TASK FORCE ON CLIMATE, DEVELOPMENT AND THE INTERNATIONAL MONETARY FUND

OCTOBER 2022

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Indices of Sustainability of Fiscal Policy Among the V20

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ABSTRACT

In 2021, the Vulnerable Twenty Group (V20) made a call for debt flexibility, invoking insufficient fiscal resources to finance responses to crises caused by the pandemic as well as urgent investments in climate adaptation. We explore the extent of the problem described by the V20 using the index of fiscal sustainability proposed by Blanchard et al. (1990), computed as the difference or "gap" between an economy's current tax rate and the "sustainable" tax rate, or the tax rate which, if constant, would enable the debt-to-gross domestic product (GDP) ratio at time n to be equal to the debt-to-GDP ratio at time 0, given forecasts of spending and transfers under current policy rules. We estimate short-term (n=1) and medium-term (n=5) gap indices for each year from 2010 to 2020 where fiscal and macroeconomic projections are available as well as a "climate change" gap (n=10), which incorporates a country's self-reported costed needs for climate change adaptation and mitigation for the period 2021 to 2030. We find that short term gaps worsen by 7.5 percentage points in 2020 and imply a large average adjustment of 12.8 percent of GDP in either increased tax revenues and/or decreased spending/transfers to immediately attain "sustainable" fiscal policy. Medium term gaps also worsen by 5.8 percentage points when actual 2020 conditions are considered. Climate change gaps are 11.7 percent of GDP on average but the distribution is positively skewed: nine countries have gaps between 22 and

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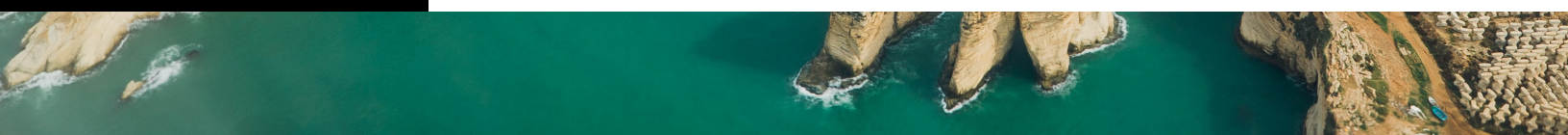

99 percent of GDP while 30 have gaps less than 8 percent, half of which are negative - not a bad thing. Esimated climate change gaps are likely to be significantly understated, however, since cost estimates of climate change needs, especially adaptation needs, are incomplete.

Keywords: Fiscal policy sustainability, sustainability gaps, Vulnerable Group of 20, International Monetary Fund

MOTIVATION AND OBJECTIVES

In 2021, the Vulnerable Twenty Group (V20), made a call for debt flexibility, invoking insufficient fiscal resources to finance responses to the health and social crises caused by the pandemic as well as urgent investments in climate adaptation.[2] Citing Buhr et al. (2018), the V20 Presidency stated that for every ten dollars climate vulnerable developing countries spend on interest payments, they have to pay another dollar because they are climate vulnerable.[3] Further, "climate change is happening faster and with greater impact than was understood when financing contracts between debtors and creditors were established," and thus "the service of public debt crowds out room for crucial investments that countries require in order to climate-proof their economies and establish a resilient, sustainable and equitable recovery."

In this note, we explore the extent of the problem claimed by the V20 using the index of fiscal sustainability proposed by Blanchard et al. (1990).[4] The index is computed as the difference or "gap" between an economy's current tax rate and the "sustainable" tax rate, or the tax rate which, if constant, would enable the debt-to-gross domestic product (GDP) ratio at time *n* to be equal to the debt-to-GDP ratio at time 0, given forecasts of spending and transfers under current policy rules. If the gap is positive, it signals the need for either increases in taxes and/or decreases in spending and/or transfers by an amount equal to the indicator itself, assuming adjustments are undertaken immediately. If adjustments are not undertaken immediately, then the cost of the delay would be an increase in the size of the required adjustment (computed as a function of the indicator itself). The gaps are, therefore, purely descriptive, a measure of fiscal sustainability without any normative nor prescriptive content about whether or when adjustments *should* be implemented, much less how adjustments *should* be made, if ever.

We look back over a decade and estimate short-term (n=1) and medium-term (n=5) gaps for a sample of V20 countries, for each year from 2010 to 2020, where fiscal and macroeconomic projections by the International Monetary Fund (IMF) are available. We then compute what we call a "climate change" gap (n=10), which incorporates a country's self-reported climate change adaptation and mitigation needs for the period 2021 and 2030.

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[2] The V20 Group of Finance Ministers of the member states of the Climate Vulnerable Forum is a dedicated cooperation initiative of economies systematically vulnerable to climate change.

[3] https://www.v-20.org/our-voice/statements/group/v20-statement-on-debt-restructuring-option-for-climate-vulnerable-nations

[4] The index of Blanchard et al. (1990) is among those mentioned in Box 2 of IMF (2016) and (IMF 2012)

We interpret the climate change gap as the size of the fiscal adjustment that a climate vulnerable country would have to implement to keep debt on a stable path given anticipated adaptation and mitigation spending needs. To provide an idea of the "room for maneuver" that governments have on the revenue side, gaps are also reported relative to the approximate quantity of resources that may still be appropriated by each government.

Year 2020 appears to be an outlier for macroeconomies but one that had a significant and sizable negative impact. Between 2019 and 2020, V20 countries' debt-to-GDP ratio increased by 10.1 percentage points, on average. By 2020, the IMF had tagged a total of 30 members as either high risk (or worse) or for higher scrutiny, up from 18 members in 2010. Average growth-adjusted interest rates turned positive in 2020 for all regions except Africa and the Middle East, whereas it had been negative in prior periods. Forecasts in 2020 indicated that growth-adjusted interest rates would be negative again on average from 2021 to 2025.

Our computed short-term gap (STG) and medium-term gap (MTG) indices validate the disruption that 2020 had on fiscal policy sustainability. STGs worsen by 7.5 percentage points in 2020 and imply a large average adjustment of 12.8 percent of GDP in either increased tax revenues and/or decreased spending or transfers to immediately attain "sustainable" fiscal policy, up from 5.3 percent of GDP in 2019. Members in Asia-Pacific registered the largest percentage point increase between 2010 and 2019—almost double that of the V20 as a whole—as well as the largest increase between 2019 and 2020, driven largely by the Small Island Developing States (SIDS) among them.

MTGs also worsen by an average of 5.8 percentage points, to 7.2 percent of GDP, when actual 2020 conditions are considered. Indices improve by 1.9 percentage points in 2021, to 5.3 percent of GDP, as growth-adjusted interest rates are forecast to turn negative.

Despite negative growth-adjusted interest rates, the average climate change gap (CCG) index over the sample is 11.7 percent of GDP. But the distribution is positively skewed. On the one hand, four countries have CCGs greater than 50 percent of GDP, and five others have CCGs between 20 and 50 percent of GDP. On the other hand, 30 countries have CCGs less than 8 percent, of which half (15) are negative, 12 are less than 5 percent of GDP, and three are between 6 and 8 percent of GDP. A negative CCG indicates that immediate increases in taxes or decreases in spending or transfers are not required for fiscal policy sustainability (quite the opposite in fact). This is not a bad thing.

One caveat with respect to our CCGs is that it relies heavily on self-reported quantified or "costed" climate change needs per country as compiled in the *First report on the determination of the needs of developing country Parties related to implementing the Convention and the Paris Agreement*, known as the NDR (UNFCCC 2021). However, among the V20, the number of costed needs is just 56 percent of the total number of needs indicated in the national reports we used, which the NDR explains is due to lack of data, tools, capacity and so forth, especially for estimating climate change adaptation and resilience needs. To the extent that V20 member countries are among the most climate vulnerable, the quality of cost estimates for climate change related needs should be of great concern and incomplete

estimates could very well undermine efforts to secure debt relief and financing for crucial investments.

Therefore, if there is one policy implication that arises from this exercise, it would be that perhaps much more attention and technical resources from international organizations and country governments should be directed to obtaining better cost estimates of climate change needs.

The rest of this note proceeds as follows. The derivation of the indices we use is briefly outlined in the next section, followed by a description of our implementation strategy and data in the third section. The fourth section presents our computed indices and the fifth section closes.

INDICES OF SUSTAINABILITY OF FISCAL POLICY

The concern for sustainable fiscal policy is posed as follows: "*Can the current course of fiscal policy be sustained, without exploding... or imploding... debt? Or will government have to increase taxes, decrease spending, have recourse to monetization, or even repudiation*?" (Blanchard 1990).

To obtain indicators of sustainability, Blanchard et al. (1990) define "sustainable" fiscal policy—a policy such that the debt-to-GDP ratio eventually converges back to its initial level—and derive an expression for what this definition imposes on fiscal policy from first principles.[5] Letting b denote the ratio of real debt to real GDP, s denote time; g, h and t the ratios of real spending, transfers and taxes; d the ratio of the primary deficit; θ the real rate of growth of GDP; and r the ex-post real rate of interest $(i - \pi)$, where π is the rate of inflation, the dynamic government budget constraint is

$$db/ds = g + h + t + (r - \theta)\, b = d + (r - \theta)b \tag{1}$$

from which the debt to GDP ratio at any time n, or b_n, can be stated as

$$b_n = b_0 \exp(r - \theta)\, n + \int_0^{\infty} d_s \exp(r - \theta)\, (n - s) ds \tag{2}$$

where d_s is the sequence of primary deficits-to-GDP ratios arising from current fiscal policy and growth-adjusted interest rates, $(r - \theta)$, are assumed to be constant and positive.[6] Discounting both sides of (2) to time 0 and imposing the requirement that b_n tends to b_0 as n approaches infinity, yields

[5] Except for the replacement of GDP for GNP, the following derivation, including notation and notes, draws heavily from Blanchard et. al. (1990).

[6] If $(r-\theta)$ is negative, a government does not have to run primary surpluses for debt to be sustainable. Even permanent primary deficits of any size would decline at rate $(\theta-r)$ and approach a constant level of debt without entailing any adjustment in fiscal policy. A negative $(r-\theta)$ does not preclude the use of the methodology described here - one can still solve for the finite horizon t_n^* (in equation (6) below) and derive related indices – but it does provide a reason for governments to be less worried about keeping debt to GDP ratios from increasing (Blanchard et al. 1990).

$$\int_0^{\infty} d_s \exp -(r-\theta)s\, ds = \ -d_0 \tag{3}$$

That is, fiscal policy is sustainable if the present discounted value of the ratio of primary deficits to GDP is equal to the negative of the current level of debt to GDP. This suggests one theoretical index of sustainability of current policy: the gap between the constant tax rate that ensures sustainability (that is, which satisfies equation (3) given forecasts of spending and transfers and an initial level of debt), t*, called the 'sustainable' tax rate, and the current tax rate, or

$$(t^* - t) \tag{4}$$

where t* is

$$t^* = (r-\theta)[(\int_0^{\infty}(g+h)\exp -(r-\theta)s\, ds) + \ b_0] \tag{5}$$

The index provides a measure of the size of the adjustment were it to be taken today. A positive gap is a signal for "changes to come" but specific implications will vary by country and depend on the current level of t; room for maneuverability on the revenue side can be represented by (t*-t)/(1-t). As earlier mentioned, a positive gap does not mean that taxes *should* be increased, however. The index is "agnostic" as to whether adjustment should come from increases in taxes or decreases in spending/transfers.[7]

Implementing this index requires specifying finite time periods into the future. Thus equation (4) becomes

$$t^* = (r-\theta)[b_0 + (1 - exp - (r-\theta)n)^{-1}((\int_0^{n}(g+h)\, exp - (r-\theta)s\, ds))] \tag{6}$$

As *n* goes to infinity, t_n* converges to t*; as *n* goes to zero, equation (6) reduces to equation (1). Blanchard et al. (1990) construct indicators corresponding to n equal to 1, 5 and 40, and compute what they call short-, medium- and long-term gaps, for selected Organization for Economic Co-operation and Development (OECD) countries. The short-term index does not require any forecasts and serves as a "useful benchmark" by which to compare the other two, which are based on more forward-looking indicators (ibid). The medium-term index hopes to account for predictable changes in the ratios of spending and transfers to GDP ratios over the business cycle. The long-term index intends to account for the implications on fiscal sustainability of slower but steadier changes in spending or transfer ratios (e.g., due to population and other dynamics).

Sustainability gaps are recognized as one approach to measuring fiscal space (IMF 2016). Relative to other approaches, the advantage of the Blanchard et al. (1990) approach used

[7] This follows from the symmetric treatment of taxes, spending and transfers implicit in the index. See Blanchard et al. (1990), p. 13

here is that it is forward-looking and considers policy plans and projections of the fiscal balance, the discount rate and the growth rate of the economy. As these can change over time, the debt path and hence, estimated fiscal gaps, will change. One drawback of the approach, however, is that it assigns a narrow role to the feedback between fiscal policy changes and private sector behavior (IMF 2016).[8]

The European Commission uses sustainability gaps for its indicators of medium-term fiscal challenges (S1) and long-term fiscal challenges (S2), and up to October 2014, the IMF's *Fiscal Monitor* regularly reported a measure of "adjustment need" for advanced and emerging economies.[9] Kose and others (2017) also include a number of sustainability gap indicators in their fiscal space database, describing them as "simple snapshot(s) of the adjustments that may be needed to reach debt targets under various macroeconomic conditions", although later versions of the database do not feature them.[10] Kose et al. use the gaps as derived/proposed by Escolano (2010) and Ley (2009); Ley (2009) begins by citing Blanchard (1990). In a recent analysis, Kose et al. (2022) report on the evolution of fiscal space from 1990 to 2020 using, among others, sustainability gaps computed for 117 advanced and emerging market developing economies.

IMPLEMENTATION STRATEGY AND DATA

Our sample is comprised of the 48 members of the V20, with 20 from Africa and the Middle East (AME), 19 from Asia and the Pacific (AP) and nine from Latin America and the Caribbean (LAC). One-third (16) of the V20 members—10 from AP, five from LAC, and one from AME—are also SIDS.

