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SSRN Research Paper 2022/4

Reconciling fiscal and environmental sustainability in the Eurozone

Paul van den Noord

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Reconciling fiscal and environmental sustainability in the Eurozone

Paul van den Noord

Amsterdam Centre for European Studies Research Paper 2022/04

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Paul van den Noord is an Affiliate Member of the Amsterdam School of Economics (University of Amsterdam) and Theme Group leader at ACES, Amsterdam Centre for European Studies. He spent most of his career at the OECD in Paris, from 2010 to 2013 as Counsellor to the Chief Economist, following a secondment to the European Commission in Brussels from 2007 to 2010. In 2013 Paul joined a financial institution in London and Geneva and returned to his alma mater in 2018. He has held positions as Visiting Professor at the College of Europe in Bruges and Associate Fellow at Chatham House in London.

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Abstract

Fiscal restraint looks inevitable in the Eurozone following the pandemic, especially if the fiscal rules are reinstated. How to match this with the need to finance the climate transition? Two possible routes are explored. One is the adoption of a 'green golden rule', with the structural deficit limit (or 'Medium Term Objective') increased by 1% of GDP. Alternatively, new borrowing capacity could be created at the centre through a 'European Climate Fund', involving some redistribution towards countries most in need of abatement. Either way, financing the energy transition – now more urgent than ever in view of the Ukrainian war – could be achieved within the confines of the 60% of GDP debt constraint.

Keywords: Fiscal policy, European Green Deal, EMU

JEL Classification: E32, E63, F33

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1. Introduction

With the Russian invasion of Ukraine, the longer-term challenge to prevent or mitigate the looming climate crisis has morphed into an acute need to reduce the dependency on fossil fuels. Major calls on government budgets to finance the energy transition are thus again likely to be made, just after the exit from the COVID-19 pandemic led to rapid increases in public debt.

Fiscal stimulus related to the pandemic has been largely intentional and coordinated at the EU level. Indeed, it prompted the EU to temporarily revoke all fiscal rules, including the 60% of GDP debt ceiling, the 3% of GDP deficit ceiling and the 'Medium Term Objective' (MTO) for the structural budget deficit (with a reference value of 0.5% of 1% of GDP depending on the initial debt position). The EU's Recovery and Resilience Facility (RRF), created in response to the pandemic under the aegis of 'Next Generation EU' (NG-EU), provides grants and loans to governments to support countries most affected by the pandemic, funded by a common bond.

The rules will eventually be reinstated, possibly in 2023, while NG-EU support is designed to be of a temporary nature as well. At the same time governments in Europe have committed to the ambitious 'European Green Deal' in the pursuit of the goal to achieve carbon neutrality by 2050. How to finance this energy transition while government budgets are constrained? The coordination of fiscal policies is of particular importance for the Eurozone's economic and financial stability – as the sovereign debt crisis a decade ago has amply shown. How much fiscal space will be available to Eurozone countries to finance the Green Deal as they exit the pandemic?

Against this backdrop, this paper addresses three intertwined questions:

1. Are Eurozone countries' debt positions sustainable and, if not, how much fiscal consolidation is needed to secure debt sustainability?
2. How much additional fiscal consolidation is necessary to respect the fiscal rules once these have been reinstated? Is adherence to the fiscal rules necessary or sufficient for debt sustainability?
3. How much additional borrowing capacity needs to be built on a permanent basis to finance the climate transition, either at the national or the supranational level? Specifically, should a 'golden green rule' be adopted, or a European Climate Fund created?

To tackle these questions, this paper is structured as follows. Section 2 assesses debt sustainability in the Eurozone under different scenarios for the development of interest rates. Section 3 then explores the nexus with the fiscal rules, assessing how much fiscal consolidation would be necessary to ensure compliance with these rules under each scenario. Section 4

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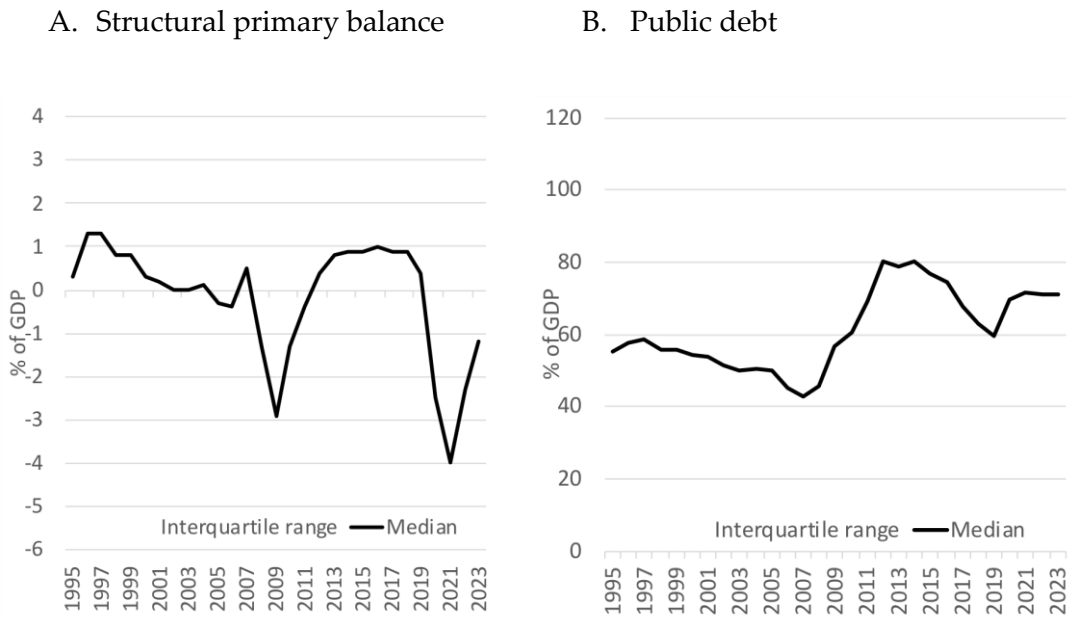
assesses for each scenario how much additional fiscal room is required to finance the energy transition, and whether this room could be created at the level of the member states or under the umbrella of a European Climate Fund. Section 5 concludes.

