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Green Fiscal Rules? Challenges and Policy Alternatives

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Green Fiscal Rules? Challenges and Policy Alternatives
Prepared by **Francesca Caselli, Andresa Lagerborg, Paulo Medas***

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ABSTRACT: This paper studies the impact of green fiscal rules – designed to protect climate-related spending – on debt dynamics. Simulations of green rules that exempt green spending from the rule limits for an emerging market economy illustrate that they can lead to unsustainable debt dynamics when the net zero emissions goal is pursued mostly using spending-based instruments (e.g., investment and subsidies). Or the rule would need to implicitly assume a large fiscal adjustment in the non-green budget, which would undermine its credibility. It will be needed to build broad public consensus for a more comprehensive fiscal strategy that tackles the difficult policy tradeoffs that will be required and takes into account long-term effects. A more appropriate mix of climate policies, including actively employing carbon pricing, should be pursued within the overall setting of fiscal and debt objectives. Developing ‘green’ medium-term fiscal frameworks would help to integrate climate change considerations into fiscal policy design in a more comprehensive manner.

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WORKING PAPERS

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Prepared by Francesca Caselli, Andresa Lagerborg, and Paulo Medas¹

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I. Introduction

The urgency of the climate agenda is putting pressure on public finances at a time when governments are also struggling with rising debt sustainability concerns. Addressing climate change will require significant upfront action by governments on mitigation and adaptation. The impact of such actions on the fiscal accounts can vary widely depending on the tools chosen and the country specificities (including degree of vulnerability to natural disasters). Namely, relying largely on expenditure-based measures to achieve net zero emissions would put significant pressure in the fiscal accounts in the absence of compensatory measures on the revenue side (IMF October 2023 Fiscal Monitor). At the same time, governments are returning to and revising fiscal rules to strengthen public finances after the Covid-19 crisis given higher public debt and borrowing costs (Caselli et al. 2022). A key challenge will be how to address pressing needs, like climate, while ensuring credible and sustainable fiscal strategies.

Some have proposed green fiscal rules as a solution to both protect climate-related priorities and promote fiscal sustainability. Fiscal rules, in the form of limits on budgetary aggregates, usually aim at solving the ‘common pool problem’, namely the fact that recipients of public spending ignore the externality that they impose on other taxpayers and future generations leading to a deficit bias (Wyplosz 2013). Fiscal rules, by tightening the hands of governments, constrain the use of fiscal discretion (Debrun and Kumar 2007) and can increase the credibility of fiscal policy.¹ At the same time, there is growing consensus that rules need to balance fiscal sustainability with flexibility to respond to shocks (including adopting countercyclical policies).² Proponents of green rules also call for greater flexibility regarding climate-related spending. A key objective is usually to protect *green* public investments, including during periods of fiscal adjustment to address concerns with debt sustainability (Van den Noord 2021; Pekanov and Schratzenstaller 2020; Cottarelli 2020; Darvas and Wolff 2021; Giavazzi et al. 2021).³ Green rules typically propose excluding spending associated with green policies from the fiscal rule limit to support the expansion of green public investments even if that means higher fiscal deficits. Other options include modifications to current rules including ‘green’ escape clauses, or benchmarks to guarantee a minimum level of expenditures, or the establishment of green investments funds (Darvas 2022), towards achieving climate goals.

There are, however, significant challenges to adopting green fiscal rules, including the potential of undermining the rules’ credibility and lead to disruptive debt dynamics. If countries rely mainly on government spending measures (e.g., investment, subsidies) to address climate change, they will likely experience significant increases in public spending and deficits. This, in turn, would undermine the

¹ Several empirical studies indeed find that countries that adopt fiscal rules tend to have better fiscal outcomes, including by running smaller fiscal deficits (Debrun et al., 2008; Tapsoba, 2012; Bergman et al., 2016; Caselli and Wingender 2021; Caselli and Reynaud 2020; Davoodi et al., 2022) and reducing sovereign spreads, from which savings could be channeled towards other priority spending such as climate.

² Poorly designed rules, for instance, can potentially lead to procyclical policies, encouraging fiscal relaxation during expansions and fiscal restraint in bad times (Bova, Carcenac, and M. Guerguil 2014; Guerguil, Mandon, and Tapsoba 2017; Ardanaz and others 2021; Caselli and Lagerborg forthcoming).

³ Giavazzi et al. (2021) propose a version of the green golden rule in the broader context of reforming the EU Stability and Growth Pact. They suggest a debt target with an operational expenditure rule and a speed of adjustment towards the desired debt target that is also dependent on past levels of investment. The higher the levels of past investment towards “spending for the future” items, such as climate-related investments, the slower the needed speed of adjustment towards the rule threshold. In a similar vein, the European Commission’s 2022 proposal to reform the EU fiscal rules includes up to a 3-year extension to countries’ fiscal adjustment path when the budget supports the green transition.

effectiveness of the fiscal rule—in promoting fiscal discipline—and the credibility of the fiscal strategy, potentially leading to adverse reaction by financial markets. At the same time, the needed level and composition of investments both for climate change adaptation and mitigation (consistent with achieving the green transition) and the relative returns of investing in each are highly uncertain, further making it difficult to design and calibrate green fiscal rules. The long-term effects of climate and how countries (governments, private sector) insure against natural disasters also add additional layers of complexities that make it very difficult to reflect in fiscal rules.

This paper first quantifies the impact of the introduction of a green rule that excludes spending in mitigation and adaptation. Simple simulations show that when the net zero emissions goal is pursued mostly using spending-based instruments, green rules can lead to either unsustainable debt dynamics or require overly tight limits on the non-green fiscal balance, significantly skewing budget priorities. We then discuss operational design challenges related to defining green spending items, their financing, and the interaction with other policies on the revenue side.

We propose an alternative strategy that incorporates the complex climate considerations in the formulation of fiscal policy that relies on medium term fiscal frameworks (MTFFs).⁴ Adopting green MTFFs—that account for the (long-term) effects of climate change and climate policies on fiscal accounts—can help optimize the mix of green fiscal policy tools. For example, the choice of policies to address climate change mitigation should consider their economic and fiscal impact and not only focus on green spending. Similarly, spending on climate change adaptation should be weighed against the counterfactual of inaction, which in turn would result in lower potential growth and potentially larger climate-related shocks over time. This can be part of a broader green public financial management (PFM) approach, used to integrate climate considerations into the budget process and help prioritize across different spending items, while ensuring that green spending focuses on high-impact areas for achieving climate objectives.

The rest of the paper is structured as follows. Section II provides illustrative simulations of simple green rules' impact on fiscal balances and debt and discusses additional challenges associated with designing green fiscal rules. Section III outlines desirable elements of green MTFFs, proposed as a more comprehensive approach to address climate change while maintaining fiscal sustainability. Finally, Section IV concludes.