For each country, we construct a set of three fiscal sustainability indices following equation (6). The first corresponds to a short-term (n=1) time horizon, giving us STGs for each year from 2010 to 2020, and providing a useful benchmark for the other two indices. The second corresponds to a medium term (n=5) time horizon and employs 5-year forecasts to capture predictable changes over the business cycle, giving us MTGs for the years 2011 to 2021 when forecasts are available. To try and capture the disruption of 2020, we compute two MTGs for 2020: one that uses 2019 forecasts for 2020-2024, and one that uses actual 2020 data and 2020 forecasts for 2021 to 2024, which we call "perfect foresight." We also compute two MTGs for 2021: one that takes as given the average projected growth-adjusted interest rates for 2021 to 2025 and one that assumes "stressed" conditions, i.e., where average growth adjusted interest rates per country are shocked by reducing country-specific

[8] In contrast, the structural approach of Ostry et al. (2010) relies on past data and behavior and assumes that future behavior will be as in the past. The approach entails the estimation of country-specific debt limits implied by a country's historical record of fiscal adjustment; fiscal space is the difference between the current level of public debt and the estimated debt limit. Monsod, Majadillas, and Gochoco-Bautista (2022) estimate debt limits and fiscal space for a sample of V20 and ASEAN members using this approach.

[9] For the European Commission, see, for instance, European Commission (2007), (2009) and (2015) (available at https://ec.europa.eu/economy_finance/publications/pages/publication_summary340_en.htm). For the IMF Fiscal Monitor, see IMF (2012), Box 1, and Statistical Tables 10a and 10b. Other editions are available at https://www.imf.org/en/Publications/FM?page=1

[10] The latest version is found here: https://www.worldbank.org/en/research/brief/fiscal-space

sample means of GDP growth by one country-specific standard deviation and increasing country-specific real (effective) interest rates by one country- specific standard deviation.

Because of data limitations, neither the STG nor the MTG time series per country is complete and the number of estimated MTGs is far less than STGs; 171 MTGs are estimated as against 451 STGs. Four countries do not have a 5-year forecast for any year and therefore, no estimated MTG.

All countries will have a CCG for 2021—our third indicator. The CCG index attempts to account for the implications on fiscal sustainability of changes in the ratios of spending and transfers to GDP due to a country's costed climate change needs until 2030.

While the CCG is, in essence, a medium-term gap computed for n=10, we do not require a 5-year forecast from 2020 to estimate the CCG. Instead, we employ whatever length of forecast data is available in 2020 and extend the same to 2030 using simple assumptions (Annex 1). We then add the country's costed climate change needs to what is estimated as regular spending for the period by assuming that climate change spending is expended in the middle of the period (year 2025).

Data on historical and forecast non-interest spending, tax revenues, real interest rates, real GDP growth and general government gross debt per country per year from 2010 to 2020 (thus, forecasts from 2021 to 2025 or 2026) are assembled from IMF publications compiled as of 2 February 2022 (Annex 1). Data on quantified or "costed" climate change needs per country are taken from UNFCCC (2021), or the NDR. The NDR consolidates mitigation, adaptation and cross-cutting "needs" and "costed needs" (or "needs" with associated costs specified) contained in national reports submitted to the UNFCCC as of May 31, 2022.[11] Costed needs per country are listed by type of national report and are not aggregated across reports "to avoid double counting…".[12] We choose one report per country—the report that indicates the largest amount of associated costs—and assume that costs cover the period until 2030 (Annex 2).

Tables 1 through 5 below provide an overview of the fiscal position and climate change costed needs of V20 members. Between 2010 and 2019, primary spending across the V20 rose from an average of 17.3 to 21.6 percent of GDP, further increasing to 24.9 percent of GDP in 2020 (Table 1). The spike in 2020 reflects the increase in spending and the contraction of economic output due to the pandemic; non-interest spending was forecast in 2020 to remain elevated in the period 2021 to 2025 at an average of 23.4 percent. Average tax effort rose from 13.5 to 14.9 between 2010 and 2019, before rolling back to 13.9 in 2020. Primary deficits rose by an average of 4.2 percentage point, from 6.7 to 10.9 percent of GDP,

[11] National reports may be Adaptation Communication (AC), Biennial Update Reports (BUR), Low-Emission Development Strategies (LED), National Adaptation Plan (NAP), National Adaptation Programme of Action (NAPA), National Communication (NC), Nationally Determined Contribution (NDC), Technology Action Plan (TAP), and Technology Needs Assessment (TNA). The NDR includes "all needs that are expressed in a quantitative (hereinafter referred to as costed needs) or (hereinafter referred to as needs) qualitative manner. Quantitative information was compiled from lists of projects and economic modelling in reports at the national, regional and global level and other sources." Further, costs are taken at face value, "that is, as stated in the national report without considering the net present value and the potential of inflation." (pp. 27-28)

[12] Footnote 30, UNFCCC (2021).

TABLE 1 Average* Primary deficit, Non-Interest Spending, and Tax Revenues, in percent of GDP, 2010, 2019 and 2020

	N	Ave Primary deficit/GDP			Ave non-interest spending/GDP				Ave tax revenues/GDP		
		2010	2019	2020	2010	2019	2020	2021-25 (forecast in 2020)	2010	2019	2020
V20	48	3.8[a]	6.7[b]	10.9[c]	17.3[a]	21.6[b]	24.9[c]	23.4	13.5[a]	14.9[b]	13.9[c]
AME	20	2.0	4.9	6.1	14.1	16.7	17.9	16.3	12.2	11.7	11.8
AP	19	6.5	12.0	18.7	20.9	29.0	33.9	33.1	14.4	17.0	15.1
LAC	9	2.5	-0.3	4.3	16.7	15.9	19.8	16.9	14.2	16.2	15.5
SIDS	16	8.6	13.6	21.7	24.2	31.1	38.3	35.9	15.6	17.6	16.6

Source: Annex 3.

Notes: *Averages are unweighted. [a] 6 countries have no data (Kiribati, Niger, South Sudan, Timor-Leste, Tuvalu, Yemen); [b] 7 countries have no data (Gambia, Palestine, Tunisia, Tuvalu, Tanzania, Vietnam, Yemen); [c] Palestine and Yemen have no data

between 2019 and 2020, with SIDS registering the largest average increase at 8.1 percentage points.

Growth-adjusted interest rates, also known as interest rate-growth differentials (IRGD), were large and negative between 2010 and 2019, although there was a deterioration from -7.9 to -4.8 percent across the sample and IRGDs were barely negative in LAC (Table 2). In 2020, IRGDs turned marginally positive across the V20 driven by large increases in LAC and AP. AMEs seemed to have bucked the trend, but this was due to at least one outlier—Sudan—whose IRGDs between 2019 and 2020 jumped from -50.0 to -160.8 percent.[13] Without Sudan, average IRGDs in AME and the V20 as a whole are -2.3 percent and 3.8 percent, respectively. Forecasts in 2020 indicated that IRGDs for 2021 to 2025 would again be negative.

TABLE 2 Average (Effective) Interest Rate- Growth Differentials (IRGD), in percent

	N	Average IRGDs*			
		2010	2019	2020	2021-25 (Forecast in 2020)
V20	48	-7.9[a]	-4.8[b]	0.2[c]	-7.1
AME	20	-9.5	-8.2	-11.1	-11.2
AP	19	-10.1	-3.8	5.9	-5.3
LAC	9	-1.3	-1.2	10.7	-2.9
SIDS	16	-2.4	-2.3	9.2	-3.3
Note: Excl. Sudan:					
V20		-7.5	-3.7	3.8	
AME		-8.5	-5.2	-2.3	

Source: Annex 3. **Notes:** * Averages are unweighted; [a] 8 countries have no data (Kiribati, Niger, Palau, South Sudan, Timor- Leste, Tuvalu, Yemen); [b] 7 countries have no data (Gambia, Palestine, Tunisia, Tuvalu, Tanzania, Vietnam, Yemen); [c] Palestine, Yemen have no data.

[13] Lebanon's IRGD likewise jumped from 9.1 to -31.1 percent between 2019 and 2020.

Average general government gross debt across the V20 stood at 39.9 percent of GDP in 2010, 53.7 in 2019 and 63.8 percent of GDP in 2020 (Table 3). Clearly the events of 2020 made a significant dent: the average percentage point increase between 2019 and 2020 accounted for about 38 percent of the percentage point increase between 2010 and 2020. However, rising debt ratios were already a concern before 2020. In its assessments of debt sustainability during the period, the IMF moved seven members, from among 32 considered to be low-income countries (LIC), into the "high risk" category, joining nine others already classified as high risk or worse (i.e., seven at high risk and two in debt distress), although two LICs were moved out of the high risk category (Table 4).[14] The IMF also moved three market access countries (MAC) into the "higher scrutiny" category, joining nine others already there. In all, 30 V20 members were either tagged as high risk (or worse) or for higher scrutiny in 2020 as against 18 in 2010.

TABLE 3 Average Debt to GDP ratio (in percent), 2010, 2019 and 2020*

	N	2010	2019	2020	ppt change 2010 and 2020	ppt change 2019 and 2020	Share of 2019-20 to 2010-20 increase
V20	48	39.9 **	53.7	63.8	26.4	10.1	0.38
AME	20	39.9	63.4	71.9	34.1	8.5	0.25
AP	19	33.7	42.7	52.6	20.7	10.0	0.48
LAC	9	41.7	55.5	69.3	21.5	13.8	0.64
SIDS	16	40.0	44.1	56.9	19.4	12.9	0.66

Source: Annex 3.

Note: * Averages are unweighted **Excludes 2 countries without data (Palestine and So. Sudan).

TABLE 4 Changes in IMF "debt sustainability" ratings between 2010 and 2020/2021

LIC: Increased risk of debt distress		LIC: Decreased risk of debt distress	MAC
To Moderate Risk	To High Risk (from Low or Moderate)	From High to Moderate, or Moderate to Low Risk	To "higher" scrutiny
Madagascar	Ethiopia (from Low)	Comoros (from H to M)	Fiji
Rwanda*	Kenya (from Low) *	Democratic Rep of Congo (from H to M)	Mongolia **
Senegal	Samoa (from Low)	Honduras (from M to L)	Vietnam **
Timor-Leste	Ghana		
Tanzania *	Malawi		
Vanuatu	Papua New Guinea *		
	South Sudan		

Source: Country IMF Article IV reports. Notes: * Change attributed directly to impacts of the pandemic on growth, exports, revenues and financing; ** Previously a LIC, with low risk of debt distress

[14] The IMF conducts debt sustainability analyses as part of its surveillance and advisory functions. Separate frameworks are applied to LICs and MACs. LIC are classified into four depending on risk of debt distress: "low", "moderate", "high", and in "debt distress" based on various thresholds and assessments of debt carrying capacity. MACs are classified into "lower" or "higher" scrutiny, with the latter indicating the need for more extensive risk analysis. See IMF (2013) and IMF (2018).

Finally, on self-reported costed needs for climate change response, 2,083 "needs" are contained in 48 selected national reports, as counted by the NDR as of May 31, 2021, of which just 1,166 (or 56 percent) have associated cost estimates. National reports from three countries—Barbados, Guatemala and Marshall Islands—do not indicate any associated costs (Table 5). Cumulatively, costed needs amount to $1,033.7 billion, with individual country needs ranging from less than $10 million (Malawi, Tuvalu) to about $294.7 billion (Ethiopia). Assuming that costs are spread out equally on an annual basis from 2021 to 2030, the quantified needs per country range from less than 0.1 percent of GDP (Philippines, Honduras, Malawi, Lebanon and Colombia) to 89.5 percent of GDP (Fiji), averaging out at 7.8 percent of GDP.

TABLE 5 Number of Needs, Costed Needs, and Amount Reported from Selected National Reports

	Number of Needs	Number of Costed Needs *	Total Costed Needs (high range), USD Billions *	Average Annual Costed Needs (% of GDP) *
V20	2083	1166	1033.7	7.8
AME	838	544	729.7	9.1
AP	840	455	255.3	8.4
LAC	405	167	48.7	3.6
SIDS	734	345	108.2	11.2

Source: Annex 2. * Excludes three countries (Barbados, Guatemala and Marshall Islands)

UNFCCC (2021) emphasizes that the quality of the compiled information is limited by country- Parties' lack of data, tools and capacity for determining and costing needs. Deriving cost estimates is observed to be a major challenge, especially for climate adaptation and enhancing resilience since adaptation actions are typically longer-term interventions that are difficult to estimate in monetary terms. As such, a lower number of needs or costed needs should not imply that a country has no or fewer needs.

That said, incomplete or spotty country-level estimates of climate change adaptation, mitigation and cross-cutting needs should be of great concern, especially in the context of the urgent calls from the V20 for debt relief and other forms of support so that members can undertake crucial investments to climate-proof their economies.

RESULTS

The description of short-and medium-term indices below excludes Sudan, although summary Tables 6 and 7 (from Annex 4) present results with Sudan for reference. Graphs showing the evolution of STGs and MTGs over time per country as well as each country's CCG are presented in Annex 5.

On average, short-term gaps among the V20 increased steadily from -0.03 in 2010 to 5.3 in 2019, before jumping to 12.8 in 2020 (Table 6). That is, for fiscal policy to have been

considered 'sustainable' by this index, an average adjustment of 12.8 percent of GDP, in either increased tax revenues and/or decreased spending/transfers, would have been necessary in 2020 (a 7.5 percentage point increase from the adjustment implied in 2019). Among the regions, the AP registered the largest percentage point increase between 2010 and 2019—at roughly 10 percentage points, or almost double that of the V20 as a whole—and also registered the largest increase between 2019 and 2020. The increase in AP is likely driven by the SIDS among it, which, on its own, had an even larger increase between 2019 and 2020. The implied adjustment in 2020 for AP was 22.1 percent of GDP, up from 10.5 percent in 2019. For SIDS it was 28.1 percent of GDP up from 12.9 percent of GDP in 2019.

The last three columns of Table 6 provide an indicator of the (limited) room for maneuver from the revenue side. For the V20, the STG in 2020 amounts to about 15.2 percent of resources/output not yet collected as tax revenues in 2020. For the SIDS and AP, the STG amounts to about 33.9 and 26.2 percent of resources/output not yet collected as tax revenues in 2020, respectively.

