fiscal Model Variables

Variables		Source
Revenue		
tax revenue	endogenous	
non-tax revenue	exogenous	*WEO*
identified grants	exogenous	*WEO*
Unidentified SDG needs	residual	
Non-SDG spending		
primary spending	exogenous	*WEO + user*
interest	exogenous	*WEO*
SDG spending		
health and eduction	endogenous	
Infrastructure	endogenous	
bankable	endogenous	
non-bankable	endogenous	
Net public lending	exogenous	*WEO*

Source: IMF staff estimates

89. **Besides SDG spending, the government budget also finances non-SDG spending, namely primary non-SDG spending, interest payments, and non-SDG capital spending.** These variables are all exogenous and set according to country specific characteristics. The envelop of

resources for SDG spending is therefore endogenously determined by the growth-tax relationship, given exogenous paths of non-SDG spending, non-tax revenue, grants, and the overall deficit. This envelop is equally distributed between current (i.e., education and health) and capital (roads, electricity, and water) spending.[36]

90. **Based on a cross-country analysis of the impact of growth on the level of taxation, the model assumes a 0.1 elasticity of taxation to GDP per capita in the long run.** The elasticity of public investment to growth is based on the work of Atolia et. al. (2019). However, the model is flexible, with users being able to set key model parameters to analyze different country settings (Bartolini and Perrelli, 2021). For example, productivity of investment differs across countries and sectors. So does the response of tax revenue to economic growth, and the relative importance of private and public investment in SDGs.

Reaching the SDG goals

91. **The framework takes the quantification of SDG targets by Gaspar et. al. (2019) and subsequent country-specific SDG costing studies as inputs.** These targets comprise an annual goal on recurrent spending on health and education as well as annual goal on spending on infrastructure needed to reach a capital stock target by 2030. The targets are used to derive the gap between the actual annual available financing for recurrent expenditure in health, education, and investment spending in infrastructure and the spending required to meet the SDG targets. The framework thus calculates the amount of additional financing, i.e., on top of resources already in the public budget and from the private sector, needed to reach the SDG goals within a given timeframe.

C. The External Sector

92. **Economic flows with the rest of the world are exogenous.** The dynamics of private and public transfers as well as net foreign direct investment (FDI) and net private external borrowing follow WEO projections, with net public external borrowing the residual. The framework ensures consistency by imposing a balance of payment identity:

$$CA + net\ FDI + net\ external\ borrowing = reserve\ accumulation \quad (8)$$

In the framework, net exports of goods and services are determined by the domestic savings and investment balance, while the path of exports can be chosen by the users (the default setting is that exports grow with GDP, i.e., they are constant as share of GDP).

[36] The distribution of SDG spending between current and capital spending is a model parameter that is set to 50-50 by default but can be changed by the user.

D. Other Accounting Identities and Prices

93. **The framework ensures that a set of accounting identities are always satisfied, as policies and assumptions are changed by the user. In addition to the equations describing the accumulation of physical and human capital and the balance of payments**, we have:

- The aggregate resource constraint

$$Y = C + I + G + NX \quad (9)$$

- The overall fiscal balance

$$Net\ public\ borrowing = Revenue - Expenditure \quad (10)$$Type equation here.

Prices and the real exchange rate

94. **The path of inflation is exogenously determined. Changes in price levels matter for the real value of debt.** Similarly, the exchange rates determine the real cost of external debt. The real exchange rate is assumed to appreciate with increases in GDP per capita, as the empirical observation suggests (Rodrik, 2008). Nominal exchange rate movements are determined by real exchange rate movements and inflation. Since the focus of the framework is on long-run rather than cyclical dynamics and since there is no non-tradable sector, we abstract from feedback from exchange rates to output or from output to inflation.