⁴ IMF (2020a), for instance, discusses the impact on the fiscal balance of a green fiscal stimulus that includes subsidies on renewables production and a green public investment program combined with carbon price increases and compensatory transfers to households. This policy package deteriorates the fiscal balance in the initial years and is financed with the issuing of debt, as carbon revenues initially cannot compensate the early spending on infrastructure, subsidies, and transfers to households. Carbon tax revenues are thereafter sufficient to finance the additional green infrastructure and transfers to poor households and hence the policy package has a negligible effect on the budget balance. These results point to the importance of financing potential green investments with carbon price increases to safeguard fiscal sustainability. Barrett et al. (2021) shows that, in the case of the US, policy packages that rely on subsidies combined with a moderate carbon tax, can achieve the same outcomes at a lower fiscal cost, with respect to packages that envision subsidies only. The IMF's April 2023 Fiscal Monitor shows that achieving countries' net zero emissions target by 2050-60 mostly through spending measures would entail large fiscal costs and an unsustainable rise in public debt-to-GDP ratios, whereas more active use of carbon pricing could achieve the same goals while maintaining public debt levels sustainable.

II. Challenges in Designing Green Fiscal Rules

Green fiscal rules typically propose excluding spending associated with green policies from the fiscal rule limit to support the expansion of green public spending in the spirit of traditional golden rules. This section aims at i) quantifying the impact of this type of rules on both the budget balance and public debt with simple illustrative simulations, and ii) discussing further design challenges related to the classification of green spending, its financing, and the interplay with other climate-related measures on the revenue side.

A. Green rule simulations: Unsustainable debt dynamics or overly tight non-green fiscal balances?

Fiscal rules, whether green or not, should be calibrated to meet their central objective of promoting debt sustainability. In this section, we provide simulations that highlight design challenges associated with calibrating 'green' fiscal rules. We simulate the impact of simple green rules on fiscal balances and debt for a typical emerging market (EM).

The simulations follow a methodology for calibrating traditional fiscal rules that has been widely applied in IMF technical assistance provided to many countries. Simply put, fiscal rules should safeguard that government debt remains at a sustainable level. Public debt should not exceed a threshold (debt limit), above which debt sustainability risks are high.⁵ To meet this objective, fiscal rules should set a medium-term fiscal anchor (for instance, a debt-to-GDP ceiling) that is consistent with sufficient fiscal buffers (a safety margin) to help ensure that public debt remains sustainable even in the face of common macroeconomic shocks. Larger buffers, accounting for tail risks (e.g., global financial crisis, Covid-19 pandemic, and natural disasters), would provide governments with additional fiscal space to act decisively in response to large crises.

Analyzing the impact of excluding green spending from the rule limits, also requires estimating the size of green spending needs and simulating the debt dynamics equation. We rely on the IMF October 2023 Fiscal Monitor's estimates of green spending needs to achieve climate goals by 2060 (if mostly spending-based measures are employed) for a representative Emerging Market economy—namely additional public investment of around 2 percent of GDP per year for mitigation alone (assuming that the public sector funds 20 percent of costs while the private sector funds the remainder). This is in addition to adaptation costs which vary widely across countries and are estimated to average 1-2 percent of GDP per year for many developing countries (Aligishiev et al. 2022). Finally, we simulate what would happen to the fiscal balance (and its green and non-green components) and debt sustainability under alternative green rules, which either allow overall government spending to rise or compress non-green spending in order to protect debt sustainability. Noteworthy, the high uncertainty around climate spending needs further complicates assessing the impact of establishing green rules and calibrating them to ensure debt sustainability.

More specifically, simple green fiscal rules are simulated according to the following steps:

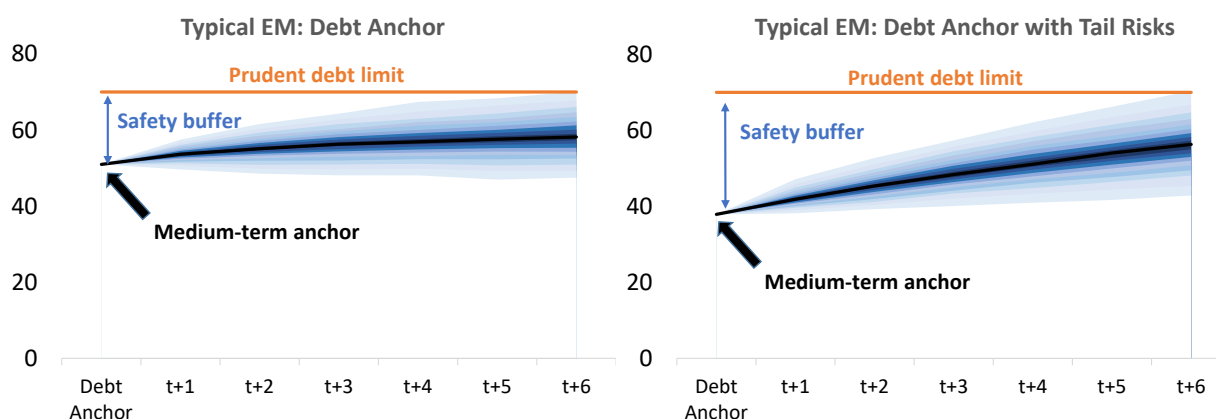
First, estimate the debt limit. The literature has highlighted several approaches to estimate a country's debt limit—beyond which debt risks becoming unsustainable. One prominent approach consists of estimating the

⁵ That is, at such level, the level of primary balance needed to stabilize debt would be politically unfeasible and the country would likely lose market access.

maximum sustainable level of debt associated to a fiscal balance that is economically and politically feasible to be maintained over time. Caselli and others (2022), calibrating the model by Mian and others (2022), estimate that for a typical emerging market the debt limit was around 95 percent of GDP pre-pandemic (when global interest rates were low), although this can vary significantly across countries and over time, depending on factors such as global interest rates and the elasticity of interest rates to changes in debt.⁶ For example, during the mid-2000s, the corresponding maximum sustainable debt limit was significantly lower, at around 70 percent of GDP for a typical EM. To set a *prudent* limit, we use the lower end of the 70-95 range.

Second, estimate the size of needed fiscal buffers. Next, we use the IMF's FAD debt anchor calibration toolkit (Eyraud and others, 2018; Gbohoui and others, 2023) to simulate debt trajectories under a series of shocks that take into account normal macroeconomic volatility and natural disaster tail risks.⁷ For a typical emerging market economy, appropriate safety buffers are estimated at around 20 percent of GDP when accounting for normal macroeconomic volatility and up to 30 percent of GDP when also accounting for tail risks, implying a debt anchor of around 40-50 percent of GDP (Figure 1). By comparison, average EM government debt levels stood at 66 percent of GDP at the end of 2022. The appropriate buffer size is country-specific, varying depending on its exposure to macroeconomic shocks, the fiscal response, and climate risks.

Figure 1. Safe Debt Anchor



Third, estimate spending needs to achieve climate goals. Depending on the tools chosen, the fiscal costs of green policies can be large. If mostly spending-based measures are employed—such as public investment and subsidies—with limited use of carbon pricing, reaching net zero emissions by 2050 in a representative AE and 2060 in a representative EM would require additional expenditures of around 2 percent of GDP per year on

⁶ A typical EM is defined as the GDP-weighted average of the respective country group.