TABLE 6 Short-Term Gaps and Room for Maneuver on the Revenue Side, 2010, 2019 and 2020

	N	2010	2019	2020	STG/1 – t_{2010}	STG/1 – t_{2019}	STG/1 – t_{2020}
V20	47	-0.03	5.3	12.8	0.000	0.062	0.152
AME	19	-2.0	2.7	2.7	-0.021	0.030	0.031
AP	19	0.5	10.5	22.1	0.006	0.126	0.262
LAC	9	2.5	-0.6	12.0	0.029	-0.009	0.149
SIDS	16	6.0	12.9	28.1	0.071	0.154	0.339
Note: with Sudan,							
V20	48	-0.3	3.2	5.7	-0.002	0.040	0.079
AME	20	-2.4	-2.8	-14.8	-0.026	-0.029	-0.150

Source: Annex 4

It is difficult to compare average MTGs over the period from 2011 to 2020 as the sample of countries with 5-year forecasts for each year differ greatly. For instance, only five countries have 5-year forecast data in 2010 (for MTG 2011) while 24 have 5-year forecast data in 2019 (for MTG 2020). We are better able to compare MTGs in 2020 and 2021 since 39 countries have 5-year forecast data in 2020, allowing the computation of 2020 MTGs with "perfect foresight" in 2019 (which consider actual 2020 conditions, along with 2021-2024 forecasts) as well as MTGs for 2021 (using forecasts for 2021-2025).

The assumption of perfect foresight worsens (increases) the MTGs for 2020 by 5.8 percentage points on average, from 1.4 percent of GDP without it to 7.2 percent of GDP with it; the average increase is 4.3 for 24 countries with data for both indices (Table 7). MTGs for 2021 then improve slightly overall, reflecting 2020 forecasts of 2021 to 2025 conditions, including negative IRGDs; average MTGs for LAC and AME become negative. However, when average

IRGDs for the 2021 to 2025 period are shocked, the MTGs worsen by 2.4 percentage points on average, although MTGs for LAC and AME remain less than 0.1 percent of GDP.

TABLE 7 Medium-term Gaps 2020 and 2021 and Room for Maneuver 2021

	MTG 2020	MTG 2020, Perfect foresight	MTG 2021	MTG 2021 stressed	MTG 2021 / $(1 - t_{2021})$	MTG 2021 stressed/ $(1 - t_{2021})$
N*	*25* *(24)*	*39* *(24)*	*35*	*35*	*35*	*35*
V20	1.4 (1.3)	7.2 (5.6)	5.3	7.7	0.060	0.087
AME	0.6	0.04	-2.6	0.3	-0.030	0.001
AP	5.2	19.2	19.9	22.2	0.232	0.256
LAC	-1.3	2.4	-1.1	0.6	-0.017	0.006
SIDS	4.3	19.1	18.0	20.8	-0.032	0.003
Note: with Sudan,						
V20	-25.0	-13.2	-3.0	7.4	-0.025	0.084
AME	-75.8	-45.8	-20.0	0.1	-0.210	-0.001

Source: Annex 4.
Note: *Total number of countries with data.

Extending the time horizon to 2030 and adding country-reported costed needs for climate change increases the index by about 6.4 percentage points of GDP (assuming forecasts) or 7.2 percentage points of GDP (assuming simulated stress conditions) (Table 8). On average, the CCG over the sample is 11.7 percent of GDP, but the difference between the mean and median indicate that the distribution is positively skewed; there are more extreme scores in the top 50 percent than in the bottom 50 percent.

TABLE 8 MTG and CCG in 2021, Forecast and Stressed

		MTG 2021	MTG 2021 stressed	CCG 2021	CCG 2021 stressed
V20	Mean	5.3	7.7	11.7	14.9
	Median	-0.6	0.6	2.3	3.5
	Min	-13.4	-8.4	-8.6	-7.6
	Max	72.1	72.2	98.6	104.8

Source: Annex 4.
Note: Excludes Sudan

Indeed, this is shown in Table 9. Four countries of the 45 for which we have estimates of CCG, excluding Sudan, have CCGs greater than 50 percent of GDP, and five others have CCGs between 20 and 50 percent of GDP. The top four are Fiji, with a CCG of 98.6 percent of GDP; Tuvalu (73.7 percent); Timor-Leste (63.7 percent) and Marshall Islands (57.5 percent). Room for maneuvering from the revenue side looks limited for the top nine: the

MTGs imply adjustments that amount to between 27 and 116 percent of resources not yet appropriated by government in 2021.

TABLE 9 Climate Change Gaps, 2021

Country	Rank	CCG	CCG/1-t	CCG Stressed	CCG stressed/1 – *t*
Fiji	1	98.6	1.165	104.8	1.238
Tuvalu	2	73.0	0.871	73.1	0.872
Timor-Leste	3	63.7	0.686	64.0	0.689
Marshall Islands	4	57.5*	0.670	58.0	0.676
Kiribati	5	48.8	0.592	48.9	0.594
South Sudan	6	37.0	0.390	103.9	1.094
Palau	7	35.6	0.417	45.6	0.534
Samoa	8	24.6	0.315	27.9	0.358
Vanuatu	9	22.5	0.268	23.6	0.282
Comoros	10	13.7	0.148	13.7	0.149
Madagascar	11	13.6	0.151	14.6	0.162
Haiti	12	13.3	0.149	14.5	0.162
Afghanistan	13	12.9	0.142	13.1	0.143
Niger	14	10.7	0.119	12.1	0.135
Lebanon	15	10.2	0.123	10.9	0.132
U.R. of Tanzania	16	8.0	0.090	8.7	0.098
Morocco	17	7.7	0.098	8.3	0.105
D.R. of the Congo	18	6.3	0.068	7.4	0.080
Costa Rica	19	4.4	0.050	5.2	0.060
Ethiopia	20	3.9	0.043	11.3	0.127
Papua New Guinea	21	3.4	0.039	4.8	0.055
Colombia	22	2.4	0.028	3.0	0.034
Saint Lucia	23	2.3	0.028	4.1	0.051
Dominican Rep.	24	1.4	0.016	1.8	0.021
Bangladesh	25	1.3	0.014	2.0	0.022
Philippines	26	1.1	0.013	1.6	0.018
Rwanda	27	1.1	0.013	3.5	0.042
Guatemala	28	0.9*	0.009	1.1	0.012
Grenada	29	0.4	0.005	1.9	0.025
Nepal	30	0.2	0.003	0.5	0.006
Tunisia	31	-0.3	-0.003	0.6	0.009
Sri Lanka	32	-0.3	-0.003	0.1	0.001
Honduras	33	-1.1	-0.013	-0.5	-0.006

Country	Rank	CCG	CCG/1-t	CCG Stressed	CCG stressed/1 – *t*
Burkina Faso	34	-1.3	-0.016	-0.9	-0.011
Viet Nam	35	-1.3	-0.015	-0.8	-0.009
Kenya	36	-1.4	-0.016	-1.1	-0.013
Mongolia	37	-2.0	-0.027	-0.7	-0.009
Cambodia	38	-2.7	-0.034	-2.0	-0.025
Malawi	39	-3.4	-0.038	-2.0	-0.022
Ghana	40	-3.4	-0.039	-1.0	-0.012
Bhutan	41	-6.2	-0.072	-3.5	-0.041
Senegal	42	-6.3	-0.076	-3.9	-0.048
Maldives	43	-6.4	-0.077	-0.6	-0.008
Barbados	44	-7.5*	-0.103	0.2	0.003
Gambia	45	-8.6	-0.096	-7.6	-0.085
Sudan	46	-298.5	-3.275	*	*
State of Palestine	nd	nd	bd	nd	nd
Yemen	nd	nd	nd	nd	nd

Source: Authors' computations.

Note: * no climate change costed needs reported; ** not applicable; nd (no estimate)

However, 30 countries—or two-thirds of the 45—have CCGs less than 8 percent, of which half (15) are negative, ranging from -0.3 percent to -8.6 percent of GDP, 12 are less than 5 percent of GDP, and three are between 6 and 8 percent of GDP. A negative CCG is not a bad thing; immediate increases in taxes or decreases in spending/transfers are not required for fiscal policy "sustainability" (quite the opposite). The smallest CCGs are reported for Gambia (-8.6 percent of GDP), Barbados (-7.5 percent), Maldives (-6.4 percent), Senegal (-6.3 percent) and Bhutan (-6.2 percent). A CCG of less than 5 percent amounts to just between 0.3 and 5.0 percent of resources in 2021 not yet appropriated by the governments of the twelve countries. On their face, these shares/amounts do not seem to be infeasible.

All this said, it is important to recall that many climate change-related needs listed by countries did not have associated costs for reasons of lack of data, tools, capacity and so forth. Estimated CCGs are, therefore, likely to be significantly understated.

CONCLUDING REMARKS

The 2020 COVID-19 pandemic appears to be an outlier but one that had a significant and sizable negative impact on countries. Between 2019 and 2020, V20 countries' debt-to-GDP ratio increased by 10.1 percentage points on average. By 2020, the IMF had tagged a total of 30 members as either high risk (or worse) or for higher scrutiny, up from 18 members in 2010. Average IRGD turned positive in 2020 in all regions except AME, whereas it had

been negative in prior periods. It is projected to turn negative again in 2021-2025 based on forecasts in 2020.

Using the STG index, a large average adjustment of 12.8 percent of GDP in either increased tax revenues and/or decreased spending/transfers, equivalent to an average of 15.2 percent of resources/output not yet appropriated by government in 2020, is estimated to immediately attain 'sustainable' fiscal policy in 2020. AP members registered the largest percentage point increase between 2010 and 2019—at roughly 10 percentage points, or almost double that of the V20 as a whole—and again between 2019 and 2020, the latter driven largely by the SIDs members within AP.

The MTG index likewise reflects the devastating surprise of the pandemic. MTGs for 2020 worsen by 5.8 percentage points (from 1.4 percent to 7.2 percent of GDP), when actual 2020 conditions are considered. The MTGs for 2021 generally show improvement as they are based on 2020 forecasts of 2021-2025 conditions, including negative average IRGDs; average MTG 2021 declines to 5.3 percent of GDP. From perfect foresight MTG 2020 of 7.2 percent in V20 countries, MTG 2021 declines to 5.3 percent of GDP. However, under stressed conditions, MTGs for 2021 worsen by an average of 2.4 percentage points.

CCGs over the sample are an average 11.7 percent of GDP, but the distribution is positively skewed. Nine countries have CCGs greater than 20 percent of GDP while 30 countries have CCGs less than 8 percent. Of the 30, half are negative, 12 are less than 5 percent of GDP, and three are between 6 and 8 percent of GDP. A negative CCG is not a bad thing.

Thus, despite negative average IRDGs in the pre-pandemic period and forecast over the period 2021-2025, there still exist positive debt-to-GDP ratios and positive fiscal sustainability gaps. A positive gap signals the need for either increases taxes or decreases in spending or transfers by an amount equal to the indicator itself, if debt-to-GDP ratios are to immediately return to the level at time 0. Specific implications will vary by country.

The other consideration in this exercise concerns the articulation and measurement of the cost of climate change needs. Changes in these will, of course, affect the sizes of the gaps and the measure of fiscal sustainability. As it is, 44 percent of climate change needs listed in the national reports considered in this exercise have no cost estimates for reasons that are evidently due to lack of data, tools or capacity among country-governments. Three countries do not have any associated costs indicated in their national reports.

To the extent that V20 member countries are among the most climate vulnerable, the quality of cost estimates for climate change-related needs should be of great concern. Spotty estimates could very well undermine efforts to secure debt relief and financing for crucial investments that members require "to climate-proof their economies and establish a resilient, sustainable and equitable recovery."

REFERENCES

Blanchard, O.J.. 1990. "Suggestions for a New Set of Fiscal Indicators," OECD Dept. of Economics and Statistics Working Paper no. 79. Available from http://www.oecd.org

Blanchard, O., J. C. Chouraqui, R. P. Hagemann, and N. Sartor, 1990, "The Sustainability of Fiscal Policy: New Answers to an Old Question," OECD Economic Studies, 15.

Buhr et al. (2018), *Climate Change and the Cost of Capital in Developing Countries*. London and Geneva: Imperial College London; SOAS University of London; UN Environment

Escolano, J. 2010. "A Practical Guide to Public Debt Dynamics, Fiscal Sustainability, and Cyclical Adjustment of Budgetary Aggregates." IMF Technical Notes and Manuals 10/02, International Monetary Fund, Washington, DC.

European Commission (EC). 2007. "Public Finances in the EMU 2007," *European Economy*, No. 3 (Brussels: European Commission).

———. 2009. "Sustainability Report 2009," *European Economy*, No. 9 (Brussels: European Commission).

———. 2016. "Fiscal Sustainability Report 2015," *European Economy Institutional Papers No. 18* (Brussels: European Commission).

International Monetary Fund. 2012 (April). "Fiscal Monitor: Balancing Fiscal Policy Risks," (Washington).

———. 2013. *Guidance Note on DSA for Market-Access Countries*. https://www.imf.org/external/np/pp/eng/2013/050913.pdf

———. 2016. "Assessing Fiscal Space: An Initial Consistent Set of Considerations", IMF Policy Paper.

———. 2018, *Guidance Note on the Bank-Fund Debt Sustainability Framework for Low Income Countries*. https://www.imf.org/-/media/Files/Publications/PP/2017/pp122617guidance-note-on-lic-dsf.ashx

Germanwatch. (2018, November). *Global Climate Risk Index 2019*. https://germanwatch.org/sites/default/files/Global%20Climate%20Risk%20Index%202019_2.pdf

Kose, M. A., S. Kurlat, F. Ohnsorge, and N. Sugawara. 2017. "A Cross-Country Database of Fiscal Space." Policy Research Working Paper 8157, World Bank, Washington, DC.

Kose, M. A., S. Kurlat, F. Ohnsorge, and N. Sugawara. 2022. "A Cross-Country Database of Fiscal Space." *Journal of International Money and Finance* 128 (2022) 102682.