VI. ESTIMATES OF TAX CAPACITY[37]

95. **Tax capacity (or the tax frontier) is defined as the maximum theoretical level of tax revenues that a country can achieve given its characteristics.** It is estimated using a stochastic frontier model based on country characteristics, such as per capita income, inequality, the level of education, the sectoral composition of the economy, and institutional factors such as indicators of governance. The ratio of actual tax revenue to tax capacity is the so-called tax effort (Box A1). The difference between current revenue and tax capacity can be interpreted as the tax potential, which can reflect policy factors, such as low tax rates and narrow tax bases (i.e., high level of tax exemptions and deductions) or inefficient tax collection (i.e., a high level of non-compliance).[38]

96. **We use a panel dataset of 116 countries from 1991 to 2017.** Seventeen of these countries were classified as natural-resource dependent economies, for which we use non-natural resource tax revenues to non-natural resource GDP as dependent variable. We present two different models, the Mundlack random effect model (MREM) and the Truncated Normal Heterogeneous in Mean and Decay Inefficiency model (TNH) (Box 2). Table 19 reports the model parameter estimates for all countries, while Table A12 shows the tax potential for African countries.[39]

97. **Under the two models most coefficients and the *lambda* factor[40] are statistically significant at 1 percent level and have the expected signs** (Table 19). Consistent with previous analysis, countries with a higher level of public expenditure on education and per-capita GDP are near their tax capacity (Tanzi 1987 and Lotz and Mors (1967). Also, in line with prior findings, the size of the agricultural sector, GINI coefficient, and corruption are also highly significant variables with an inverse relationship with tax capacity and tax effort (Tanzi and Davoodi (1997), Davoodi and Grigorian (2007), and Lotz and Mors (1967); the natural resource variable (Oil) is not significant under MREM.[41]

[37] Prepared by Ricardo Fenochietto (RFenochietto@imf.org).

[38] Of course, the policy factor could also represent societal preference for a small government and low provision of public goods.

[39] In some LICs, the GDP maybe undervalue showing a high current level of revenue to GDP and, therefore, a high and level of tax effort.

[40] *Lambda* ($\sigma u_i / \sigma v_i$) provides information of the relative contribution of v_{it} and u_{it} to the total error term.

[41] This is probably because some natural resource countries (like Bolivia, Ecuador, Chile, and Mozambique) had developed a tax system before exploiting their natural resource and, therefore, show comparatively high levels of tax revenues and, on the other hand, the public finance of other natural-resource countries (like Saudi Arabia, Bahrein, Angola, and Nigeria) were always dependent on natural resources showing a very low level of tax revenue.

Table 19. Parameter Estimates of the Stochastic Frontier Tax Function - All Countries

Variable	Mundlack Random Effects Model		Truncated Normal Heterogeneous in Mean and Decay Inefficiency	
	Coefficient	St. Error	Coefficient	St. Error
Constant	3.4439 ***	1.2067	-1.828 ***	0.2426
LGD	1.2687 ***	0.1197	1.129 ***	0.0566
AVA	-0.0034 ***	0.0012	-0.003 ***	0.0004
PE	0.0258 ***	0.0038	0.029 ***	0.0019
TR	0.0013 ***	0.0002	0.001 ***	0.0009
GINI	-0.0090 ***	0.0013	-0.009 ***	0.0006
OIL	-0.0498	0.0436	0.113 **	0.0448
GOV	0.2634 ***	0.0703	0.266 ***	0.0386
LGD^2	-0.0658 ***	0.0065	-0.058 ***	0.0031
Inefficiency				
Lambda 1/	4.6137 ***	0.0397	5.902 ***	0.0256
Constant	0.6412	0.4071	0.641 *	0.4071
CPI			0.002 ***	0.0005
Lcor			-0.894 *	0.5096
Sigma (u) 1/	0.5817 ***	0.0397	0.742 ***	0.0653

Source: IMF Staff estimates
***,**,* = significane 1%, 5%, 10% level.
1 / Parameters for compound error.
2 / Parameter for time varying inefficiency.

98. **The empirical analysis shows that most African countries have space to increase revenue (Table 20).** According to the MREM model, the difference between tax capacity and current revenue is 5.7 percent of GDP on average. According to the TNH model this difference is 9.8 percent. For countries with the lowest level of per capita GDP and natural resource dependent economies the MREM estimates of tax capacity are below the ones estimated with the TNH model. The MREM seems to adequately control for the 'short term' tax capacity of those two groups of countries.