2. Is Eurozone public debt sustainable?

Public debt and structural primary deficits in the Eurozone have risen significantly since the onset of the pandemic (Figure 1). The surge in debt has been somewhat less pronounced in comparison with the financial and sovereign debt crisis, despite a more marked increase of the primary deficits, which owes much to the sustained fall in real bond yields and the recovery of potential economic growth (Figure 2). This is also indicative of the relative strength of the financial (and banking) sector in comparison with the previous crises.

While the fiscal situation in the Eurozone thus looks somewhat better than a decade ago, the sustainability of public finances may still be in jeopardy, depending on the longer-term outlook for potential growth, real interest rates and the structural primary balances. This outlook is in turn shaped by the behavioral responses of financial markets, the real economy and the government to the rise in public debt in the future. The analytical framework applied in this paper to assess debt sustainability takes these feedback loops into account. A brief discussion of this framework is presented below, underpinned by a more elaborate exposition in Van den Noord (2022).

Figure 1: Key fiscal developments in the Eurozone



Source: European Commission (2021)

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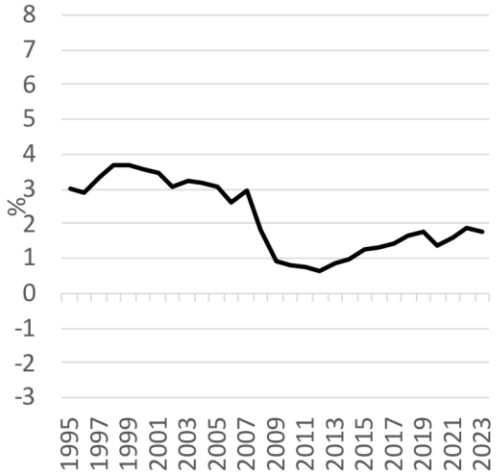
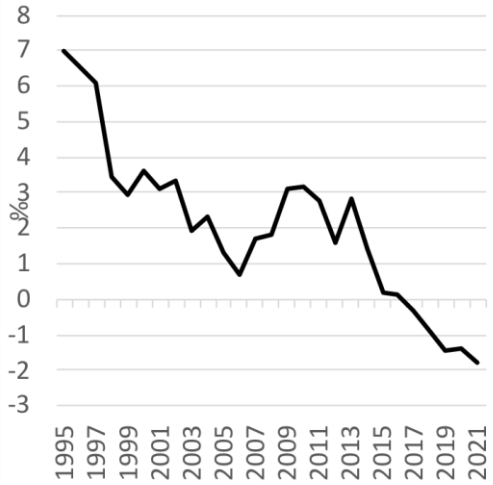
Figure 2: Potential economic growth and real bond yields

A. Potential economic growth



B. Real bond yield (10Y)



Source: European Commission (2021), OECD.

2.1. Analytical framework

A commonly accepted definition of debt sustainability reads that 'public debt can be regarded as sustainable when the primary balance needed to at least stabilize debt under both the baseline and realistic shock scenarios is economically and politically feasible such that the level of debt is consistent with an acceptably low rollover risk with preserving potential growth at a satisfactory level' (IMF, 2020).

The standard tool to assess the sustainability of public debt is the Debt Sustainability Analysis (DSA), in Europe applied *inter alia* by the European Commission (2014) and the European Central Bank (Bouabdallah, et al, 2017). A DSA is a helpful signalling device to detect if – at prevailing (or projected) rates of economic growth, real interest rates and the primary balance – public debt converges towards a stable equilibrium or, on the contrary, follows an explosive path.[1]

However, the above definition of debt sustainability refers not only to the impact of economic and financial shocks on debt dynamics, but also to the feedback effects of public debt on the outlook for economic growth and real interest rates, and on the urge of governments to take

[1] A useful distinction can be made between medium-run and long-run debt sustainability, with the former concept taking account of the lags in interest rate pass-through associated with the maturity structure of debt, allowing governments to buy time to adapt their fiscal policy. The long-run concept of debt sustainability used in this artcile, however, looks at the situation where yields at all maturities have fully adjusted to the market rate.