⁷ The toolkit by Eyraud and others (2018) calibrates an appropriate debt anchor for a given country based on computing debt trajectories under sequences of macroeconomic shocks. First, it draws 1,000 sequences of macroeconomic shocks from a multivariate normal distribution with a variance-covariance matrix that is estimated using historical data for real interest rates, real GDP growth, and the exchange rate. Next, for each of the shock simulations, macroeconomic variables are computed over the six-year projection horizon, by adding the generated shocks each year as the error term. In addition, a fiscal reaction function, estimated using data for a panel of countries, is used to simulate the primary balance. Gbohoui and others (2023) further extends the IMF's debt anchor calibration toolkit to capture natural disaster risks by allowing for an asymmetric distribution for GDP growth with a thicker left tail. Tail risks are calibrated to match the average growth effects of natural disaster shocks and the skewness of the growth shocks distribution.

average, relative to baseline investment (October 2023 Fiscal Monitor).⁸ Moreover, beyond investment needs for mitigation, many of these countries need to build resilience to climate change, which would imply further costs averaging around 1-2 percent of GDP per year for many developing countries (Aligishiev et al. 2022). These estimates are highly uncertain and subject to wide dispersion, especially for adaptation, which depends on country-specific vulnerability to impacts of climate change (see also IMF 2021 for a review of decadal investments needs). For instance, the 46 countries that included adaptation cost estimates in their Nationally Determined Contribution estimated annual costs averaging 1.5 percent of GDP (Bucher et al, 2019). According to Aligishiev et al. (2022), annual adaptation costs are estimated at around 0.25 percent of world GDP per year, with large disparities across countries, with costs exceeding 1 percent of GDP for emerging markets and averaging 2.7 percent of GDP for small island states (exceeding 10 percent of GDP for some). Estimates of adaptation investment needs vary widely based on differing definitions of adaptation needs and assumptions about future development levels. This is in addition to the already sizable investment needs countries have to meet other sustainable development goals.

Finally, we simulate the fiscal balance and debt trajectories under alternative green fiscal rules. We compute public debt dynamics trajectories, following the methodology of Escolano (2010)⁹, for the following alternative scenarios to the baseline “World Economic Outlook (WEO) extrapolation”¹⁰ (Figures 2 and 3, gray line). We abstract from modeling the energy transition and assume, in all scenarios, that mostly spending-based policies are adopted to reach the net zero emissions goal by 2060 in EMs.

- *No fiscal rule.* WEO extrapolation scenario with an additional 2 percent of GDP in annual green spending for mitigation without any fiscal rule (blue line).
- *Green rule exempting mitigation spending.* Green rule consisting of a 3 percent of GDP deficit ceiling, as has been commonly adopted in many countries, yet excluding mitigation spending, and 2 percent of GDP annual green spending on mitigation (green line).¹¹
- *Green rule exempting mitigation and adaptation spending.* Green rule consisting of a 3 percent of GDP deficit ceiling (excluding mitigation and adaptation) and 4 percent of GDP annual green spending on mitigation and adaptation (purple line).

⁸ To estimate fiscal costs of green spending policies we use calculations for 'representative' economies, which are based on the weighted average of the G7 for AEs, and Argentina, Brazil, China, India, Indonesia, Mexico, South Africa, and Türkiye for EMs. The private sector is assumed to fund the majority (about 80 percent) of needed investment for decarbonization. Estimates assume limited use of carbon pricing, whereby initial carbon prices (\$40 and \$5 per ton, respectively, for AEs and EMs) are consistent with analyses using the IMF's Climate Policy Assessment Tool. Carbon prices are then assumed to gradually rise by 2030 (to \$75 and \$45 per ton, respectively) and stay constant at this level afterwards, throughout the simulation period.

⁹ Following the methodology of Escolano (2010), the public debt dynamics equation can be commonly written as: $d_t = (1 + \lambda_t)d_{t-1} - p_t + SFA_t$, where d_t is the debt-to-GDP ratio, p_t is the primary balance as a share of GDP, SFA_t is the stock-flow-adjustment (residual change in debt due to exchange rate effects, materialization of contingent liabilities, and data errors) and $\lambda_t = \frac{i_t - \gamma_t}{1 + \gamma_t}$, where i_t is the nominal interest rate and γ_t is the nominal GDP growth rate. In the case where λ_t is constant, we can compute the debt-stabilizing rule as $p^* = \lambda d^* + SFA$. We use annual historical data spanning 2000-2022 and projections for 2023-2028 from the April 2023 IMF *World Economic Outlook*. Simulations use actual implied SFA values (falling from 4.6 to 3.3 percent of GDP) for the 2023-28 period and assume constant annual SFAs of 3.0 percent of GDP for EMs from 2029 onwards.

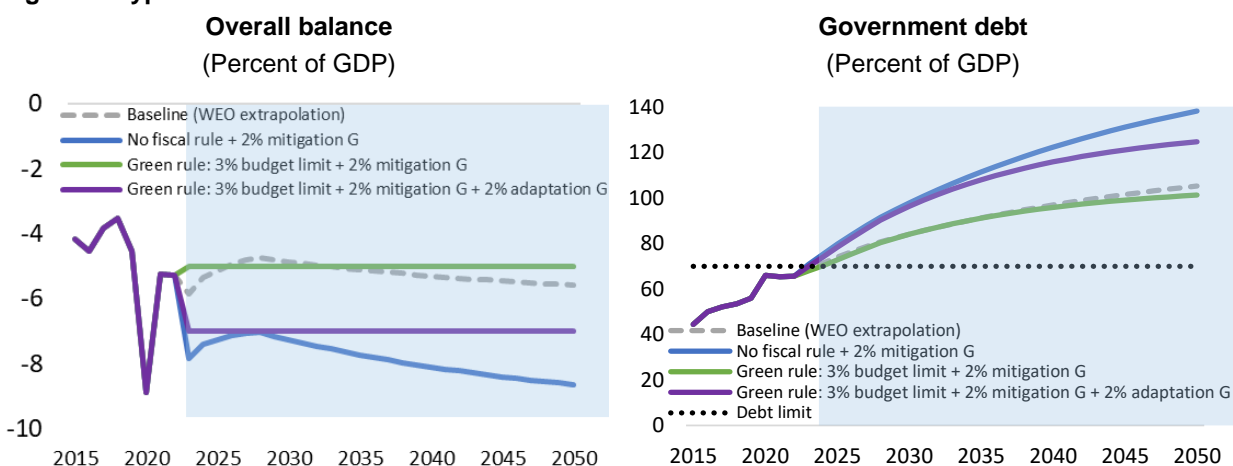
¹⁰ The WEO business-as-usual scenario considers WEO projections for the primary balance, nominal GDP growth, and implied effective interest rates and stock-flow adjustments for government debt through 2028, and their constant extrapolation through 2050.

¹¹ A deficit ceiling of 3 percent of GDP has been adopted by countries in the European Union, ECCU, WAEMU, among numerous others. The average overall budget limit for emerging market and developing economies is 2.8 percent of GDP.

- *Green rule preserving debt sustainability.* Green rule – consisting of a 2.5 percent of GDP primary surplus (excluding green spending) – calibrated to preserve debt sustainability when annual green spending is 2 percent of GDP (yellow line).
- *Illustrative green MTFF allocation.* An illustrative alternative allocation (higher green and lower non-green budget balances) calibrated to preserve debt sustainability within a green MTFF that includes carbon pricing (red dashed line).