Ley, E. 2009. "Fiscal Policy for Growth." PREM Note 131, World Bank, Washington, DC.

Monsod, T. C., M. A. Majadillas, and M.S. Gochoco-Bautista. 2022 (May). "A Closer Look at Fiscal Space in Climate-Vulnerable Developing Countries", Task Force on Climate, Development and the International Monetary Fund Working Paper (https://www.bu.edu/gdp/files/2022/07/TF-WP-007-FIN.pdf)

Ostry, J.D., A. R. Ghosh, J. I. Kim, and M. S. Qureshi, 2010, "Fiscal Space," IMF Staff Position Note 10/11.

United Nations Framework Convention on Climate Change Standing Committee on Finance (UNFCCC), 2021. First Report on the Determination of the Needs of Developing Country Parties Related to Implementing the Convention and the Paris Agreement, UNFCCC. Available at: https://unfccc.int/sites/default/files/resource/54307_2%20-%20UNFCCC%20First%20NDR%20technical%20report%20-%20web%20%28004%29.pdf (downloaded 25 November 2021).

ANNEX 1: VARIABLE DEFINITIONS AND DATA SOURCES

All data are based on information compiled as of February 2, 2022.[1]

Short-Term Gap

$$t_0^* - t = d + (r - \theta)b_0$$

Source: Blanchard et al. (1990), p. 17

Primary deficit, d

$$d = 100 \times \frac{Total\ Expense - Interest\ Payment - Tax\ Revenues}{Nominal\ GDP}$$

Variable	Source	Classification	Sector	Units
Total Expense	IMF Government Finance Statistics	Expense	Budgetary Central Government	Domestic currency
Interest Payment		Interest expense		
Tax Revenues		Tax revenue		
Nominal GDP (current prices)	IMF World Economic Outlook			National Currency, Billions

Note: When the data are not available in IMF Government Finance Statistics, we extract total expense, interest payment, and tax revenues from the IMF Article IV Reports.

Growth adjusted interest rate, $r - \theta$

$$r = i - \pi$$

$$i = 100 \times \frac{Interest\ Payment}{Previous\ Year's\ Debt}$$

$$\pi = 100 \times \left(\frac{GDP\ Deflator}{Previous\ Year's\ GDP\ Deflator} - 1\right)$$

$$\theta = 100 \times \left(\frac{Real\ GDP}{Previous\ Year's\ Real\ GDP} - 1\right)$$

[1] Expense (local currency), Interest Expense (local currency), and Tax Revenues (local currency), from IMF GFS and Article IV Reports, downloaded as of 02 February 2022. Inflation (GDP deflator), Real GDP Growth, General Government Gross Debt, from IMF WEO and Article IV Reports, downloaded 15 November 2021. UNFCCC First Report on the Determination of the Needs of Developing Country Parties Related to Implementing the Convention and the Paris Agreement, downloaded 25 November 2021

Variable	Source	Subject Descriptor	Units
Debt	IMF World Economic Outlook	General government gross debt	National Currency, Billions
GDP Deflator	IMF World Economic Outlook	Gross domestic product, deflator	Index
Real GDP	IMF World Economic Outlook	Gross domestic product, constant prices	National Currency, Billions

Note: Treasury-bill rates were also considered for "i". However, they were only available for 28 countries and 8 years on average.

b_0, lagged debt (i.e., debt at the end of year 0 or beginning of year 1)

$$b_0 = 100 \times \frac{Previous\ Year's\ Debt}{Previous\ Year's\ Nominal\ GDP}$$

Variable	Source	Subject Descriptor	Units
Debt	IMF World Economic Outlook	General government gross debt	National Currency, Billions
Nominal GDP	IMF World Economic Outlook	Gross domestic product, current prices	National Currency, Billions

Example: When computing for a country's 2019 short-term gap, we use fiscal data, interest rate and GDP growth rate for 2019 together with debt data for beginning 2019 (i.e., end-2018).

Medium-Term Gap (s = 1, 2, ...5)

$$t_5^* - t_1 = \left(\frac{r - \theta}{1 + r - \theta}\right)\left[\left[1 - \left(\frac{1}{1 + r - \theta}\right)^5\right]^{-1}\left[\sum_{s=1}^{5}\left(\frac{1}{1 + r - \theta}\right)^{s-1}(g_s + h_s)\right] + b_0\right] - t_1$$

Source: Note 7, Blanchard et al. (1990), pp. 17 and 35

Note: Four countries have no 5-year forecasts for any year and therefore have no estimated MTGs. Seven countries do not have a complete 5-year forecast for years 2021-2025 as of 2020 and therefore have no MTG for 2021.

$r - \theta$, Average Forecast Growth-Adjusted Interest Rate (as of year 0)

$$r - \theta = \frac{\sum_{s=1}^{5} r_s - \theta_s}{5}$$

r_s, Forecast Real Effective Interest Rate

$$r_s = Forecast\ Effective\ Interest\ Rate - Forecast\ Inflation$$

θ_s, Forecast Real GDP Growth

For 2021, $r - \theta$ "stressed":

$$r - \theta\ "stressed" = (\bar{r} + \sigma_r) - (\bar{\theta} - \sigma_\theta)$$

$\bar{r}$ is the country-specific mean interest rate for 2021 to 2025
σ_r is the country-specific standard deviation of interest rate for 2021 to 2025
$\bar{\theta}$ is the country-specific mean GDP growth rate for 2021 to 2025
σ_θ is the country-specific standard deviation of GDP growth rate for 2021 to 2025

Variable	Source	Units
Forecast Effective Interest Rate	IMF Article IV Reports	Percent
Forecast Inflation (GDP Deflator)	IMF Article IV Reports	Percent
Forecast Real GDP Growth	IMF Article IV Reports	Percent

$g_s + h_s$, Forecast Non-Interest Spending Ratio in year s (as of year 0)

$$g_s + h_s = 100 \times \frac{Forecast\ Total\ Expense - Forecast\ Interest\ Expense}{Forecast\ Nominal\ GDP}$$

Variable	Source	Units
Forecast Total Expense	IMF Article IV Reports	National Currency, Billions
Forecast Interest Expense	IMF Article IV Reports	National Currency, Billions
Forecast Nominal GDP	IMF Article IV Reports	National Currency, Billions

b_0, lagged debt (i.e., debt at the end of year 0 or beginning of year 1)

$$b_0 = 100 \times \frac{Previous\ Year's\ Debt}{Previous\ Year's\ Nominal\ GDP}$$

Variable	Source	Subject Descriptor	Units
Debt	IMF World Economic Outlook	General government gross debt	National Currency, Billions
Nominal GDP	IMF World Economic Outlook	Gross domestic product, current prices	National Currency, Billions

t_1, Forecast Tax Revenue Ratio in year 1 (as of year 0)

$$t_1 = 100 \times \frac{Forecast\ Tax\ Revenues}{Forecast\ Nominal\ GDP}$$

Variable	Source	Units
Forecast Tax Revenues	IMF Article IV Reports	National Currency, Billions
Forecast Nominal GDP	IMF Article IV Reports	National Currency, Billions

Example: When computing for a country's 2020 medium-term gap, we use fiscal data, interest rates, and GDP growth rates for 2020 to 2024 together with debt data for beginning 2020 (i.e., end-2019).

Climate Change Gaps (s = 1, 2, ... 10)

$$t_{10}^{*} - t_1 = \left(\frac{r - \theta}{1 + r - \theta}\right)\left[\left[1 - \left(\frac{1}{1 + r - \theta}\right)^{10}\right]^{-1}\left[\sum_{s=1}^{10}\left(\frac{1}{1 + r - \theta}\right)^{s-1}(g_s + h_s)\right] + b_0\right] - t_1$$

Note: Although not all countries in the sample have an estimated MTG for 2021, all countries will have a Climate Change gap a 5-year forecast for 2021-2025 is not required.

$r - \theta$, Average Forecast Growth-Adjusted Interest Rate (as of year 0)

$$r - \theta = \frac{\sum_{s=1}^{n} r_s - \theta_s}{n}$$

Where n is the length of the available forecast

r_s, Forecast Real Effective Interest Rate

$$r_s = Forecast\ Effective\ Interest\ Rate - Forecast\ Inflation$$

θ_s, Forecast Real GDP Growth

Variable	Source	Units
Forecast Effective Interest Rate	IMF Article IV Reports	Percent
Forecast Inflation (GDP Deflator)	IMF Article IV Reports	Percent
Forecast Real GDP Growth	IMF Article IV Reports	Percent

$g_s + h_s$, Forecast Non-Interest Spending Ratio (as of year 0)

For 2021 - 2026:

$$g_s + h_s = 100 \times \frac{Forecast\ Total\ Expense - Forecast\ Interest\ Expense}{Forecast\ Nominal\ GDP}$$

Note: When the forecast is not available, the value is replaced by the average of the available years.

For 2025, reported climate change costed needs is added

$$g_5 + h_5 = \left(100 \times \frac{Forecast\ Total\ Expense_5 - Forecast\ Interest\ Expense_5}{Forecast\ Nominal\ GDP_5}\right) + \left(100 \times \frac{Stated\ Needs\ for\ Climate\ Change}{Forecast\ Nominal\ GDP\ in\ USD_5}\right)$$

For 2027 – 2030:

$$g_s + h_s = \sum_{s=1}^{n} \frac{Forecast\ Total\ Expense_s - Forecast\ Interest\ Expense_s}{Forecast\ Nominal\ GDP_s} \div n$$

Where n is the length of the available forecast

Variable	Source	Units
Forecast Total Expense	IMF Article IV Reports	National Currency, Billions
Forecast Interest Expense	IMF Article IV Reports	National Currency, Billions
Forecast Nominal GDP	IMF Article IV Reports	National Currency, Billions
Stated Needs for Climate Change	UNFCCC First report on the determination of the needs of developing country Parties related to implementing the Convention and the Paris Agreement	USD, Billions
Forecast Nominal GDP in USD (GDP, current prices)	IMF World Economic Outlook	USD, Billions

b_0, lagged debt (i.e., debt at end of year 0 or beginning of year 1)

$$b_0 = 100 \times \frac{Previous\ Year's\ Debt}{Previous\ Year's\ Nominal\ GDP}$$

Variable	Source	Subject Descriptor	Units
Debt	IMF World Economic Outlook	General government gross debt	National Currency, Billions
Nominal GDP	IMF World Economic Outlook	Gross domestic product, current prices	National Currency, Billions

t_1, Forecast Tax Revenue Ratio in year 1 (as of year 0)

$$t_1 = 100 \times \frac{Forecast\ Tax\ Revenues}{Forecast\ Nominal\ GDP}$$

Variable	Source	Units
Forecast Tax Revenues	IMF Article IV Reports	National Currency, Billions
Forecast Nominal GDP	IMF Article IV Reports	National Currency, Billions

ANNEX 2: NATIONAL REPORTS, QUANTIFIED NEEDS AND ESTIMATED COSTS

Country	Selected National Report [a]	Number of Needs	Number of quantified needs	Costed Need (high range), USD Billions	Ave Annual Costed Needs (% of GDP) [b]	Note: Rank, Losses US$ M (PPP) [c]	Note: Rank, Losses per unit GDP in % [c]
Afghanistan	NC	16	16	11.4	4.8	85	66
Bangladesh	NC	30	25	79.7	1.5	11	29
Barbados	NC	56	--	--	--	154	103
Bhutan	NC	69	14	0.9	2.5	152	83
Burkina Faso	NDC	60	60	7.8	2.7	107	70
Cambodia	NDC	96	79	4.2	1.2	54	26
Colombia	NDC	32	1	0.1	0.0	30	88
Comoros	NDC	26	1	0.7	4.0	172	122
Costa Rica	BUR	34	2	3.4	0.4	94	91
DR of the Congo	NDC	5	4	12.5	1.6	149	159
Dominican Republic	NDC	41	41	17.6	1.4	53	58
Ethiopia	NDC	5	5	294.7	22.0	55	61
Fiji	LEDS	152	86	57.3	89.0	79	12
Gambia	NAPA	10	10	0.2	0.5	145	69
Ghana	NDC	27	27	22.6	2.2	114	136
Grenada	NDC	9	9	1.1	7.5	91	3
Guatemala	NC	39	--	--	--	45	45
Haiti	NDC	17	17	25.4	11.8	43	10
Honduras	TAPs	58	58	0.1	0.0	33	13
Kenya	NDC	19	11	61.7	4.2	46	50
Kiribati	NDC	12	12	0.1	2.6	138	4
Lebanon	TAP	64	27	0.0	0.0	118	133
Madagascar	NDC	20	4	42.1	21.1	59	22
Malawi	NC	124	3	0.0	0.0	97	38
Maldives	NAPA	12	12	0.1	0.2	174	160
Marshall Islands	NDC	26	--	--	--	180	149

Country	Selected National Report [a]	Number of Needs	Number of quantified needs	Costed Need (high range), USD Billions	Ave Annual Costed Needs (% of GDP) [b]	Note: Rank, Losses US$ M (PPP) [c]	Note: Rank, Losses per unit GDP in % [c]
Mongolia	NDC	14	14	11.5	5.6	88	53
Morocco	NDC	99	68	90.5	5.7	68	102
Nepal	NDC	81	53	25.0	5.4	57	43
Niger	NDC	23	23	8.7	3.5	101	48
Palau	NC	17	8	0.3	8.2		
Papua New Guinea	NDC	142	41	1.6	0.5	135	111
Philippines	NC	45	2	3.0	0.1	9	32
Rwanda	NDC	54	54	10.6	7.5	156	147
Saint Lucia	NC	119	39	0.9	3.8	131	19
Samoa	NAPA	33	33	1.5	15.9	142	18
Senegal	NDC	32	32	13.1	3.2	134	132
South Sudan	NDC	46	46	50.0	77.0	126	127
Sri Lanka	TNA	9	6	9.6	0.9	35	55
State of Palestine	NDC	108	82	14.1	6.5		
Sudan	NDC	15	12	14.4	3.0	86	128
Timor-Leste	NC	30	3	0.2	1.1	176	171
Tunisia	NDC	13	13	19.9	3.7	96	116
Tuvalu	NAPA	9	10	0.0	0.9	162	2
U.R. of Tanzania	NDC	54	54	65.0	6.9	100	125
Vanuatu	NC	33	33	1.3	10.2	133	9
Viet Nam	NC	14	8	47.4	0.8	14	35
Yemen	NDC	34	8	1.2	0.5	82	93

Source: UNFCCC (2021), Annex C.