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corrective action. Increases in public debt tend to amplify adverse growth or interest rate shocks, while, in contrast, a tightening of fiscal policy induced by an increase in public debt may serve to mitigate the impact of these shocks. It is the balance between these forces that ultimately determines the path of public debt. To do justice to the above definition of debt sustainability, therefore, the feedback effects of public debt on growth, yields and fiscal policy must also be considered.

The method used throughout this paper to incorporate these feedback effects produces two metrics: the 'steady state equilibrium' public debt ratio and the 'debt limit' above which the debt ratio becomes explosive. This 'steady state equilibrium' is the value to which the debt ratio will converge in the long run, provided that the initial debt ratio is below the limit. According to this framework a country's public finances can be in either one of the following three situations:

1. *Sustainable*, meaning that the public debt ratio to GDP is at, or converges towards, a sustainable steady state equilibrium.
2. *Potentially sustainable*, meaning that while debt is explosive a partial default (or haircut) could restore sustainability as defined here. For a country in this situation the incentives for a partial default may thus be potentially strong.
3. *Explosive*, meaning that even a hypothetical full debt default would fail to restore sustainability unless the primary deficit is (also) cut. A country in this situation would be inclined to make a call on conditional external aid.

2.2. Baseline assessment

The baseline projections for 2023 for potential economic growth, the structural primary balance and the debt ratio are taken from European Commission (2021). The projections for real interest rates are based on the actual interest rates in 2020 (the last year available in the Commission forecast database used) and projected inflation for 2023. Figure 3 depicts the metrics of debt sustainability based on these projections. It shows that:

1. Debt ratios to GDP appear to be *sustainable* (in the above sense) in the vast majority of Eurozone member states. Technically this means that their debt ratios have stayed below the debt limit above which they become explosive. Hence, despite the high projected debt ratios in some cases, assuming 'normal' responses of economic growth, real bond yields and fiscal policy, debt is projected to automatically converge towards a long-run steady state.
2. Even so, there are significant fiscal risks in some member countries. The debt ratios in *Greece* and *Italy* are very close to their limits and hence debt sustainability in these

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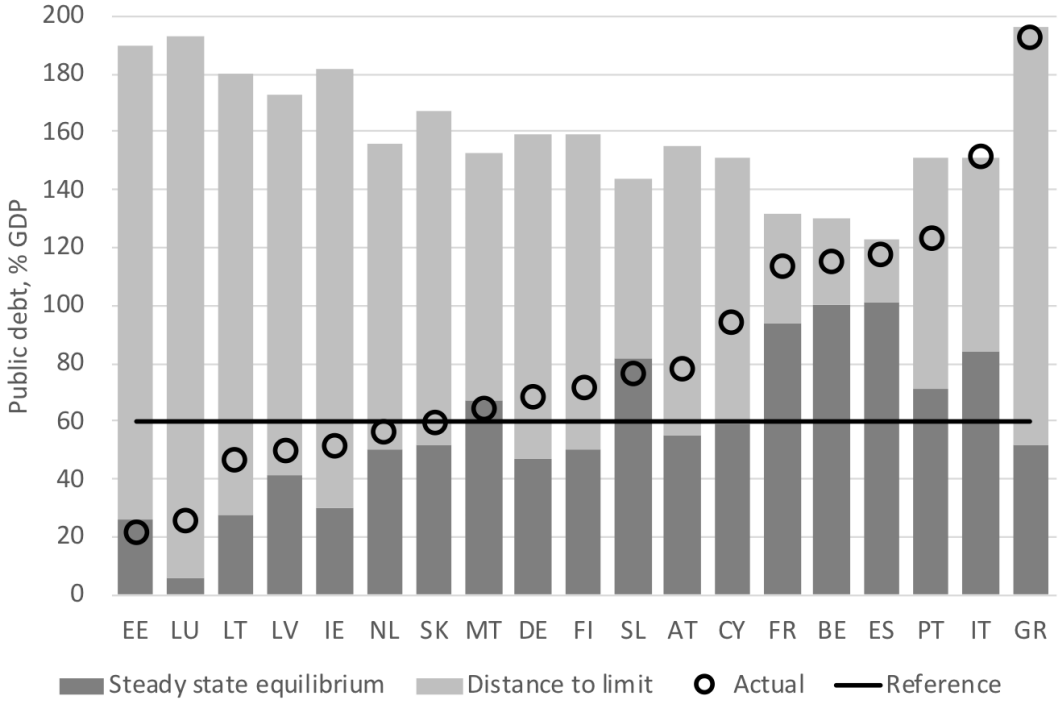
countries looks to be questionable. The room for maneuver against the debt limit appears to be narrow also in *Belgium*, *France* and *Spain*. Their wiggle room could easily evaporate if less favorable assumptions for the development of real bond yields are assumed, as indeed emerges from the scenario analysis below.

3. While not necessarily a concern from the point of view of debt sustainability, the 60% reference value for the debt ratio is not always respected. Specifically, the steady state equilibrium debt ratios appear to well exceed 60% in the cases of *Belgium*, *France*, *Italy*, *Malta*, *Portugal*, *Slovenia* and *Spain*. This means that even if these countries' debt may be sustainable, their compliance with the 60% debt rule would be compromised.