Table 20. African Countries. Tax potential: Tax Capacity - Current Revenue

Country	Current Revenue: Tax and Social Security Contributions (SSC) % of GDP	MREM			TNH		
		Tax Effort	Tax Capacity	Tax Capacity - Tax and SSC	Tax Effort	Tax Capacity	Tax Capacity - Tax and SSC
Angola	8.2	0.79	10.4	2.1	0.45	18.2	10.0
Burkina Faso	17.0	0.67	25.4	8.5	0.65	26.1	9.2
Cameroon	12.7	0.61	20.7	8.1	0.44	29.0	16.4
Congo, Rep of	30.0	0.98	30.7	0.7	0.81	37.2	7.2
Ethiopia	11.6	0.59	19.7	8.0	0.58	20.0	8.3
Gambia,The	16.9	0.80	21.0	4.1	0.68	24.7	7.8
Ghana	15.5	0.51	30.7	15.2	0.43	35.7	20.2
Guinea	14.6	0.75	19.4	4.8	0.52	28.1	13.5
Guinea-Bissau	10.3	0.66	15.5	5.2	0.38	27.3	17.1
Kenya	15.5	0.66	23.4	7.9	0.64	24.1	8.6
Madagascar	11.4	0.64	17.8	6.3	0.51	22.5	11.1
Malawi	19.6	0.88	22.2	2.6	0.88	22.3	2.6
Mali	15.2	0.79	19.3	4.1	0.57	26.5	11.3
Mozambique	21.4	0.62	34.5	13.1	0.79	27.1	5.7
Namibia	29.6	0.97	30.5	0.9	0.97	30.7	1.0
Niger	18.7	0.97	19.2	0.5	0.99	19.0	0.3
Nigeria	3.3	0.41	8.1	4.8	0.14	24.3	21.0
Senegal	19.4	0.70	27.6	8.1	0.71	27.1	7.7
SouthAfrica	24.6	0.77	32.0	7.4	0.70	35.0	10.4
Tanzania	12.7	0.60	21.1	8.4	0.46	27.6	14.8
Togo	16.1	0.88	18.3	2.2	0.71	22.9	6.7
Uganda	13.5	0.69	19.6	6.1	0.58	23.4	9.9
Zambia	15.0	0.85	17.8	2.7	0.74	20.4	5.4
Africa	**16.2**	**0.73**	**21.9**	**5.7**	**0.62**	**26.0**	**9.8**

Source: IMF staff calculations

Box 2. Estimation Strategy

The stochastic frontier model of Aigner, Lovell, and Schmidt (1977) is the standard econometric method for tax capacity estimates. A panel version of this model can be written as

$$ln\tau_{it} = \alpha + \beta^{\pi} x_{it} + v_{it} - u_{it} \qquad (1)$$

Where, u_{it}, represents the inefficiency, a non-negative random variable associated with country-specific factors which contribute to country i not attaining its tax capacity at time t. u_{it}, > 0; τ_{it} represents the tax revenue to GDP ratio for country i at time t; the vector, x_{it} represents independent variables affecting tax revenue for country i at time t; β is a π vector of unknown parameters, v_{it} is the residual, a random stochastic variable. We assume that v_{it} has a symmetric distribution, such as the normal distribution, and v_i and u_i are statistically independent of each other. We then define tax effort (a value between zero and one) as:

$$TE_{it} = \frac{\tau_{it}}{exp(\alpha + \beta^T x_{it} + v_{it})} = \frac{exp(\alpha + \beta^T x_{it} + v_{it} - u_{it})}{exp(\alpha + \beta^T x_{it} + v_{it})} = exp(-u_{it}) \qquad (2)$$

Box 3. Dealing with Heterogeneity

Introducing observed and un-observed heterogeneity in the specification of the frontier model is important. We follow two models described in Fenochietto and Pessino (2013). First, to disentangle observed heterogeneity, a truncated normal distribution model, heterogeneous in mean and decay inefficiency (TNH). Second, to disentangle un-observed heterogeneity, we use the Mundlak random effect model (MREM).