Notes: [a] Report with the highest amount of costed needs indicated, i.e. Biennial Update Reports (BUR), Low-Emission Development Strategies (LEDS), National Adaptation Programme of Action (NAPA), National Communication (NC), Nationally Determined Contribution (NDC), Technology Action Plan (TAP), or Technology Needs Assessment (TNA).; [b] Authors' estimates; [c] Indicator of the Global Climate Risk Index 1998-2017 (Germanwatch 2018)

ANNEX 3 COMPONENTS OF INDICES OF SUSTAINABILITY

Country	Non-Interest Spending to GDP Ratio					Tax Revenue to GDP Ratio			Growth-Adjusted Interest Rate						General Government Gross Debt to GDP Ratio		
	$g+h$	$g+h$	$g+h$	mean $g+h$	mean $g+h$	t			$r-\theta$	$r-\theta$	$r-\theta$	mean $r-\theta$	mean $r-\theta$	mean, stressed $r-\theta$	b_0	b_0	b_0
	2010	2019	2020	2021-25	2021-26	2010	2019	2020	2010	2019	2020	2021-25	2021-26	2021-25	2010	2019	2020
Afghanistan	17.7	19.6	18.4	17.9	17.7	9.3	8.3	7.4	-16.5	-9.6	-4.8	-7.8	-7.8	-6.7	7.7	6.1	7.4
Bangladesh	7.4	7.6	7.3	12.3	12.3	7.8	10.3	10.1	-7.4	-6.2	-1.2	-10.5	-10.5	-9.1	35.5	35.7	38.9
Barbados	29.0	24.2	31.6	25.6	25.3	24.7	28.3	28.6	3.9	-2.2	19.0	-3.8	-3.1	1.2	108.9	119.6	150.4
Bhutan	21.4	17.6	24.1	14.4	14.4	14.6	16.2	12.5	-10.1	-4.7	-2.8	-7.2	-7.2	-5.3	61.0	106.6	120.7
Burkina Faso	10.2	17.0	16.1	15.3	15.3	11.3	15.7	13.7	-10.4	-1.7	-3.0	-6.1	-6.1	-5.3	27.8	42.0	46.5
Cambodia	10.4	15.4	18.4	18.6	18.5	10.0	19.7	18.3	-8.2	-9.0	7.2	-7.5	-7.8	-5.8	28.7	28.6	34.2
Colombia	15.1	18.4	20.2	17.3	17.0	11.3	14.9	13.0	0.3	-0.8	10.4	-1.4	-1.4	-0.6	36.5	52.3	65.4
Comoros	13.9	18.2	20.5	18.6	18.6	6.7	7.0	8.2	-4.0	-5.3	0.7	-4.4	-4.4	-4.2	30.5	19.5	22.3
Costa Rica	16.5	17.2	18.1	15.1	14.7	12.6	13.0	12.1	-3.2	3.7	11.9	2.8	2.5	4.1	28.1	56.7	67.5
DR of the Congo	8.1	9.8	9.8	14.5	14.7	8.4	7.0	6.2	-27.5	-8.0	-6.7	-12.5	-12.2	-6.9	30.6	15.0	15.2
Dominican Republic	11.2	12.6	18.9	13.9	13.9	12.2	13.3	12.4	-8.2	-1.7	7.9	-1.5	-1.5	-1.0	37.3	53.5	71.5
Ethiopia	12.1	9.2	9.4	8.6	8.6	8.2	6.7	9.2	-12.6	-20.2	-23.2	-16.9	-16.9	-10.2	39.6	57.9	55.4
Fiji	18.7	24.0	29.5	27.4	26.9	20.1	22.7	16.7	-0.2	4.3	24.5	-1.7	-1.6	4.0	51.8	48.9	70.8
Gambia	7.1		14.5	11.2	11.0	8.4		10.8	-6.1		-1.9	-9.9	-9.8	-8.9	42.9	83.0	83.5
Ghana	12.6	12.0	19.1	13.8	13.8	9.9	12.0	12.0	-13.2	-4.7	3.5	-6.9	-6.9	-4.4	34.5	62.6	78.9
Grenada	17.6	17.3	24.2	17.6	17.6	18.7	22.5	21.9	2.3	1.6	17.0	-4.7	-4.7	-2.9	96.9	60.5	71.3
Guatemala	11.2	11.4	13.2	10.9	10.9	10.4	10.5	10.0	-0.9	-1.0	5.4	-0.5	-0.5	0.4	24.0	26.5	31.5
Haiti	14.7	9.2	9.1	16.7	16.7	5.3	5.9	5.7	0.2	-14.1	-16.3	-12.7	-12.7	-10.0	23.2	25.8	21.3
Honduras	19.2	15.4	18.4	17.3	17.2	14.4	17.5	14.8	-4.5	0.8	11.4	-4.0	-3.9	-3.1	22.6	43.3	51.3
Kenya	14.3	18.0	19.1	13.7	13.7	13.9	15.1	14.2	-5.0	-2.6	2.4	-8.8	-8.8	-8.4	39.1	59.0	67.6
Kiribati		85.2	72.7	64.2	64.2		22.7	22.3		-1.8	-1.1	-1.9	-1.9	-1.4	8.2	18.0	17.4
Lebanon	15.7	19.0	15.2	22.3	22.3	16.8	15.3	10.9	-0.9	9.1	-31.1	3.3	3.3	3.9	136.8	171.1	150.4

Country	Non-Interest Spending to GDP Ratio					Tax Revenue to GDP Ratio			Growth-Adjusted Interest Rate						General Government Gross Debt to GDP Ratio		
	$g+h$	$g+h$	$g+h$	mean $g+h$	mean $g+h$	t			$r-\theta$	$r-\theta$	$r-\theta$	mean $r-\theta$	mean $r-\theta$	mean, stressed $r-\theta$	b_0	b_0	b_0
	2010	2019	2020	2021-25	2021-26	2010	2019	2020	2010	2019	2020	2021-25	2021-26	2021-25	2010	2019	2020
Madagascar	7.9	9.4	11.0	9.0	9.0	8.5	10.5	9.4	-8.6	-9.0	3.8	-9.6	-9.6	-8.4	32.3	38.5	46.0
Malawi	11.7	12.0	13.5	12.6	12.6	10.9	12.0	12.1	-11.6	-6.1	-0.2	-7.2	-6.9	-5.0	19.3	45.3	54.7
Maldives	23.4	24.0	31.6	21.2	21.2	8.8	20.2	18.1	-5.5	-3.8	36.4	-7.1	-7.1	-3.6	52.7	78.3	146.0
Marshall Islands	54.2	64.2	58.6	72.9	72.1	17.8	18.4	17.0	-5.3	-5.5	-2.5	-1.7	-1.7	0.5	39.4	25.0	18.9
Mongolia	16.1	19.7	26.8	26.0	26.0	19.6	22.5	21.5	-44.0	-10.8	4.3	-10.5	-10.5	-9.2	31.0	68.4	77.0
Morocco	24.8	22.6	26.1	24.0	24.0	22.8	21.4	21.2	0.3	0.1	9.3	-1.4	-1.4	-0.7	49.0	65.1	75.4
Nepal	12.9	21.2	19.4	22.0	22.0	11.7	19.8	15.7	-17.7	-9.4	0.5	-10.3	-10.3	-9.9	35.3	33.1	42.2
Niger		20.3	21.8	21.9	21.9		11.0	9.6		-3.2	-1.8	-8.4	-8.0	-5.9	15.1	39.8	45.0
Palau	51.0	43.3	59.1	46.6	44.9	17.1	18.8	18.2		4.6	7.2	-3.6	-3.4	10.6		38.6	62.1
Papua New Guinea	17.7	16.6	18.1	17.5	17.5	15.6	13.0	12.5	-14.0	1.4	9.6	-3.8	-3.8	-1.2	17.3	40.0	48.9
Philippines	10.6	13.0	17.5	18.5	18.5	11.6	14.5	14.0	-4.5	-1.5	13.2	-4.0	-4.0	-3.3	47.6	37.0	51.7
Rwanda	14.0	16.1	17.4	17.0	16.7	11.6	14.6	14.8	-8.0	-9.2	-1.9	-10.0	-9.6	-7.0	18.8	50.2	60.1
Saint Lucia	15.7	17.4	24.3	18.0	18.0	18.2	19.7	21.3	-1.2	2.6	29.3	0.1	0.1	2.1	52.8	61.4	93.5
Samoa	24.9	25.1	28.6	31.5	31.0	21.0	25.7	25.9	3.9	-4.3	3.9	-0.8	-1.2	5.8	41.3	47.5	46.5
Senegal	11.7	18.2	19.1	12.8	12.7	15.0	18.5	17.4	-2.4	-2.8	-0.5	-6.0	-5.7	-3.0	28.5	63.8	68.7
South Sudan		29.9	36.0	23.1	23.1		4.0	4.3		-8.7	4.8	-33.4	-28.8	21.3		31.3	35.8
Sri Lanka	11.4	10.9	13.4	13.4	13.4	11.3	11.6	8.1	-6.8	2.5	7.7	-1.3	-1.3	-1.0	71.6	86.8	101.2
State of Palestine	31.3					18.8			-11.1						22.7	34.5	47.2
Sudan	13.2	18.4	11.5	14.9	14.9	5.9	5.4	3.1	-24.8	-50.0	-160.8	-52.8	-52.8	-3.4	74.6	200.3	272.9
Timor-Leste		58.6	73.9	71.6	70.5		7.6	7.6		-6.4	7.4	-4.2	-4.3	-2.4	0.0	11.5	13.9
Tunisia	19.1		27.9	24.4	24.1	20.1		23.8	-3.1		8.0	-4.0	-4.0	-3.1	45.5	74.2	89.7

Country	Non-Interest Spending to GDP Ratio					Tax Revenue to GDP Ratio			Growth-Adjusted Interest Rate						General Government Gross Debt to GDP Ratio		
	$g+h$	$g+h$	$g+h$	mean $g+h$	mean $g+h$	t			$r-\theta$	$r-\theta$	$r-\theta$	mean $r-\theta$	mean $r-\theta$	mean, stressed $r-\theta$	b_0	b_0	b_0
	2010	2019	2020	2021-25	2021-26	2010	2019	2020	2010	2019	2020	2021-25	2021-26	2021-25	2010	2019	2020
Tuvalu			75.0	88.7	88.7			14.6			-2.7	-5.2	-5.2	-3.9	20.0	11.5	7.5
United Republic of Tanzania	12.6		14.3	15.5	15.4	10.0		11.8	-12.2		-1.9	-6.9	-7.2	-5.6	27.6	39.0	39.1
Vanuatu	22.7	27.0	36.9	30.8	30.8	16.2	17.6	14.6	-0.2	-4.4	6.8	-4.3	-4.2	-2.4	20.2	45.3	48.7
Viet Nam	14.2		13.9	13.6	13.6	17.6		12.4	-15.5		-1.2	-7.0	-7.0	-5.9	36.8	43.6	46.3
Yemen															42.4	76.5	84.2

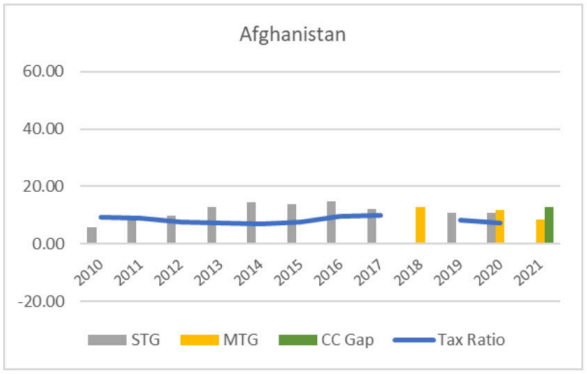
ANNEX 4 SHORT-TERM AND MEDIUM-TERM GAPS

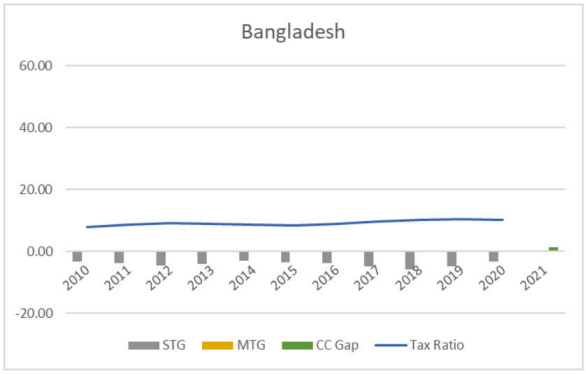
Country	Short-Term Gap (STG)			STG/(1 - t_{year})			Medium-Term Gap (MTG)						MTG/(1-t_{year})	
	2010	2019	2020	2010	2019	2020	2011	2011-20 (mean)	2020	2020 (perfect foresight)	2021	2021 Stressed	2021	2021 stressed
Afghanistan	5.7	10.7	10.7	0.06	0.12	0.12		12.25	11.8	10.3	8.6	8.7	0.093	0.095
Bangladesh	-3.4	-4.8	-3.2	-0.04	-0.05	-0.04		.		-1.9	-0.1	0.5	-0.001	0.006
Barbados	8.2	-6.9	25.7	0.11	-0.10	0.36		2.92	-3.7	-1.3	-7.2	0.6	-0.101	0.008
Bhutan	0.2	-3.8	8.6	0.00	-0.05	0.10					-9.51			
Burkina Faso	-3.8	0.7	1.2	-0.04	0.01	0.01		-4.65		-0.6	-3.9	-3.5	-0.046	-0.042
Cambodia	-1.9	-6.8	2.2	-0.02	-0.09	0.03		-3.82	-6.0	-1.0	-3.8	-3.1	-0.046	-0.038
Colombia	3.9	3.0	12.7	0.04	0.04	0.15	1.6	1.21	0.2	5.6	2.6	3.2	0.030	0.037
Comoros	6.0	10.3	12.5	0.06	0.11	0.14		13.22	10.1	10.2	9.7	9.8	0.106	0.106
Costa Rica	3.1	6.1	12.7	0.04	0.07	0.14		2.86	1.5	6.5	4.2	5.1	0.048	0.058