Figure 3: Debt sustainability analysis -- baseline



Source: Author's computations, based on European Commission (2021). Each bar corresponds to the debt limit above which debt becomes unsustainable. The dark part of each bar corresponds to the long-run equilibrium debt ratio. If the actual debt ratio is below the debt limit, it will tend to converge to the equilibrium debt ratio. If otherwise, debt will be explosive.

2.3. Interest rate risk

At first sight the above results are encouraging in that they suggest fiscal room for maneuver would be available for most Eurozone countries. However, the picture may change (even dramatically so) if real bond yields increase relative to baseline. Real yields could surge as the ongoing energy price shocks produce more price volatility and induce (expectations of) more rapid 'normalization 'of monetary policy.

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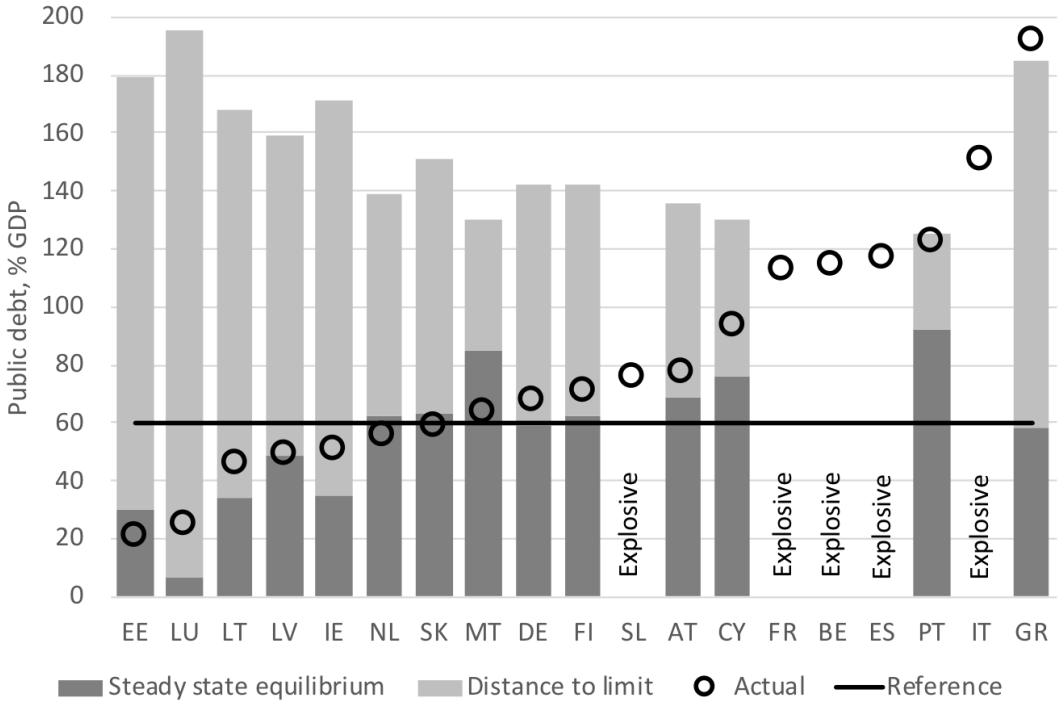
Figure 4 reports what happens if real bond yields increase by 200 basis points (bps) from their baseline levels. Only in the *Baltic states*, *Finland*, *Germany*, *Ireland*, *Luxembourg*, *the Netherlands* and *Slovakia*, would debt now be both sustainable and converging to a. steady state od 60% of GDP or less. Public debt would be explosive in five countries (*Belgium*, *France*, *Italy*, *Slovenia* and *Spain*). In *Greece* the debt ratio would be potentially sustainable in the sense that – unlike in the other cases – sustainability could be restored via a debt default – however politically problematic that may be.

Figure 4: Debt sustainability analysis – real bond yield +2 ppts



Source: Author's computations, based on European Commission (2021). Each bar corresponds to the debt limit above which debt becomes unsustainable. The dark parts correspond to the long-run equilibrium. If the debt ratio is below the debt limit, it will converge to the equilibrium debt ratio. In five cases (Slovenia, France, Belgium, Spain and Italy) debt is on an explosive path regardless of its initial level.

The situation deteriorates further if another increase of real bond yields by 200 bps – bringing the total increase to 400 bps – is assumed. In that scenario real bond yields would have reverted to their average level for the period 1999-2015, not an implausible scenario in view of the spike in energy prices and the prospective tightening of monetary policy by the European Central Bank.

As shown in Figure 5, almost half of the Eurozone member states (*Austria*, *Belgium*, *Cyprus*, *France*, *Greece*, *Italy*, *Malta*, *Portugal*, *Slovenia* and *Spain*) would now see debt embarking on an explosive path, hence requiring a permanent cut in the structural primary deficit to restore debt sustainability (with the same caveat applying as before in the case of Greece). Only in the *Baltic states*, *Finland*, *Luxembourg*, *Ireland*, *the Netherlands*, and Slovakia would debt remain