Since the fiscal costs of green policies can be very large, debt can become unsustainable under a green rule (Figure 2). Under the business-as-usual WEO extrapolation scenario, with additional climate mitigation spending, the overall deficit would deteriorate to almost 9 percent of GDP by 2050 and the debt ratio would surge by more than 30 percentage points reaching almost 140 percent of GDP (blue line). Under a green rule where the non-green budget deficit is constrained by a 3 percent limit, and green spending totals 2 percent of GDP annually, public debt would reach more than 100 percent of GDP by 2050 (green line). If 2 percent of GDP annual spending on adaptation is further added, the deficit would remain at 7 percent of GDP throughout the projection horizon and debt would reach 125 percent of GDP by 2050 (purple line). Under all the scenarios, the rise in debt would be unsustainable for the average emerging market, significantly surpassing the debt limit computed as described above (black dotted line)

Figure 2. Typical EM: Green Fiscal Rules Could Lead to Unsustainable Debt Levels



Calibrating a green fiscal rule consistent with the budget constraint that preserves debt sustainability would require significantly tighter non-green fiscal balances (Figure 3). The long-run deficit consistent with the debt anchor provides an estimate of the budget constraint which, if maintained over a long period of time, would preserve debt sustainability. For the typical EM, the overall primary balance which stabilizes debt at the level of the estimated debt anchor (50 percent of GDP) in the long run is a 0.5 percent of GDP primary surplus.¹² This budget limit can be further decomposed into a green and non-green component. If a green fiscal rule were adopted (exempting mitigation spending amounting to 2 percent of GDP annually), a large and persistent non-green primary yearly *surplus* of around 2.5 percent of GDP would be needed to ensure compatibility with debt sustainability (yellow line). Achieving such a large surplus would require difficult policy

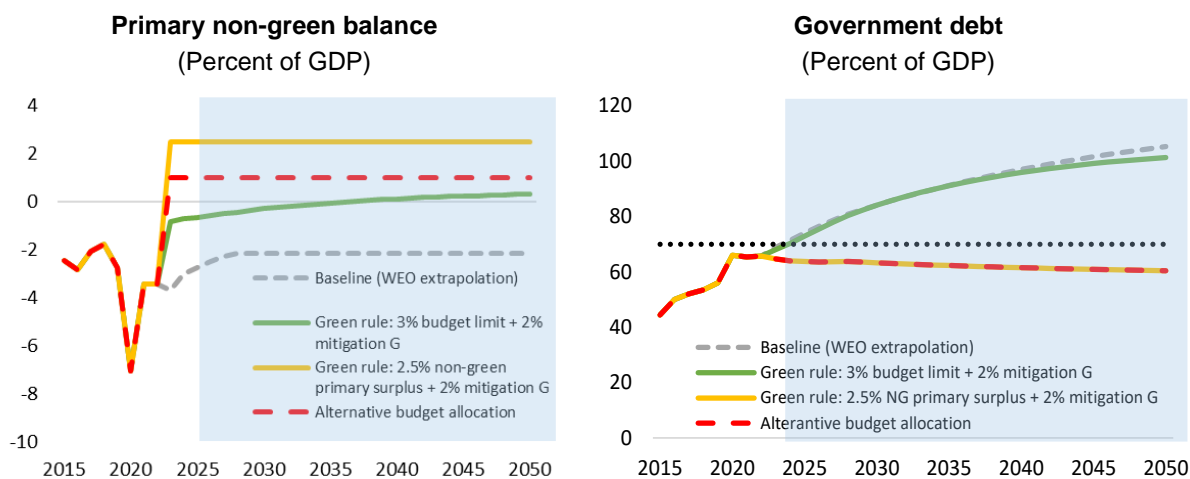
¹² This calculation assumes annual stock-flow adjustments of 3 percent of GDP (as before), which is consistent with average historical realizations over 2000-2022.

decisions—EMs averaged a primary deficit of 0.7 percent of GDP during 2000-2022 (although this led to debt rising over the period).

This exercise highlights the need for a broader policy strategy when considering how to tackle climate, and other pressing priorities (other Sustainable Development Goals, pressures from ageing). Just setting a numerical rule would not be credible given the large tradeoffs involved. It will require building wide public consensus for a medium- and long-term fiscal strategy that identifies which programs to prioritize and how to fund it. For low-income countries, it will likely require also significant donor support. The optimal mix of tools should also weight the relative cost of green spending, which is also subject to high uncertainty and likely to evolve over time. For instance, the emergence of affordable low-carbon technology (e.g., solar and wind energy) can allow low-carbon developments to be less expensive than conventional developments.

Adopting a more comprehensive mix of climate-related policies would help balance the different policy goals. We consider a different illustrative scenario under which the overall primary balance still stabilizes debt at a safe level but has a different composition between green and non-green spending. Instead of assuming that the government's policies to achieve the net zero emissions targets rely mostly on green spending, a more balanced mix of fiscal policy tools – for example by adopting green PFM practices, such as a green MTFE and enhanced investment efficiency, combined with carbon pricing – can lead to an improved fiscal balance for the green sector, thereby allowing more space to accommodate non-green spending priorities (red dashed line). In the illustrative scenario, the non-green primary balance required to keep debt sustainable is less tight at about 1 percent of GDP throughout the projection horizon.

Figure 3. Typical EM: Large Non-Green Surpluses Would Be Required to Ensure Debt Sustainability Under Green Rules



Moreover, additional complexities of climate considerations are difficult to capture through simple simulations and a simple numerical rule:

- **The simulations abstract from modeling externalities associated with countries' climate policies.** Climate shocks are endogenous to *global* policies, meaning that individual countries' policies carry externalities. A general equilibrium model would be needed to fully model externalities associated with climate mitigation, which goes beyond the scope of this paper. Assuming that all the simulations (except for the WEO baseline extrapolation) are consistent with achieving the same climate mitigation goals, simply

financed through a different mix of tools, allows us to abstract from this discussion. Finally, we do not consider alternative paths for reaching climate goals (e.g., frontloading or backloading the drop in CO₂ emissions).

- **There could be a case for accounting for differing sizes of green fiscal multipliers.** While the literature on green multipliers is still limited, large green spending output multipliers could potentially dampen the effect on public debt.¹³ If climate-friendly spending policies were to display large output multipliers, public debt dynamics could be less adverse than what described so far. Consideration would need to be given to the type of green spending. For example, replacing an existing bridge with one that is resilient to climate shocks might not have a high fiscal multiplier, but rather mitigate the impact of natural disaster shocks which could in turn lead to less adverse growth dynamics in the future. Instead, a solar power plant, for instance, increases revenue from the sale of electricity, so that the effect on the government budget could potentially be neutral over time. While carbon pricing would have a negative effect on GDP growth, this could be partially or totally offset with effective revenue recycling.¹⁴
- **A more resilient and sustainable fiscal future.** Transitioning away from fossil-fuel based toward renewable energy has the potential to lessen fiscal pressures, especially those caused by surges in global fossil-based energy prices. While this could contribute to a more sustainable debt path in the MTF scenario (Figure 3), and a more resilient and sustainable fiscal future more generally, it is not considered in our simulations.