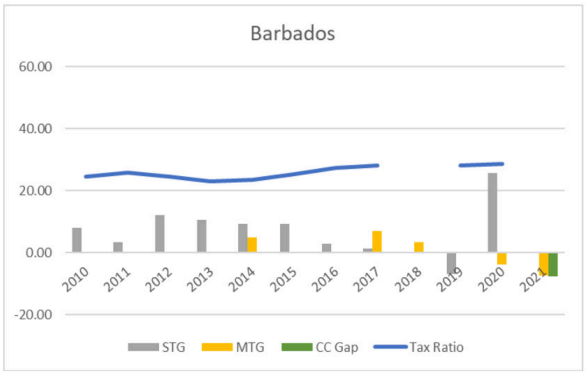
Country	Short-Term Gap (STG)			STG/(1 - t_{year})			Medium-Term Gap (MTG)						MTG/(1-t_{year})	
	2010	2019	2020	2010	2019	2020	2011	2011-20 (mean)	2020	2020 (perfect foresight)	2021	2021 Stressed	2021	2021 stressed
DR of Congo	-25.4	1.6	2.6	-0.28	0.02	0.03		4.64	3.3	5.4	4.7	5.7	0.050	0.061
Dominican Rep	-4.0	-1.5	10.7	-0.05	-0.02	0.12		0.80	0.8	2.8	0.0	0.4	0.000	0.005
Ethiopia	-0.5	-9.8	-13.2	-0.01	-0.10	-0.15		-13.83	-14.2	-13.8	-13.4	-8.4	-0.148	-0.094
Fiji	-1.6	3.3	24.8	-0.02	0.04	0.30		3.06	4.9	13.5	10.8	14.9	0.129	0.176
Gambia	-3.7		2.2	-0.04		0.02		-6.54		-6.3	-8.9	-7.9	-0.100	-0.089
Ghana	-0.8	-3.0	9.3	-0.01	-0.03	0.11		-4.06	-3.7	-0.4	-5.6	-3.3	-0.064	-0.038
Grenada	0.9	-4.2	12.6	0.01	-0.05	0.16		-6.87	-7.1	-3.3	-6.9	-5.4	-0.088	-0.069
Guatemala	0.6	0.7	4.7	0.01	0.01	0.05		0.57	0.3	1.6	0.9	1.2	0.010	0.013
Haiti	9.4	0.2	-0.8	0.10	0.00	-0.01		2.93	2.9	6.0				
Honduras	3.7	-1.8	8.6	0.04	-0.02	0.10		-2.58	-2.9	2.4	-1.0	-0.5	-0.012	-0.006
Kenya	-1.3	1.5	6.3	-0.02	0.02	0.07		-7.95		-3.6	-5.5	-5.2	-0.064	-0.059
Kiribati		62.2	50.2		0.80	0.65				44.06				
Lebanon	-2.5	17.7	-48.9	-0.03	0.21	-0.55		8.98	11.4	3.8				
Madagascar	-3.7	-4.7	3.0	-0.04	-0.05	0.03		-6.02	-6.9	-3.0	-5.9	-5.3	-0.066	-0.059
Malawi	-2.0	-2.6	1.3	-0.02	-0.03	0.02		-0.42		-2.3	-3.4	-2.0	-0.038	-0.022
Maldives	11.9	1.0	41.9	0.13	0.01	0.51		2.91		6.1	-6.6	-0.8	-0.080	-0.009
Marshall Islands	34.2	44.5	41.0	0.42	0.54	0.49		45.03		54.0	58.3	58.8	0.702	0.686
Mongolia	-24.8	-10.9	8.2	-0.31	-0.14	0.10		-6.93	-9.2	-1.1				
Morocco	2.2	1.3	11.0	0.03	0.02	0.14		-0.80	-2.6	4.0	2.1	2.6	0.026	0.033
Nepal	-5.8	-1.5	3.9	-0.07	-0.02	0.05		-3.03		3.0	-4.7	-4.5	-0.056	-0.057
Niger		8.1	11.5		0.09	0.13		8.81	7.3	9.4	7.6	8.9	0.084	0.099
Palau		26.1	43.7		0.32	0.53		16.83		31.9	29.2	39.3	0.357	0.461

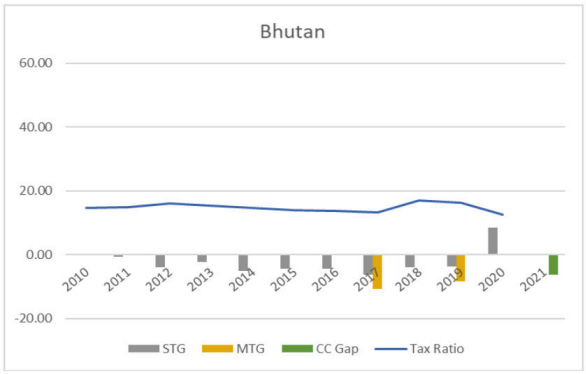
Country	Short-Term Gap (STG)			STG/(1 - t_{year})			Medium-Term Gap (MTG)						MTG/(1-t_{year})	
	2010	2019	2020	2010	2019	2020	2011	2011-20 (mean)	2020	2020 (perfect foresight)	2021	2021 Stressed	2021	2021 stressed
Papua NG	-1.0	4.1	9.5	-0.01	0.05	0.11	-0.9	-1.37	0.8	4.8	2.9	4.3	0.033	0.049
Philippines	-3.3	-2.1	8.4	-0.04	-0.02	0.10					.			
Rwanda	0.9	-2.6	1.6	0.01	-0.03	0.02		-2.16		-2.2	-5.6	-3.4	-0.066	-0.040
Saint Lucia	-3.1	-0.7	21.0	-0.04	-0.01	0.27	-5.5	-2.08	-2.4	1.5	-1.6	0.2	-0.020	0.003
Samoa	5.2	-2.8	4.6	0.07	-0.04	0.06		-1.32	-3.2	5.8	9.1	12.2	0.122	0.156
Senegal	-4.0	-2.1	1.4	-0.05	-0.03	0.02	-5.9	-8.03		-6.9	-9.3	-7.0	-0.112	-0.084
South Sudan		21.9	33.1		0.23	0.35		.		5.7	-1.1	25.1	-0.011	0.264
Sri Lanka	-5.1	1.4	11.9	-0.06	0.02	0.13		-1.71		5.7				
State of Palestine	9.9			0.12			.							
Sudan	-10.3	-80.5	-313.6	-0.11	-0.85	-3.24		-152.31	-686.6	-825.9	-298.9	-3.6	-3.084	-0.039
Timor-Leste		50.4	67.2		0.55	0.73		40.10	37.4	65.1	63.6	63.9	0.688	0.689
Tunisia	-2.4		10.0	-0.03		0.13	1.5	-1.18		0.3	-3.7	-2.8	-0.048	-0.037
Tuvalu			60.1			0.70		97.84		71.1	72.1	72.2	0.845	0.862
UR of Tanzania	-0.3		1.8	0.00		0.02		.		1.1	1.5	2.1	0.017	0.023
Vanuatu	6.5	7.3	25.3	0.08	0.09	0.30		5.31	5.4					
Viet Nam	-9.0		1.0	-0.11		0.01	.							
Yemen							.							

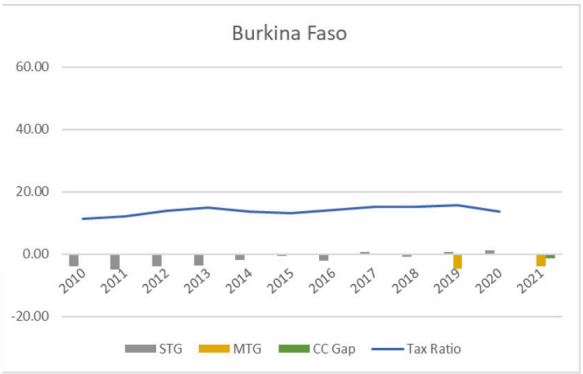
ANNEX 5 INDICES OF FISCAL POLICY SUSTAINABILITY, 2010 TO 2021[1]

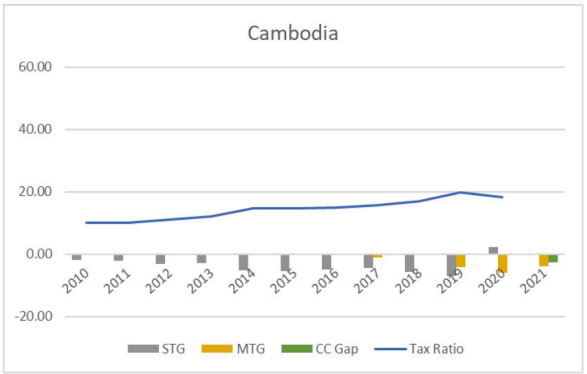


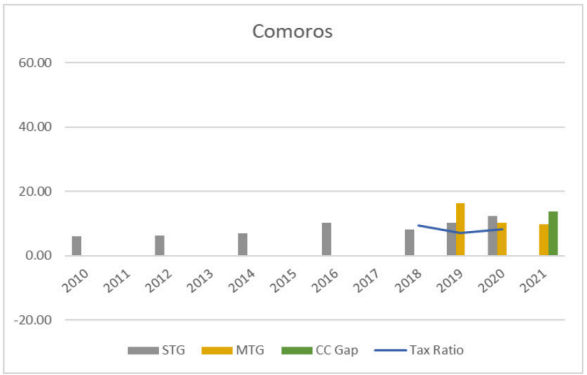




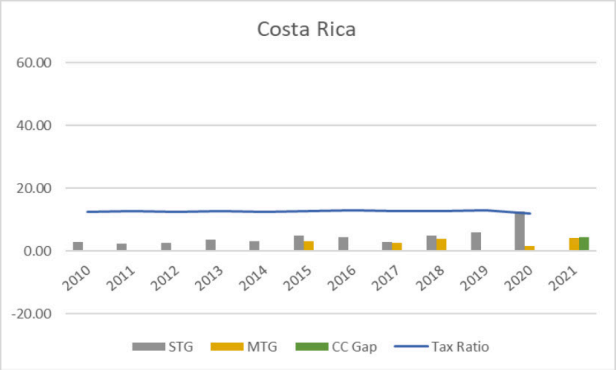








[1] Refer to Annex 1 for definitions.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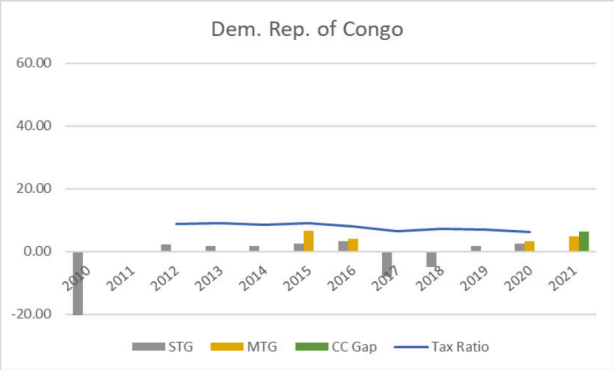
2021
STG
MTG
CC Gap
Tax Ratio


Dem. Rep. of Congo
60.00
40.00
20.00
0.00
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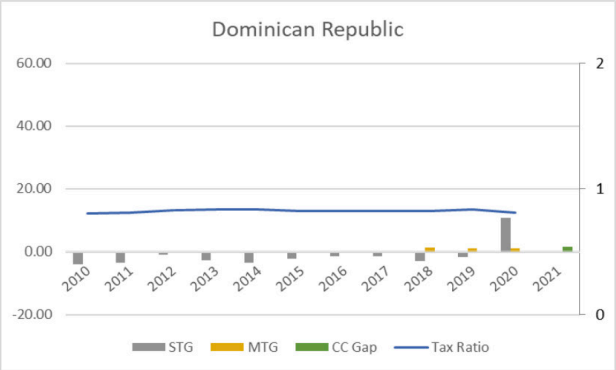
STG
MTG
CC Gap
Tax Ratio


Dominican Republic
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20.00
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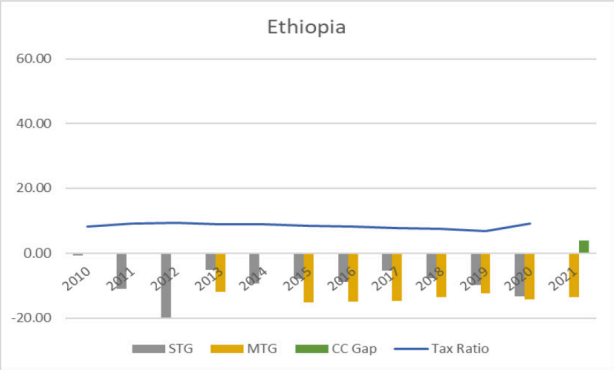
STG
MTG
CC Gap
Tax Ratio


Ethiopia
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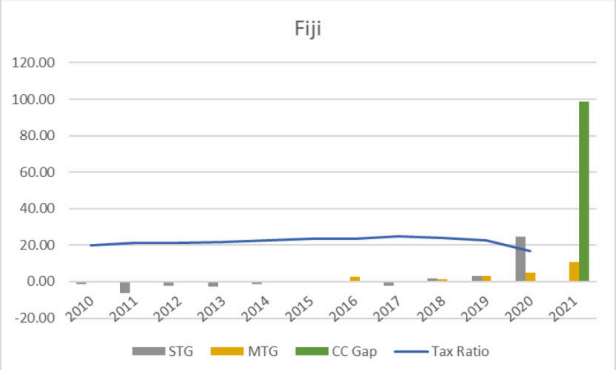
2020
2021
STG
MTG
CC Gap
Tax Ratio