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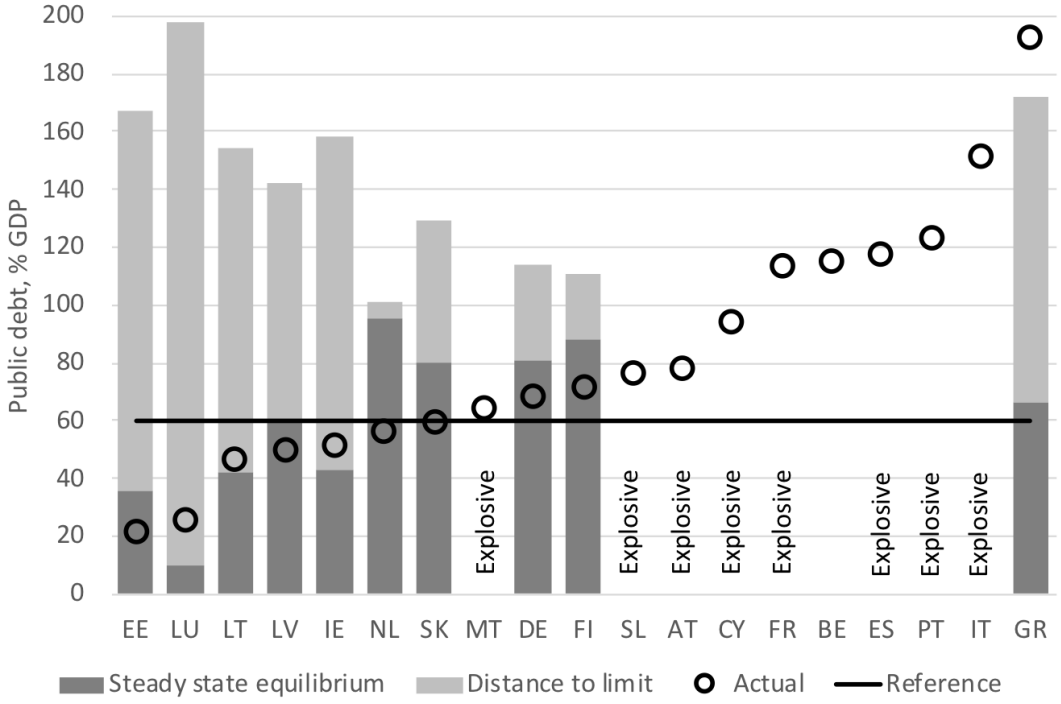
sustainable, and only in the *Baltic states*, *Luxembourg* and *Ireland* would it converge to a steady state of 60% of GDP or less.

Figure 5: Debt sustainability analysis – real bond yield +4 ppts



Source: Author's computations, based on European Commission (2021. Each bar corresponds to the debt limit above which debt becomes unsustainable. The dark part of each bar corresponds to the long-run equilibrium debt ratio. If the actual debt ratio is below the debt limit, it will tend to converge to the equilibrium debt ratio. In nine cases (Malta, Slovenia, Austria, Cyprus, France, Belgium, Spain, Portugal and Italy) the debt limit is nil and hence debt is on an explosive path regardless of its initial level.

By how much would the structural primary deficit need to be cut to restore debt sustainability? Figure 6 shows that if real yields increase by 400 bps from baseline, the required fiscal effort amounts to more than 5 ppts of GDP in *France* and *Italy*, be in the range of 3-5 ppts in *Belgium*, *Greece*, *Spain*, *Slovenia*, and amount to 1-3 ppts in *Austria*, *Malta* and *Portugal*. If real yields were to rise by 200 bps the latter three countries escape the necessity of fiscal consolidation, but not the other six countries.

All in all, major fiscal consolidations look inevitable in about half of the Eurozone member states, including two major ones – *France* and *Italy* – if real yields rise on a permanent basis. Moreover, depending on the interest rate assumption debt in several or even a majority of Eurozone countries would fail to converge to the 60% of GDP mark or less. This takes us to the assessment of countries 'budgetary positions against the EU fiscal rules in the next section.

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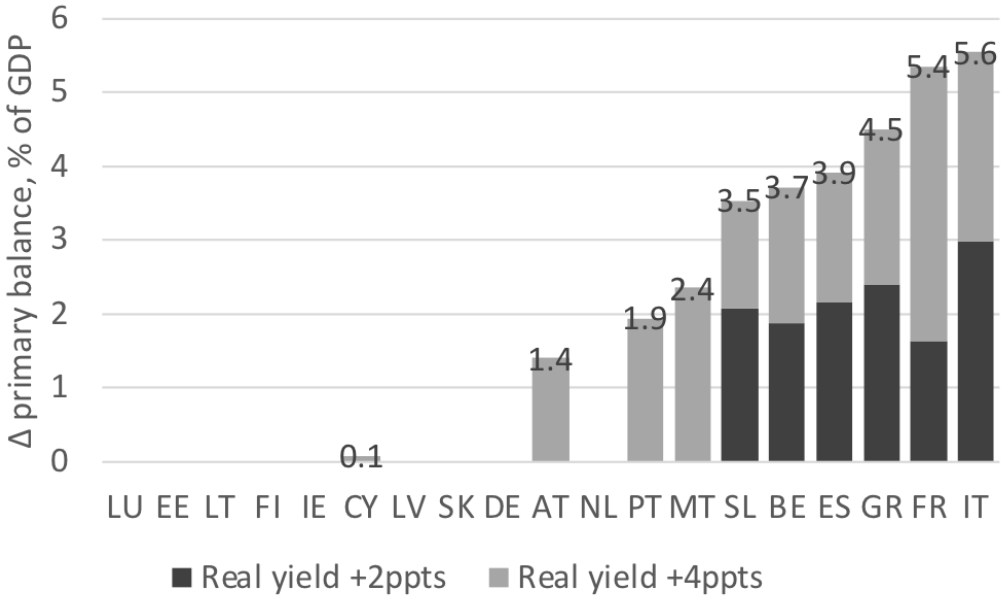
Figure 6: Fiscal effort required to keep debt sustainable