Similar practical design challenges apply to countries worldwide. While our simulations are used to illustrate challenges associated with designing green fiscal rules for a typical emerging market, similar challenges apply to exempting green spending in advanced economies or low-income developing countries, although their debt limits differ.

B. Further challenges with green fiscal rules

Green fiscal rules face other operational challenges related to their design. Green rules are similar to more traditional golden rules which exclude investment spending from the budget ceiling. In practice, golden rules provide incentives to reclassify current as capital expenditure to avoid the limit imposed by rule (Servén 2007; Mancini and Tommasino 2023), and in green rules will incentivize classifying any type of spending as green (especially as many projects will contain some degree of “green” spending as countries adapt to climate change). In this context, the monitoring and enforcement of this type of rule can become particularly difficult due to increased complexity of the rule. Similarly, introducing a floor on green spending (in addition to other operational rules) could undermine compliance with the other existing rules, as often happens in the face of numerous rules (Caselli et al., 2022).

Countries’ experience with golden rules have been mixed, suggesting caution when thinking about the introduction of similar types of rules. During the global financial crisis in Mexico, for instance, capital

¹³ Batini et al. (2021) find that the point estimates of the multipliers are in the range 1.1-1.5 for renewable energy investment and between 0.5 and 0.6 for fossil fuel energy investment, depending on the horizon and econometric specification. Hasna (2021), using state-level data for the United States, find a contemporaneous multiplier of 1.1 and an upper bound of 4 in the second year of implementation.

¹⁴ For a more detailed discussion and country examples on how to use carbon tax revenue see: “Using Carbon Revenues”. Note 16. World Bank, Washington, DC. World Bank.

expenditures by the national oil and the state-owned electricity companies were excluded from the budget balance contributing to adverse public debt dynamics (Valencia 2015). Germany abandoned its golden rule in 2010, after more than 30 years, as it did not prove successful at impeding the buildup of debt (OECD 2008). Also, in the UK, the objectives of the golden rule on public investment were incompatible with the fiscal adjustments imposed by the debt rule, and eventually led to the suspension of the rule (Basdevant et al. 2020). In other countries, capital expenditure sometimes includes social current expenditure (considered as a form of ‘human capital’) to allow for debt financing under this type of rules, reducing budget transparency.

Further practical design challenges apply to green rules related to how green spending is defined, how it is financed, and the interplay with other measures on the revenue side such as carbon prices. First, a decision on what constitutes green spending will need to be taken, which is complicated as most spending items can have a green component (for example, water and sanitation). Countries have very heterogeneous definitions and procedures to define climate relevant activities across the public and private sectors (World Bank 2021), which can undermine transparency. Governments will also need to decide whether only capital or also current spending should be exempted from the rule limit. For instance, there could be a case for excluding current spending, such as green subsidies, as it may not matter whether climate mitigation spending takes the form of public investment or private investment through government subsidies. And if current spending is excluded, there could also be an argument in favor of excluding interest payments associated with financing the green budget, which would further worsen the debt dynamics in our simulations. Finally, the potential introduction of other measures, such as carbon taxes, could be considered in the design of green rules (see also below).

III. *A green medium-term fiscal framework*

Addressing climate change decisively will imply difficult policy choices that go well beyond fiscal rules—it will require to better integrate climate considerations into fiscal policy decision-making and planning. Given the complexities of how climate considerations affect the economy and the fiscal accounts in the short and medium term, trying to design numerical green rules would be counterproductive. Countries will need to weigh the trade-offs between different policy choices—e.g., how much to increase carbon taxes, how much to rely on public versus private investment on adaptation needs, level of subsidies, as well as other policies during the climate transition (e.g., to protect those most affected). This will require developing the capacity of governments to better integrate climate considerations when designing annual budgets and enhance medium-to-long-term fiscal analysis and strategies.

A priority should be to enhance medium-term fiscal frameworks to incorporate green considerations.

As noted in Caselli and others (2022), medium-term fiscal frameworks can combine more flexible rules with stronger institutions to promote sound public finances. Medium-term fiscal framework can help inform the costs and benefits of different policies and build broad consensus for the needed measures. Countries should make efforts to incorporate the economic and fiscal effects of climate change and countries’ climate change adaptation and mitigation policies—that is, develop “green” MTFs.¹⁵ The medium-term focus would allow to better assess the effects of climate change and policies to address it during the green transition. Within the

¹⁵ This requires significant reforms, including a medium-term perspective in budgeting, incorporating climate and aging in the budget process, and upgrading transparency and independent fiscal councils.

green framework, governments can incorporate fiscal rules that promote debt sustainability and economic stability. Given the importance of climate and natural disasters on subnational governments, developing consistent MTFs at the general government level would be more effective.

Green MTFs will require significantly upgrading fiscal analysis and the budget process. Figure 4 highlights some key components of a green MTF. First, the effects of climate change and natural disasters should be better incorporated in medium-term projections (e.g., impact on GDP growth and government revenue and expenditure). Second, costing the different policies and measures and their consistency with achieving climate objectives (e.g., effect of carbon taxes or energy subsidies) can provide a framework to consider an optimal mix of fiscal tools.¹⁶ Third, risk-based frameworks should be developed where climate considerations are explicitly considered when doing debt sustainability analysis (DSAs). Fourth, fiscal rules—in the form of targets on broad fiscal aggregates to mitigate debt sustainability risks—can be better calibrated based on and integrated into MTFs that account for climate considerations. Finally, other green PFM practices should be adopted throughout the budget and investment process. In what follows, we will discuss in further detail each of these key aspects.

Figure 4. Components or Elements Supportive of Green MTFs

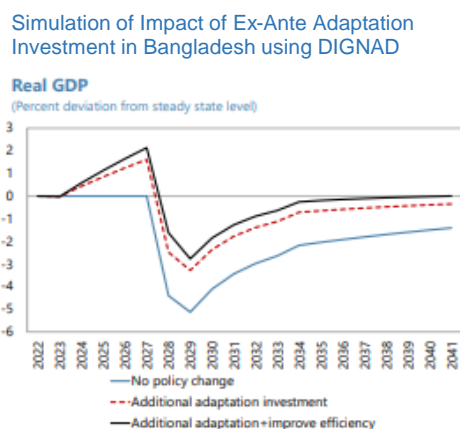
Macroeconomic projections	Climate-related policies	Risks and Debt sustainability	Fiscal Rules	Other green PFM practices
✓ Economic costs of climate change (e.g., on potential growth).	✓ Choice of measures.	✓ Risks related to climate change.	✓ Mitigate risks (reduce needed buffers)	✓ Green PFM through other phases of the budget.
✓ Related fiscal costs.	✓ Impact on taxes (e.g., carbon taxes).	✓ Effects of climate-related policies (e.g., adaptation).	✓ Target broad aggregates	✓ Climate-smart public investment
✓ Scenarios	✓ Impact on expenditures (investment; energy subsidies, safety nets).	✓ Longer-term perspective.		