Fiji
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80.00
60.00
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20.00
0.00
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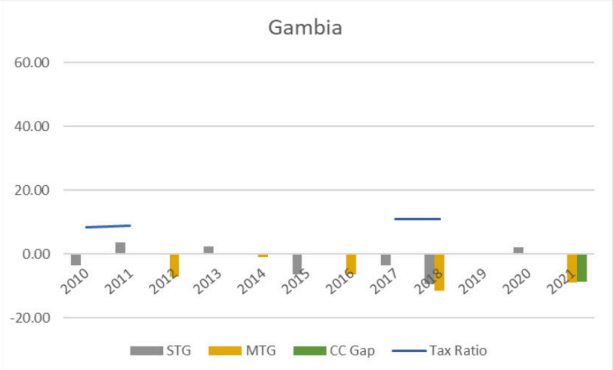
2021
STG
MTG
CC Gap
Tax Ratio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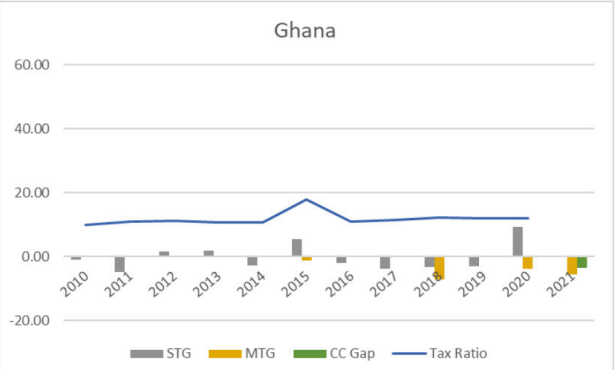
STG
MTG
CC Gap
Tax Ratio


Ghana
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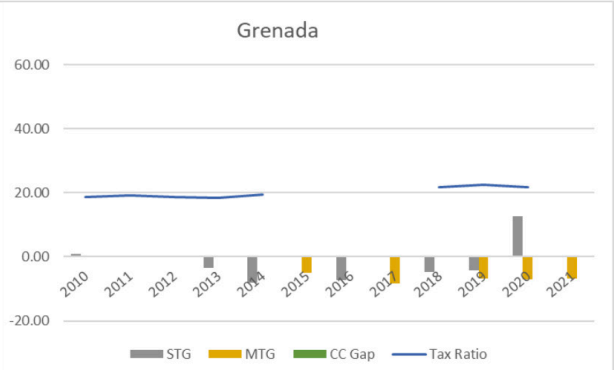
2021
STG
MTG
CC Gap
Tax Ratio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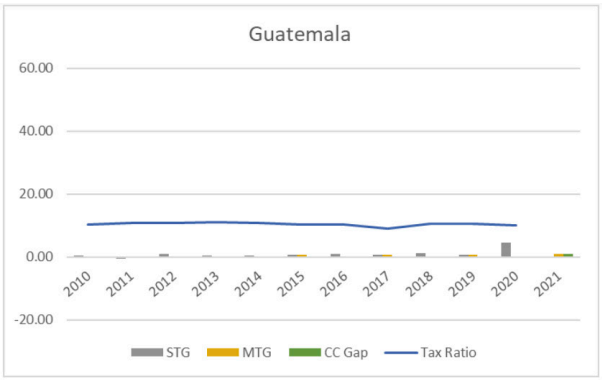
2021
STG
MTG
CC Gap
Tax Ratio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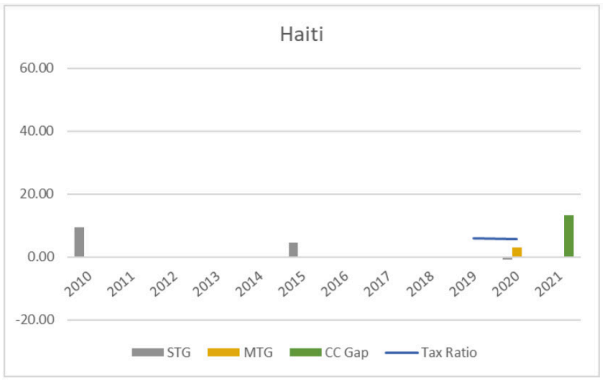
2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021
STG MTG CC Gap Tax Ratio


Haiti
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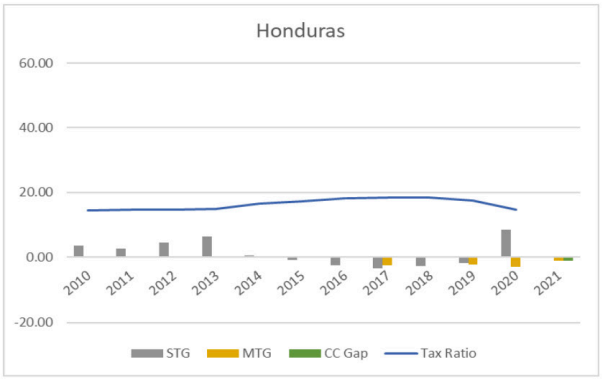
STG MTG CC Gap Tax Ratio


Honduras
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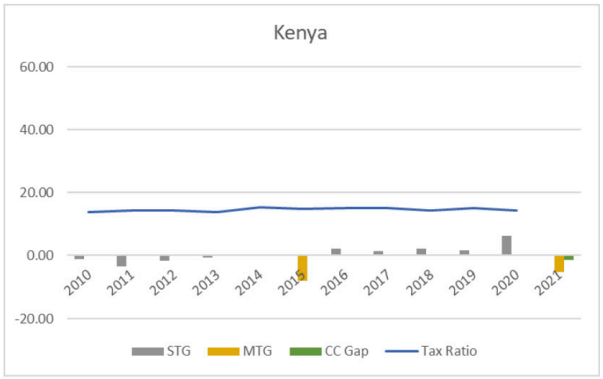
STG MTG CC Gap Tax Ratio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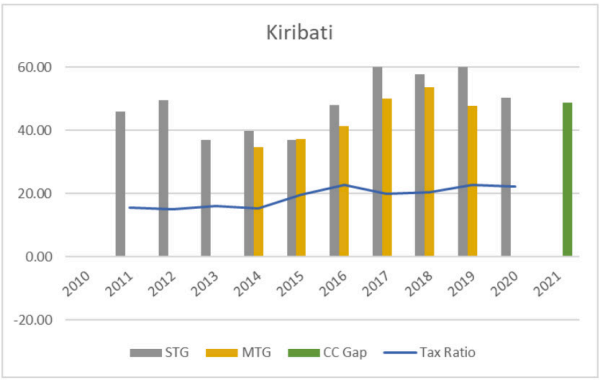
2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021
STG MTG CC Gap Tax Ratio


Kiribati
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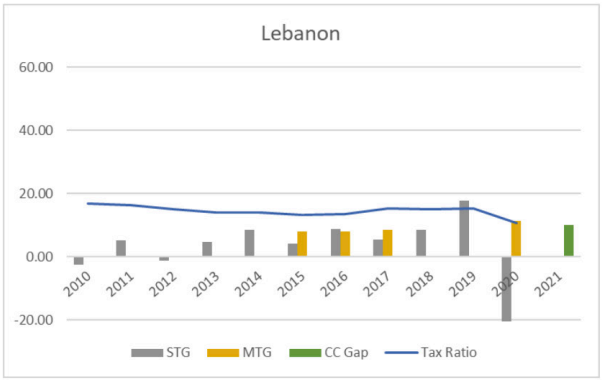
2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021
STG MTG CC Gap Tax Ratio


Lebanon
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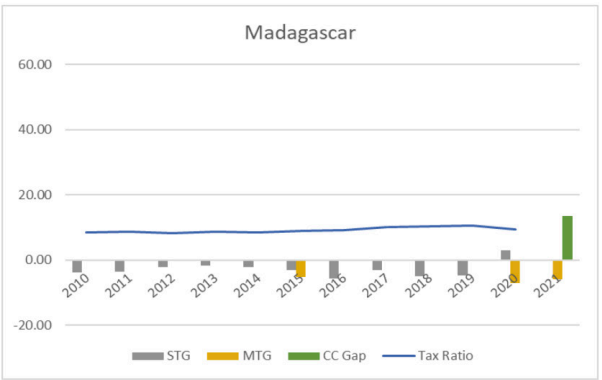
2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021
STG MTG CC Gap Tax Ratio


Madagascar
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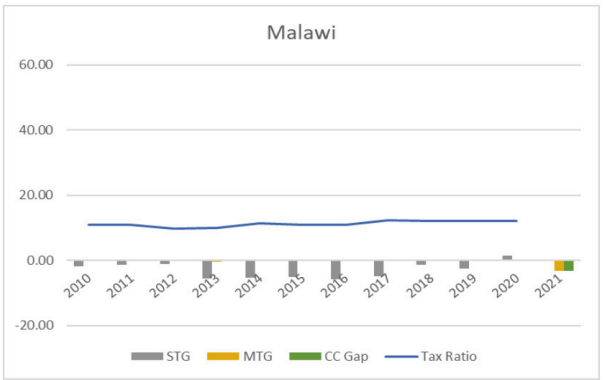
2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021
STG MTG CC Gap Tax Ratio


Malawi
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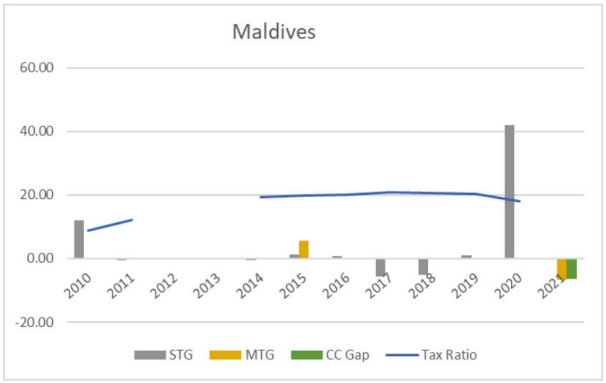
2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021
STG MTG CC Gap Tax Ratio


Maldives
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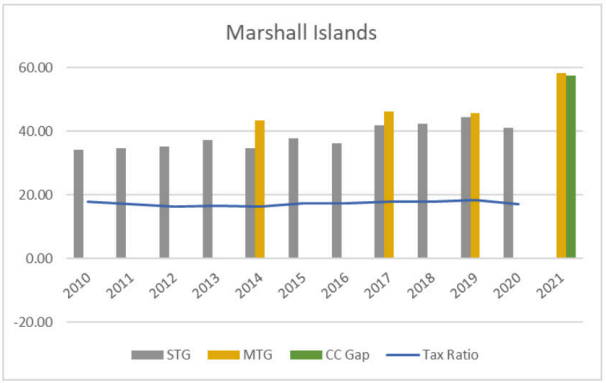
2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021
STG MTG CC Gap Tax Ratio


Marshall Islands
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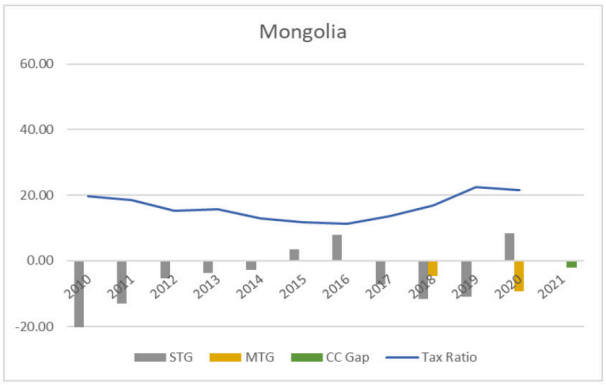
STG MTG CC Gap Tax Ratio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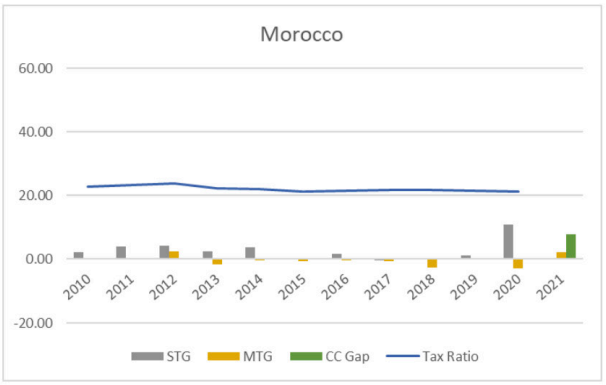
2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021
STG MTG CC Gap Tax Ratio


Morocco
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2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021
STG MTG CC Gap Tax Ratio


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2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021
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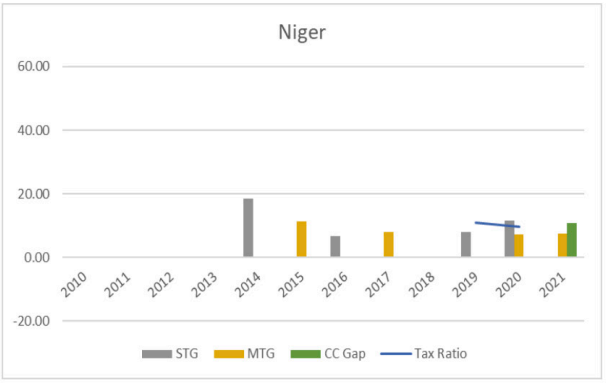
Niger
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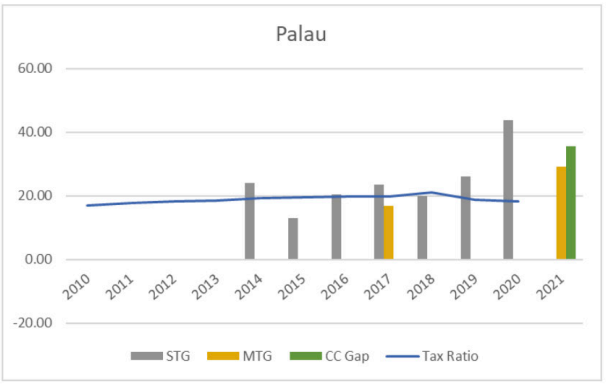
STG MTG CC Gap Tax Ratio