Source: Author's computations, based on European Commission (2021). The fiscal effort corresponds to the minimum required (permanent) reduction in the primary deficit as a per cent of GDP to ensure that the debt ratio does not exceed the debt limit. Each bar shows the required cur in the deficit in case of a 400bps shock to real yields. The required cut in case of a 200bps shock in real yields is depicted by the dark part of the bars.

3. Nexus with the fiscal rules

In response to the outbreak the Council of the European Union invoked the *General Escape Clause* in spring 2020 to temporarily lift all constraints on debt and deficits embedded in the fiscal rules. The Clause is expected to be lifted in 2023 (possibly later), and corrective action may be needed beyond that indicated in the previous section to satisfy the fiscal norms. Indeed, the above analysis indicated that compliance with the 60% debt rule may be in jeopardy, but there may be other violations in store as well.

3.1. Brief review of the rules

The EU fiscal rules – along with the associated procedures for coordination and enforcement that together with the rules form the EU's fiscal framework which has evolved in steps since first established in the late-1990s. In its present form the framework makes a distinction between a "corrective arm" and a "preventive arm":

1. The *corrective arm* is invoked when Member States' fiscal deficit exceeds the 3%of GDP mark, or if there is too little progress with the convergence of public debt towards the 60% of GDP criterion (at a pace of one-twentieth of the excess debt per annum). Non-compliance may potentially lead to financial sanctions.

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2. The *preventive arm* sets targets for the structural fiscal balance (or Medium-Term Objective, MTO) with the twin objective of keeping public debt stable at the reference value of 60% of GDP and secure a safety margin against the 3% reference for the budget deficit. The MTO must comply at least with a 'minimum benchmark' of -1% if the debt ratio is below 60% of GDP and -0.5% if it exceeds 60% of GDP.

Country-specific considerations may lead to a tighter MTO benchmark if the debt ratio to GDP is judged to otherwise fail to stabilize at 60% of GDP within a twenty years 'horizon. The MTOs are revised every three years based on the Commission's tri-annual 'Ageing Report', or if pension reform calls for a revised aging-provision.

Both the corrective and preventive arms contain rules for the adjustment of fiscal policies in case these appear off track. Accordingly, under both arms, member states are expected to adopt an adjustment path towards the relevant reference values.

3.2. What room for manoeuvre?

The analysis in section 2 indicated that many Eurozone countries – including notably France and Italy – need to cut their structural primary balance from their projected levels in 2023 to restore debt sustainability if real yields rise. However, this picture is incomplete in so far as, even with sustainable debt, compliance with the fiscal rules may not be secured. This turns out to be the case for the 60% debt rule in some countries, as noted, and it would be useful to examine to what extent this is also the case for the MTO rule, and how large a fiscal effort would be needed to secure compliance. This is done in two steps.

In a first set of computations, it is assumed that all countries adjust their primary balance so as to secure convergence towards a steady state debt of 60% of GDP. Some countries 'steady-state debt ratios outperform this rule under unchanged policy, hence they could *relax* their fiscal position by adopting a permanently smaller structural primary balance (or larger deficit). Although the 60% reference enshrined in the rule book is defined as a ceiling – not a target – it is still useful to examine how much leeway for additional borrowing a country potentially enjoys if its steady-state debt ratio is less than 60%.

The results are shown in Figure 7. In the baseline scenario eleven countries would have leeway for fiscal expansion relative to the 60% debt rule and hence could relax fiscal policy. However, if real bond yields increase by 400 bps from baseline, only a few smaller countries – the *Baltic states* as well as *Ireland* and *Luxembourg* – would be in that luxury position. All others would have to take action to keep the debt ratio converging towards a 60% steady state.

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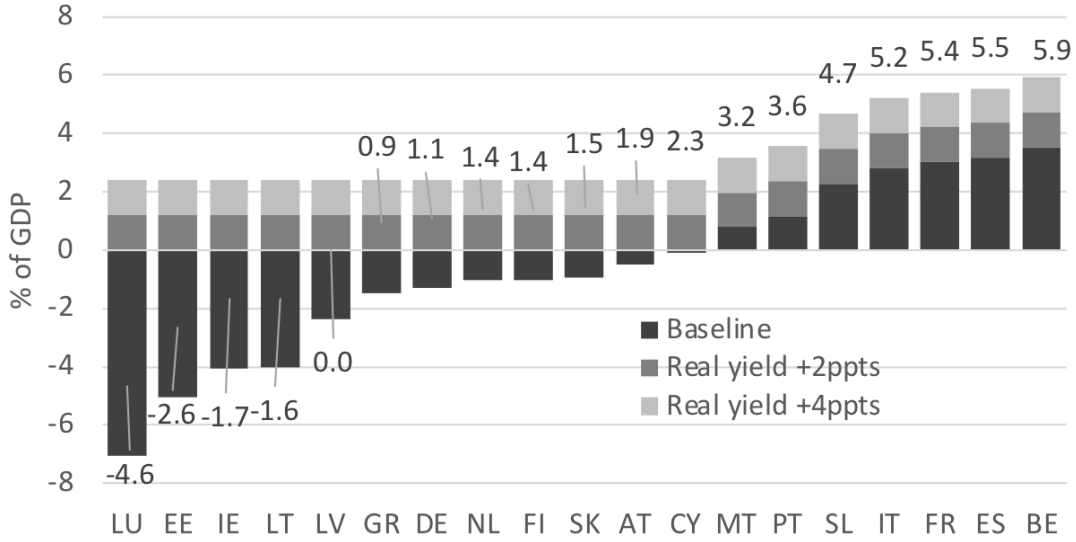
Figure 7: Fiscal effort required to ensure that debt converges to 60% of GDP