First, MTFs need to better incorporate macro-fiscal effects of climate change into macroeconomic projections and risks in the medium and long term. Climate considerations should be incorporated into macro projections by quantifying its impact in terms of economic costs (e.g., on medium-term (potential) growth, and implied fiscal costs). Projections should include the gradual effects of climate change and climate-related natural disasters—including reflecting changes in the frequency and magnitude over time. In addition, the MTFF should include discussion of fiscal risks including the risks posed by climate change. A longer-term projection analysis could be used to identify risks that may materialize beyond a 3-5 year horizon—for instance, for countries with high vulnerability to natural disasters, the assessment of macro-fiscal costs associated with climate can change significantly when taking a longer-term perspective. Macro-fiscal forecasting models can help account for economic, budgetary, and financial costs from climate change. An example is the IMF's DIGNAD (Debt-Investment-Growth and Natural Disasters) model, which captures the challenges of closing infrastructure gaps in developing countries that frequently face natural disasters (see Figure 5 for an example

¹⁶ On how to incorporate climate change adaptation, see Aligishiev et al (2022) and Bellon and Massetti (2022a, 2022b).

and Box 1).¹⁷ The toolkit enables users to (i) evaluate debt sustainability risks following natural disasters amidst the need to rebuild public infrastructure, (ii) analyze the effects of ex-ante policies, such as building adaptation infrastructure, increasing fiscal buffers, or improving public investment efficiency, and (iii) study the effects of climate risk due to natural disasters and how investments in adaptation infrastructure can help mitigate these risks. This will require building capacity and improving knowledge of climate impact over time.

Figure 5. Example of Adaptation Investment Simulation using the DIGNAD Model for Bangladesh



Second, enhance the costing and assessments of effects of different policy measures and their consistency with achieving climate objectives. Climate policies should be considered within countries' medium- and long-term fiscal strategy. Countries should set green targets and consider different types of green fiscal policies. Consistency across policies should also be evaluated. For instance, a country considering implementing green investment or green budgeting should avoid subsidizing fuel products (akin to negative carbon pricing).¹⁸ In addition, MTFs could provide information on spending (current and capital) as well as revenues related to climate, and how these affect debt dynamics. Importantly, the economic and budgetary impact of climate policies should take into account:

- *Policies for climate change mitigation.* Different fiscal policy tools to address climate change mitigation (e.g., green public investment, green subsidies, carbon pricing, feebates) can have vastly different fiscal impacts. For example, a country adopting carbon pricing type policies or revenue-neutral feebates will require less measures on the spending side. For this reason, it is important that medium and long-term projections incorporate the set of chosen policies. Projections for alternative scenarios relying on a different mix of fiscal policy tools can also be modeled to help inform the optimal policy mix. For example, the IMF's

¹⁷ The toolkit builds on the extension of the Debt, Investment and Growth model of [Buffie et al. \(2012\)](#) to natural disasters following [Marto, Papageorgiou and Klyuev \(2018\)](#). In addition to permanent damages to public and private capital, natural disasters cause temporary losses of productivity, inefficiencies during the reconstruction process, and damages to the sovereign's creditworthiness. See, for example, the toolkit's application in the [Rwanda](#) and [Bangladesh](#) IMF staff reports.

¹⁸ For instance, the 2022-23 surge in (carbon-intensive) energy subsidies in Europe to cope with the energy crisis, alongside the EU's suspension of the deficit rule limit, highlights the relevance of considering the role of fuel subsidies for the design of green rules.

Climate Policy Assessment Tool (CPAT) can help policymakers estimate the effects of climate mitigation policies on emissions and fiscal accounts.¹⁹

- *Policies for climate change adaptation.* Spending on climate change adaptation should be weighed against the counterfactual of inaction, which would result in lower potential growth and larger climate-related shocks over time. For example, if a country adopts significant adaptation measures (including public investment or measures to incentivize private investment), the economy will become more resilient to natural disasters. This implies that less fiscal buffers will be needed in the future to deal with negative shocks, while implying a short-term fiscal cost.²⁰ Knowing the size of adaptation investment needs (for different types of adaptation investment, e.g., strengthening physical assets and investing in coastal protection) is often critical for the policymakers in charge of designing affordable adaptation strategies.

Third, adopt risk-based debt sustainability analysis (DSA) including climate-related risks. Debt sustainability analysis should include the effects of climate change and natural disasters. For instance, the IMF's DSA tools (MAC-SRDSF and the LIC-DSF) provide stress tests for natural disasters (triggered for vulnerable countries) to capture risks associated with one-off climate events over the medium term. The natural disaster events considered include climate-related (e.g., droughts, wildfires), geophysical (earthquakes including tsunamis, volcanic activities), and hydrological (floods and landslides) shocks, among others (IMF 2022a). Also, the effects of different policies should be modeled by accounting not only for effects on potential growth but also for the fact that the size of the shock varies depending on the extent of investment in adaptation. The MAC-DSA includes, for instance, a module targeted at estimating the consequences of adaptation and mitigation investments. The module produces 30-year debt and gross financing needs projections reflecting the fiscal cost of adaptation investment and main debt drivers. Another sub-module on mitigation costs captures the impact on debt sustainability of the upfront estimated investment needed to ensure a transition to a low carbon economy over a 30-year horizon (for more details see IMF 2022a). Nevertheless, while longer-term fiscal projections and risk analysis are warranted, the complexity of integrating climate considerations also highlights challenges, including in estimation and communication.

Fourth, the enhanced medium-term frameworks can also help better design and calibrate fiscal rules while accounting for climate risks and policies. Fiscal rules should target broad aggregates, not specific spending items, for consistency with their objective of preserving debt sustainability. However, specific considerations can be taken when designing the fiscal rules especially for countries with high vulnerabilities to climate change and natural disasters:

- *Incorporating climate considerations can help better assess debt limits and fiscal buffers,* which are important to calibrate debt anchors and operational rules. For example, fiscal and debt projections should

¹⁹ Mitigation policies covered in the CPAT include carbon taxes, emissions trading systems, fossil fuel subsidy reform, energy price liberalization, electricity and fuel taxes, methane fees, VAT harmonization, energy efficiency and emission rate regulations, feebates, renewable subsidies, and feed-in tariffs, green public investments, and combinations of these policies.

²⁰ Climate change costs and adaptation benefits can be estimated using either simulation models – such as integrated assessment models or computable general equilibrium models – or econometric methods (see Aligishiev et al (2022) for a comprehensive summary). Models of the “optimal” level of adaptation, which assume diminishing returns of adaptation investment from initial high levels to zero for the last projects at the optimum, point to high average returns of around 80-100 percent, above the typical average returns (around 15-20 percent) of investing in standard infrastructure in countries with large investment gaps (Aligishiev et al, 2022). Sectoral studies report climate adaptation returns (benefit-to-cost ratios) as high as 100-900 percent (Hallegatte et al, 2019, Global Center on Adaptation 2018). Savings from investing in adaptation are found to be increasing in the expected intensity of natural disasters and exceed double the extra spending to finance post-disaster relief in small islands such as the Maldives and Samoa (IMF 2023).

incorporate the effects of climate change on key variables like economic growth (including its mean and higher-order moments).²¹ Similarly, adaptation policies can also affect the future growth path (relative to a scenario without the policies), which affects the amount of debt that can be sustained over time. For example, a higher potential growth (relative to no policies scenario) implies that a given primary balance will stabilize debt at a lower level. A higher maximum sustainable primary balance also implies higher debt levels could be sustained. The fiscal anchor could be calibrated at regular time intervals (e.g., every 5 years) to incorporate updated assessments of climate risks and frequency and dimension of natural disasters.