Palau
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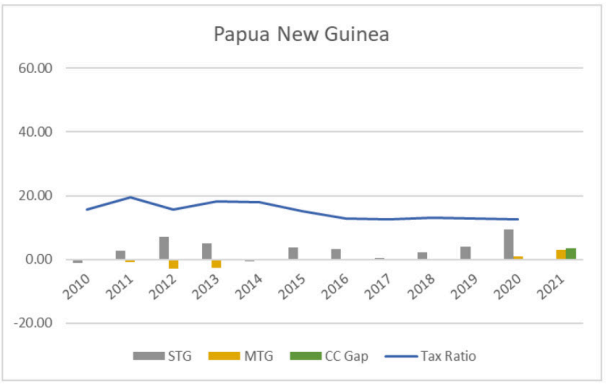
STG MTG CC Gap Tax Ratio


Papua New Guinea
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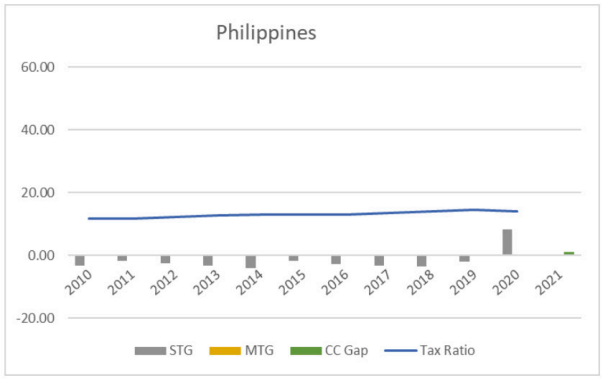
2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021
STG MTG CC Gap Tax Ratio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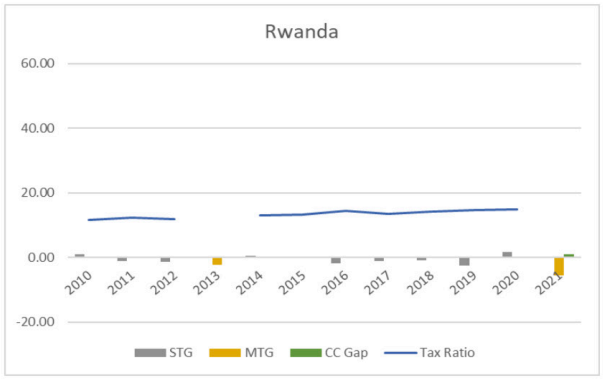
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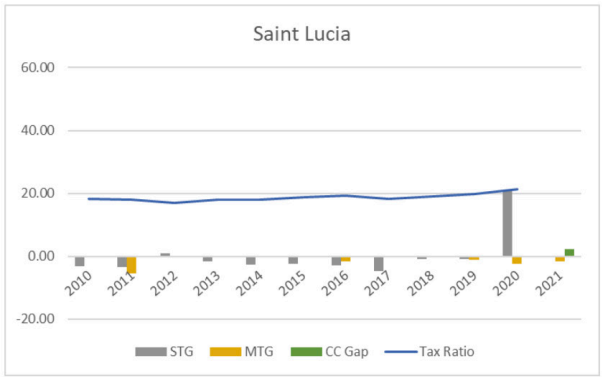
STG MTG CC Gap Tax Ratio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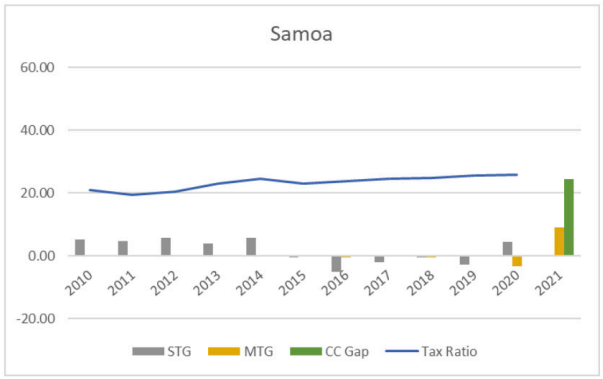
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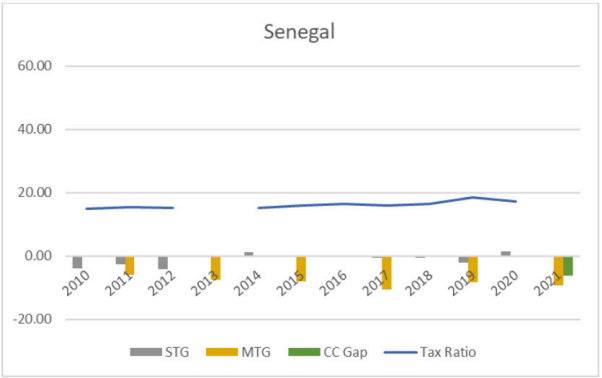
STG MTG CC Gap Tax Ratio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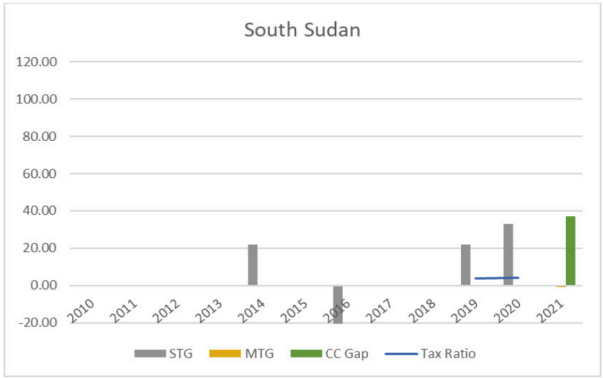
STG MTG CC Gap Tax Ratio


South Sudan
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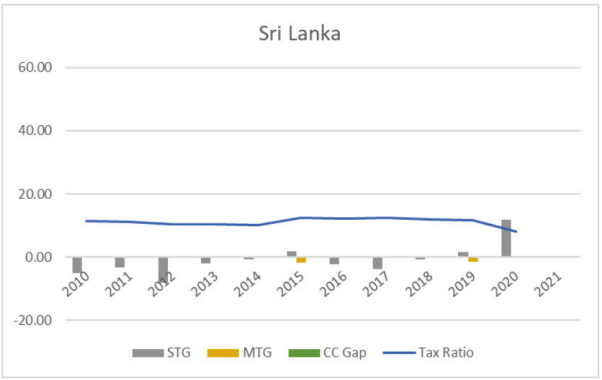
2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021
STG MTG CC Gap Tax Ratio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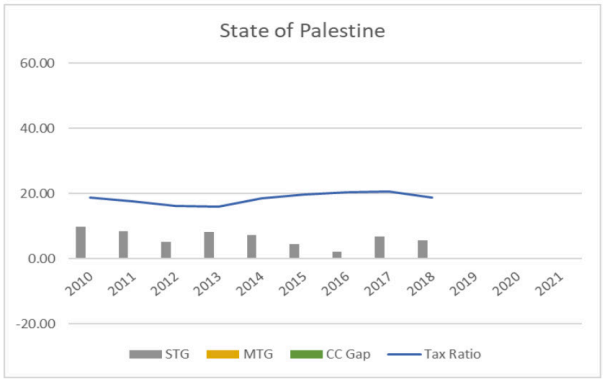
STG MTG CC Gap Tax Ratio


State of Palestine
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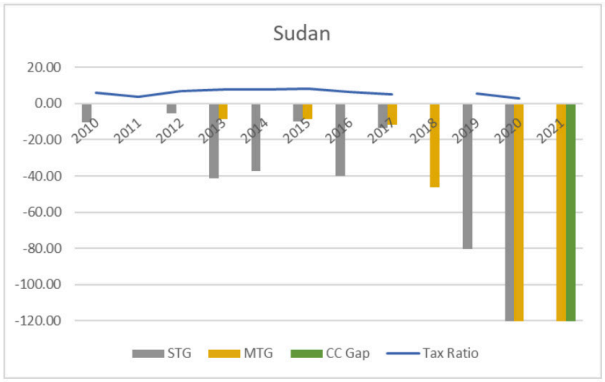
2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021
STG MTG CC Gap Tax Ratio


Sudan
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-40.00
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2011
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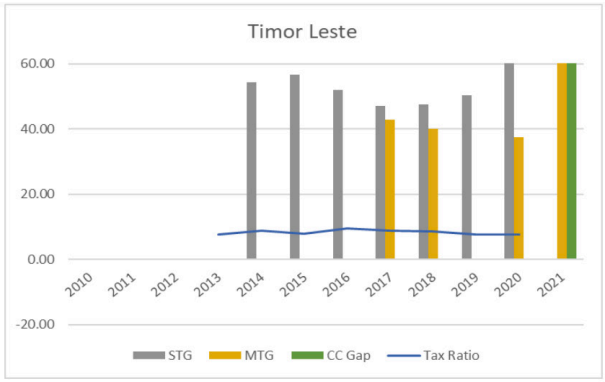
2021
STG
MTG
CC Gap
Tax Ratio


Timor Leste
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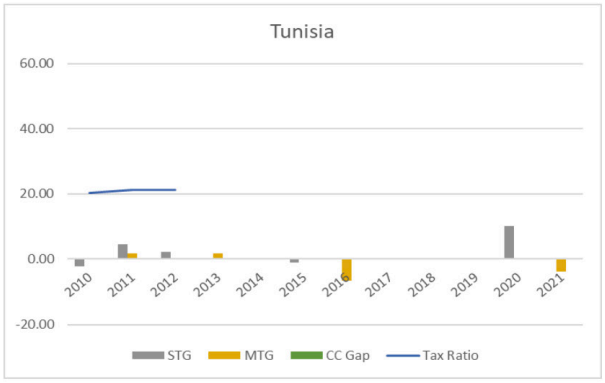
2021
STG
MTG
CC Gap
Tax Ratio


Tunisia
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20.00
0.00
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2011
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2014
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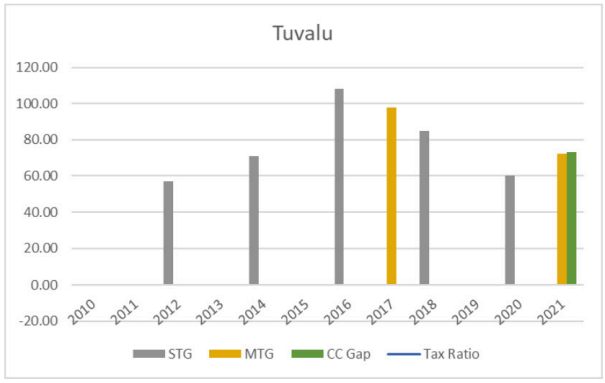
2020
2021
STG
MTG
CC Gap
Tax Ratio


Tuvalu
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80.00
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20.00
0.00
-20.00
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2011
2012
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2014
2015
2016
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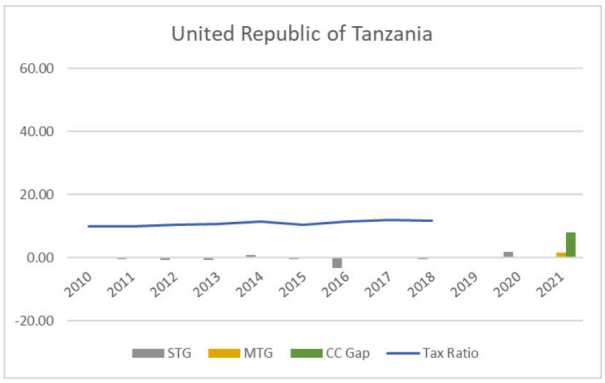
2020
2021
STG
MTG
CC Gap
Tax Ratio


United Republic of Tanzania
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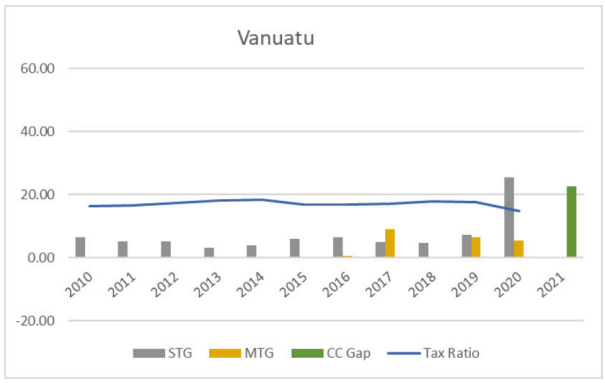
2021
STG
MTG
CC Gap
Tax Ratio


Vanuatu
60.00
40.00
20.00
0.00
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2010
2011
2012
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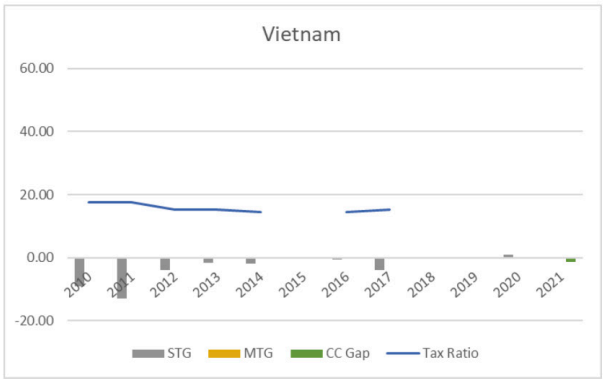
2020
2021
STG
MTG
CC Gap
Tax Ratio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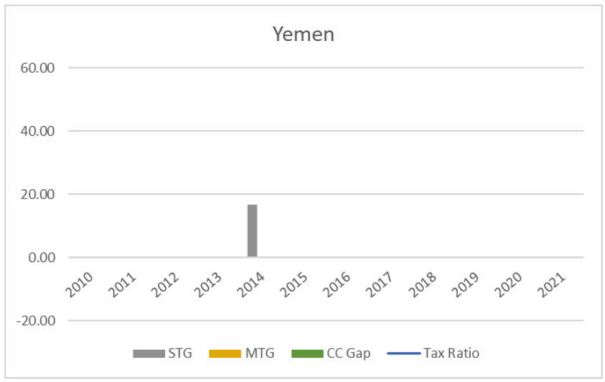
2019
2020
2021
STG
MTG
CC Gap
Tax Ratio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0.00
-20.00
2010
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2019
2020
2021
STG
MTG
CC Gap
Tax Ratio

TASK FORCE ON CLIMATE, DEVELOPMENT AND THE INTERNATIONAL MONETARY FUND