Source: Author's computations, based on European Commission (2021). The fiscal effort corresponds to the required (permanent) change in the primary balance as a per cent of GDP to ensure that the debt ratio converges to the 60% of GDP reference value. The numbers indicate the total effort needed if real bond yields are shocked by 400bps from baseline.

In a second set of computations countries are required to also comply with the MTO reference value, fixed at -1% of GDP (the -0.5% benchmark is ignored given that countries in this scenario are in compliance with the 60% rule). As shown in Figure 8, France and *Italy*, as well as *Greece* and *Belgium*, would have to increase their structural primary balance by more than 8 ppts of GDP – a Herculean fiscal effort. While the required fiscal consolidation is less onerous in the other countries, *Luxembourg* would be the only to escape the need to permanently raise the structural primary balance to secure compliance with the MTO rule.

In sum, while compliance with the 60% debt rule looks manageable overall, and in some cases even leaves leeway where debt is on track towards a steady-state equilibrium below 60% of GDP, compliance with the MTO rule looks much more problematic. In some cases – in particular *France* and *Italy* – a major fiscal effort would be necessary. This would require an extraordinary mobilization of political capital – potentially problematic as the energy transition will yet make another call on government budgets.

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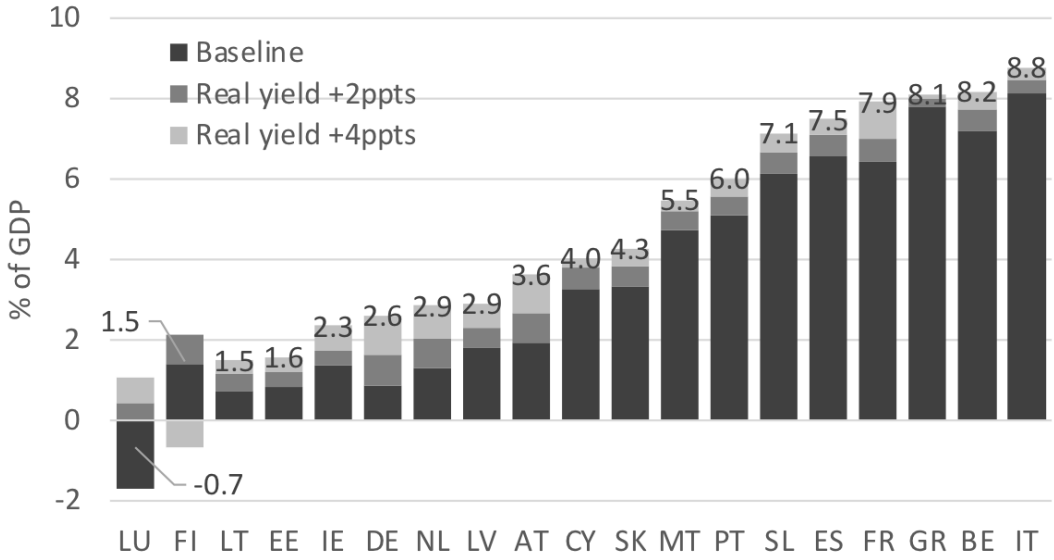
Figure 8: Fiscal effort required to ensure that net lending converges to -1% of GDP



Source: Author's computations, based on European Commission (2021). The fiscal effort corresponds to the required (permanent) change in the primary balance as a per cent of GDP to ensure that the structural deficit converges to the 1% of GDP reference value. The numbers indicate the total effort needed if real bond yields are shocked by 400bps from baseline.

3.3.Can the rules be reformed?

The analysis so far suggests that the MTO 1% of GDP ceiling for the structural deficit and the 60% debt rule are too tight from the point of view of long-run sustainability, which can be achieved at higher debt levels. A relaxation may thus be in order, as has also emerged from to the reform debate so far.

The reform proposals that have been put forward can broadly be grouped as follows:

1. Proposals to better root the rules in today's realities, such as low interest rates, the presence of backstops such as the European Stability Mechanism (ESM) and the lender-of-last-resort role of the European Central Bank established in the wake of the sovereign debt crisis, and to simplify them (Beetsma et al 2018, Eyraud 2018, Francová et al, 2021, Nielsen, 2021).