- *The size of fiscal buffers will also vary on the magnitude of shocks considered, which will depend on the country-specific vulnerabilities, as well as the country's implementation of climate adaptation policies.* The fiscal impact of shocks should consider the country's disaster insurance mechanisms (e.g., Gbohoui et al., 2023).
- *The choice of fiscal rules and calibration will also depend on the types of policies taken to address climate change.* For instance, if a country adopts a combination of carbon taxes and higher spending in adaptation, it can raise its expenditure limits (while preserving sustainable deficit and debt levels) since this would be compensated by higher tax revenues (or by dedicated grants for example). However, given hump-shaped carbon revenue projections over time, it will be important to consider medium- to long-term effects when designing the rule (rule limits may need to be revised over time). Beyond carbon taxation, revenue mobilization more broadly could help to create additional space for green spending and should be considered as part of countries' fiscal strategy.
- *Adopt escape clauses to account for large natural disasters.* Fiscal rules should be consistent with medium-term fiscal planning, including budgeting for smaller and frequent natural disasters. However, if the country is hit by large natural disasters that have a significant impact on the economy and require large fiscal action (including on social safety nets, reconstruction efforts), there may be a need to have escape clauses that allow the government to temporarily increase spending or the deficit. These types of clauses are already present in a growing number of countries, but it will be important also to specify a strategy to return to the limits of the rule over time.

Finally, other green PFM practices should be adopted alongside green MTFFs to strengthen their effectiveness. Governments are increasingly adapting their budget institutions and processes to better align their policies with climate and environmental commitments.²² The term “green PFM” can be used to describe this approach aiming at integrating a climate-sensitive perspective into PFM practices, systems, and frameworks—especially the budget process, but also elements beyond it such as relations with state-owned enterprises or subnational governments, or fiscal transparency.²³ “Greening” the MTFF, as described above, allows to “mainstream” climate concerns within the strategic planning and macroeconomic framework phase of the budget cycle. In addition, complementary green PFM practices can be adopted in other phases of the budget and investment process to strengthen the link between countries' MTFFs and climate objectives and risks. For instance:

²¹ Gbohoui and others (2023) presents a way to calibrate appropriate fiscal buffers accounting for average marginal growth effects of natural disaster shocks and the skewness of the growth shocks distribution.

²² The UN (2022) provides a useful review of reforms introduced globally to integrate climate change into PFM systems, spanning practices along the entire budget cycle.

²³ For a detailed review of green PFM practices see Gonguet et al. 2021 and Aydin et al 2022.

- *Green or climate budget ‘tagging’* classifies budgetary items according to their climate and environmental impact (positive and in some cases negative). By measuring impact, green PFM can help prioritize across different spending items and ensure that green spending focuses on high-impact areas in terms of achieving mitigation and adaptation objectives. Green PFM is an example of “priority-based budgeting”, whereby a government elevates one or more strategic priorities, in this case climate.^{24,25}
- *Climate-smart public investment* embeds climate change within public investment management (PIM), recognizing the criticality of infrastructure governance to achieve mitigation and adaptation goals. For example, the IMF’s Climate-Public Investment Management Assessment (C-PIMA) provides a tool to help countries improve how they manage climate investments, focusing on the following five areas: climate-aware planning, coordination between entities, project appraisal and selection, budgeting and portfolio management, and risk management (see IMF 2021).
- *Additional efforts can be made to enhance the transparency of a government’s green actions* (OECD, 2020b). Assessing and communicating the progress of green reforms to enhance accountability of the government’s actions is crucial and can be achieved by developing strong performance budgeting frameworks to facilitate the measurement of results and outcomes. For example, the EU budget has a well-developed framework for performance measurement and reporting that includes green aspects.²⁶ Environmental impact assessments and evaluations should also be considered.²⁷ For instance, requiring environmental-climate impact assessments to accompany new budget measures allows governments to incorporate considerations on the impact of measures on climate or environmental goals alongside considerations on efficiency. Introducing ex-post impact environmental evaluations further enables governments to understand the appropriateness of the intervention design, the cost and efficiency of the intervention, its unintended effects, and how to use the experience from previous or ongoing interventions to improve the design of future interventions. Finally, Green Spending Reviews, which assess the extent to which a government’s baseline expenditure aligns with its policies on climate change and the environment and formulate options, can help the government achieve its climate policy goals.²⁸ Monitoring and evaluating the effects of green budgeting on decision-making can also help governments strengthen their green budgeting tools and framework and progress towards green objectives.

²⁴ SDG budgeting considers a broader set of strategic priorities, whereby the full set of 17 SDGs is integrated holistically into the budget cycle, allowing priorities to emerge from country-specific needs, accelerators, and bottlenecks to achieve the 169 targets (e.g., Mexico). Green PFM is essentially an implicit element because several of the SDGs are focused on green targets.

²⁵ In the area of public investment, important to strengthen public investment management with a focus on institutional settings that are particularly relevant to address climate issues (see IMF 2021).

²⁶ The European Commission reports progress towards the climate and environmental objectives for the previous year, as planned in its 7-year Multiannual Fiscal Framework, in the Annual Management and Performance Report. This report contains (i) specific sections on climate and biodiversity highlighting how the various programs contribute to the green priorities and clear explanations on the methodologies applied, (ii) a set of key achievements that provide more timely information on how the projects are contributing to the key objectives. Mid-term evaluations of major programs and overall ex-post evaluations, three years after completion of each program, are also conducted. The evaluation process defines core performance indicators linked closely to program objectives.

²⁷ Examples of environmental impact assessment practices include, for example: (i) Italy’s Stability Programme Climate Annex, which assesses how policies are meeting emission reduction targets and presents the effects of specific measures included in the National Energy and Climate Plan, and (ii) the Netherlands’ Multi-Year Programme for Infrastructure, Spatial Planning, and Transport, which provides analyzes the potential effects of public investments on climate change mitigation and adaptation.

²⁸ Green spending reviews aim at increasing the value delivered for each public euro spent by optimizing the mix between public funding and green impact. Green spending reviews have been conducted in Austria, Ireland, Greece, and the Netherlands.

- *Effective MTFs should also be assessed by independent oversight to enhance credibility over how climate considerations are incorporated into countries' MTFs.*²⁹ As part of their climate frameworks, some countries, for instance, have established independent bodies in charge of issuing advice to governments, monitoring their climate policies and assessing the coherence of these policies with the governments' overall environmental strategy.³⁰ Such independent bodies could conduct overall assessments of the extent to which the climate and environmental objectives are effectively promoted by the proposed policies set out in the annual budget and/or multiannual documents. They can also provide an evaluation of the tools and methods used in green budgeting frameworks, their application, and conduct ex-post reviews. Furthermore, the role of independent fiscal councils could be expanded to assess the fiscal and climate impact of climate policy measures considered in countries' MTFs and perform/evaluate green spending reviews.

²⁹ For example, in the Netherlands, the Dutch Environmental Assessment Agency (PBL) evaluates government policies and produces climate estimates used by the Advisory Division of the Council of State which is tasked to assess whether the government remains on track to reach its reduction targets, while the Netherlands' Bureau for Economic Policy Analysis (CPB) assesses the fiscal, macroeconomic, and distributional impacts of climate policies.