Observed Heterogeneity

There are covariates that can be observed and indirectly affect tax collection. Inflation is a good example of such a factor. One way to address observable environmental variables is to allow them to directly influence the stochastic component of the production frontier. Battese and Coelli (1992, 1995) proposed a series of models that capture heterogeneity that can be included in the general form:

$$y_{it} = \beta' x_{it} + v_{it} - u_{it} \quad (3)$$

$$u_{it} = g(z\, u_{it}) |U_i| \text{ where } U_i \sim N[\mu_i, \sigma_u^2], \mu_i = \mu_0 + \mu_1' w_i, \quad (4)$$

where, w_i are variables that influence mean inefficiency;

y is the observed outcome (goal attainment); β′x + v = the optimal frontier goal (e.g., maximal production output or minimum cost) pursued by the individual; β′x = the deterministic part of the frontier; and v ~ N[0,σv^2] is the stochastic part. The two parts together constitute the 'stochastic frontier'. The amount by which the observed individual fails to reach the optimum (the frontier) is *u*, where *u* = |U| and U ~ N[0,σu2]. In this context, *u* is the 'inefficiency.'

We estimate countries' tax effort by using a TNH model, with a more general formulation: with $g(z_{it})$ = exp(η′z_{it}) and the mean of the truncated normal depending on observable covariates $\mu_i = \mu_0 + \mu_1' w_i$ (z variables influence time-varying inefficiency and w_i variables influence mean time-invariant inefficiency). Thus, the TNH model aims at distinguishing 'observed' endogeneity by including two variables (inflation and corruption) to represent inefficiency (see Greene 2005 and 2008).

Unobserved Heterogeneity

In order to address unobserved heterogeneity, we follow the approach taken by Farsi, Filippini, and Kuenzle (2005) by using a Mundlak version of the REM (originally proposed by Pitt and Lee, 1981). While the TNH method distinguishes observed heterogeneity, unobserved heterogeneity of independent variables remains an issue. The Mundlak version of the REM addresses this and decreases the estimation bias by separating inefficiency from unobserved heterogeneity. It is based upon Mundlak's (1978) modification of the REM for the general specification, whereby the correlation of the individual specific effects (α_i) and the explanatory variables are considered in an auxiliary equation given by:

$$\alpha_i = \gamma \overline{x}_i + \delta_i \quad (5)$$

$$\overline{x}_i = \frac{1}{T}\sum_{i=1}^{T} x_i \quad \text{and} \quad \delta_i \sim iid(0, \sigma_\delta^2) \quad (6)$$

where X_i is the vector of all explanatory variables. Equation (6) is readily incorporated in the main frontier equation (1) and estimated using the REM.

99. **We corroborated the robustness of the results. We use three different specifications of the stochastic frontier tax function: the first assumes a half normal model (HN); the second a truncated normal model (TN); and the third a truncated normal with observed heterogeneity (TNH).** Almost all coefficients are statistically significant (different from zero) at 5 percent level and have the expected signs. Moreover, in the first and third models (HN and TNH) the coefficients are quite similar (they include the same explanatory variables). In the three models, λi (σui /σvi) the lambda parameter is quite large (greater than 2.8), and statistically significant. We also examine the

sensitivity of the results by running the models i) omitting the three countries with the highest per capita GDP; ii) omitting the three countries with the lowest per capita GDP; and (iii) finally, omitting the three countries with the lowest GINI coefficient. We find that running the model with these changes does not have a significant impact on our results. Perhaps one of the most important test of the robustness of the results is that the tax effort of the 96 non-natural resource countries does not change significantly when we estimate on the sample consisting of these countries only, compared to the full sample that also includes 17 natural resource-producing countries. The low level of sensitivity of our results to alternative specifications increases the confidence in the results of our model.

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