³⁰ These include, among others, Denmark's Council on Climate Change, Finland's Climate Change Panel, France's High Council for Climate, Ireland's Climate Action Delivery Board, the Dutch Environmental Assessment Agency (PBL), Sweden's Climate Policy Council, and the UK's Climate Change Commission.

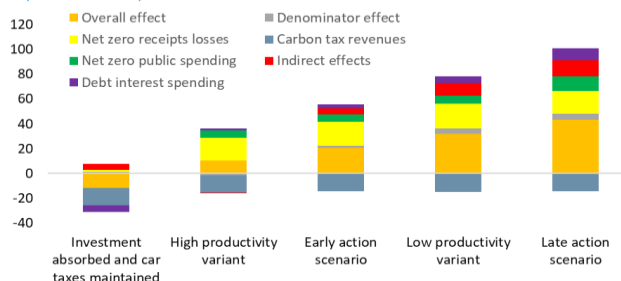
Box 1. Examples on how countries are incorporating climate risks into budgets and MTFs

Countries have been gradually incorporating climate considerations in the budget and medium-term strategies to different degrees.³¹

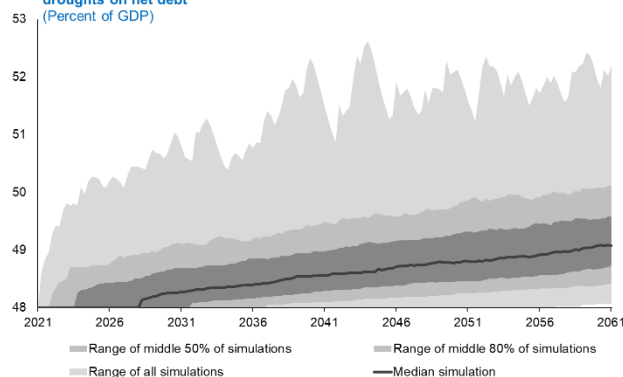
Denmark is one of the more advanced examples on incorporating climate effects on the macro-fiscal forecasting models. *Denmark's* GreenREFORM Project has been developing a macroeconomic model designed to assess the economic and fiscal impacts of climate and environmental policies, and the climate and environmental impacts of economic policies.³² The model produces annual projections up until 2100, which allows for medium-to-long-term fiscal and economic analysis, including assessing the effect of future economic developments on the climate and environment and whether these developments are consistent with climate and environmental targets.

The *United Kingdom's* Office of Budget Responsibility (OBR) 2021 Fiscal risks report explored the fiscal risks posed by climate change and the Government's commitment to reduce the UK's net carbon emissions to zero by 2050. Different scenarios in terms of timing of measures adoption and type of policies lead to significantly different public debt outcomes. The costs of getting to net zero could be significant, but under some scenarios which include carbon taxes and car taxes, for instance, public finances could even improve. Acting early also improves the outcome compared to a late-action scenario. In addition, the UK's 2022 and 2023 Fiscal Risks and Sustainability reports analyzed the impact of the energy price crisis, including its impact on demand for fossil fuels and the cost of transitioning to net zero. The 2023 OBR paper *Next steps for climate change analysis* discusses future avenues for analytical analysis on climate change.

UK OBR climate change scenarios: impact on public sector net debt in 2050-51
(Percent of GDP)



New Zealand Treasury: impact of increasing frequency of severe and moderate droughts on net debt
(Percent of GDP)



³¹ An early example includes Indonesia's First Mitigation Fiscal framework in 2012, that estimates and communicates the budget spending gap that would achieve emission reduction targets in the medium term. Bangladesh's 2020 Climate Fiscal Framework has been developed as an updated version of its 2014 Climate Fiscal Framework with ongoing efforts to integrate climate in the macro-fiscal scenario.

³² GreenREFORM describes the energy use and emission of pollutants in the Energy and Air Emissions Account produced by Statistics Denmark from all Danish businesses, households, and the public sector. Furthermore, the model describes the effect on emissions from environmental taxes, subsidies, and other regulations.

The *New Zealand* Treasury's combined Statement on the Long-term Fiscal Position and Long-term Insights Briefing includes a discussion of the fiscal impacts of climate change both for adaptation and mitigation. Different scenarios at varying degree of severity are considered and their fiscal impacts modeled. The 2021 New Zealand budget also quantifies the impact of its emissions trading scheme (ETS) and quantifies the scale of their proceeds that may be available by 2050. Since 2023 the New Zealand Treasury also began publishing a 'Climate Economic and Fiscal Assessment', complementing its regular Economic and Fiscal Updates.

Other countries have started incorporating green elements in their budget process. For instance, *France* adopted a "green budget" since 2022, which is mainly a green budgeting tagging exercise towards changing the composition to be more favorable to "green expenditure". The budget also provides a presentation of abatement costs of different mitigation options, to motivate the policy choices across possible measures. An increasing number of countries, including many developing countries, are now undertaking green budget practices. For example, *Senegal* adopted a 2024 green budget which classifies expenditures according to their environmental impact and their ability to support actions to build resilience to climate change.

IV. Conclusion

Governments are debating ways to protect climate-related spending amidst tight budget constraints and rising debt sustainability concerns, but green fiscal rules are unlikely to be the solution. Fiscal rules are used to constrain excessive deficits and signal to markets and the public in general the commitment to fiscal responsibility. Excluding "green" spending from the limits imposed by the rules would undermine those objectives and ultimately constrain the ability of the government to pursue its policy priorities, including on climate. As we illustrate before, the fiscal costs of green policies can be very large, especially when achieving the net zero emissions goal is pursued mostly using spending-based instruments (e.g., investment and subsidies). As such, green rules can lead to unsustainable debt dynamics.

Given the significant tradeoffs involved, a broader policy analysis and discussion is needed. Calibrating a green fiscal rule consistent with the budget constraint that preserves debt sustainability would require in many cases large cuts in the "non-green" fiscal balance and above what countries have been able to sustain in the past. Such efforts will require building wide public support for the difficult policy choices and a more comprehensive fiscal strategy. Most countries will need to adopt a mix of policies and tools to share the burden of the climate transition between the public and private sector. It will likely involve to some degree carbon taxes, public and private investment, regulations on energy efficiency and climate adaptation. Such complex and dynamic policy choices cannot feasibly be reflected in a fiscal rule. There would be a series of additional challenges in designing such rules making them overly complex and likely untransparent (e.g., how to define green spending).

An alternative approach is to strengthen medium-term fiscal framework to better reflect the challenges posed by climate change and the effects of the green policies, including the impact on the economy and public finances. Climate considerations should be incorporated into macro projections by quantifying its impact in terms of economic costs, for instance on potential growth, and the related fiscal costs. This can be

further complemented by a debt sustainability analysis that includes the effects of climate change and natural disasters. Fiscal rules can be incorporated into green MTFs, for example, through the calibration of sufficient fiscal buffers and flexibility to respond to shocks should consider climate-related shocks. This can be supplemented by the adoption of other green PFM practices, such as climate budget tagging and a specific attention to climate-smart public investment.

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