2. Proposals to move away from a rules-based approach to 'standards' for fiscal sustainability, while leaving countries more freedom to match these standards in a way they deem appropriate (Blanchard et al, 2021, Debrun and Reuter, 2022, Martin, P. et al, 2021). This is generally hoped to improve the 'ownership' of, and compliance with, the fiscal framework, while still leaving a role for surveillance and enforcement at the centre.

3. Proposals to create new public borrowing capacity at the center in the pursuit of a better mix of fiscal and monetary policies and stronger automatic fiscal

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stabilization in the face of symmetric or asymmetric shocks (D'Amico, L. et al, 2022, Codogno and Van den Noord, 2020, 2021 among others).

All these proposals have gained relevance as the energy transition moved centerstage. New borrowing capacity must be created, either nationally or supranationally, to finance the transition towards climate neutrality. How to do this, and what its numerical implications are, is the subject of the next section. Specifically, it looks at two options: an increase in the MTO structural deficit limit based on a *green golden rule* and the creation of a *European Climate Fund*.

4. Financing the European Green Deal

The European Green Deal launched in 2019 aims to cut the emission of greenhouse gasses by 50-55% by 2030 (as compared to 40% according to the Paris Agreement), and to achieve strict climate neutrality (no net emissions of greenhouse gasses) by 2050 (European Commission, 2019). There is a price tag attached to these ambitions: according to the European Commission the annual 'green' investment needed in the European Union would amount to €260 billion, or about 1.5% of GDP, of which two-thirds, or 1% of GDP, funded from the public purse. More recent estimates point to an even higher investment need (European Commission, 2020b, Baccianti and Steitz, 2022), though some of it funded by carbon taxation.

Environmental sustainability is a *sine qua non* for fiscal sustainability. Even so, while these thus need not be conflicting goals, 'green' public investment competes with other policy objectives, hence care must be taken that it be effective and efficient. The type of funding of green public investment also matters in this regard. The extent to which green public investment may be financed by debt – as opposed to tax increases or cuts in other ('grey') expenditure – is subject of debate (see for instance Darvas and Wolff, 2021). And so is the extent to which supranational (EU) policy should (co-)fund and issue debt earmarked for that purpose (see e.g. Garicano, 2022). There are valid rationales for both, revolving around intergenerational equity (future generations benefit from green investment today) and external effects (the impact of climate change does not stop at the border), but at the end of the day debt must be repaid. But before getting to these issues, the green investment needs must be quantified per country.

4.1. Measuring the green investment gap

After the Commission released its estimates of the (public) green investment gap, others have looked at this in more detail. Baccianti and Steitz (2022) estimate the public green investment gap at 1.7% of GDP per annum. Assuming that around 0.6 percentage points would be financed from the proceeds from carbon taxes, this would leave a green public funding gap of 1.1% of

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GDP annually – broadly in the ballpark of the Commission's estimates and another recent estimate by Darvas and Wolff (2021).

There are, however, likely to be noticeable differences between countries, reflecting their patterns of energy consumption and efficiency levels. Baccianti and Steitz (2022) suggest that these can be reasonably well approximated based on countries 'carbon emissions. Applying this approach, using the latest available data at the World Bank for CO_2 emissions in metric tons *per capita* in 2018, the results depicted in Figure 9 indeed show quite marked differences across countries. For instance, *France* prints a relatively modest green public investment need of around 0.7% of GDP per annum, helped by its strong reliance on nuclear power. Needs are even smaller in *Malta* and *Lithuania*. By contrast, the *German* and *Dutch* green public investment needs are a whopping 1.5% of GDP per annum, and around 2% of GDP per annum for *Estonia* and *Luxembourg* (although the latter country's score would be closer to average if based on the carbon emissions per unit of GDP, reflecting its atypical output mix).

How to finance these needs? A new source of (partial) funding of green public investment has become available via New Generation EU (NG-EU), adopted in response to the pandemic in 2020. This package provides funding in the form of grants and loans allocated to EU member states, spread out over the period 2020-2027, with the largest contributions allocated to the countries that are most hit by the pandemic (for instance due to their dependence on tourism, see Codogno and Van den Noord, 2022). Part of these funds are earmarked as EU co-financing of green investment projects.

It is not known with certainty what part of NG-EU funding will be allocated to green public investment (plans adopted to date add up to roughly 1.5 % of EU GDP until 2027, see European Commission, 2022). From the point of view of debt sustainability only the *grants* allocated by NG-EU are relevant. NG-EU *loans* add to national public debt and are therefore are meaningless from the point of view of debt sustainability (which may explain why the take-up of NG-EU loans has disappointed so far as these come with conditionality and 'stigma 'effects).

Assuming as a first approximation that half of NG-EU grants are earmarked for green public investment (officially at least 37% of NG-EU funding should be earmarked for climate spending), NG-EU support for green investment would amount to about 0.3% of GDP on aggregate. However, as shown in Figure 9, the allocation of funds would be biased towards the southern European countries as these receive the largest grants from NG-EU, while these are not the largest carbon emitters. Conversely, the northern countries receive the smallest grants from NG-EU. This produces a mismatch in the sense that, generally speaking, countries with the largest green public investment needs receive the smallest NG-EU grants and vice versa. This leaves large 'net 'green investment gaps (after subtracting NG-EU grants) for some

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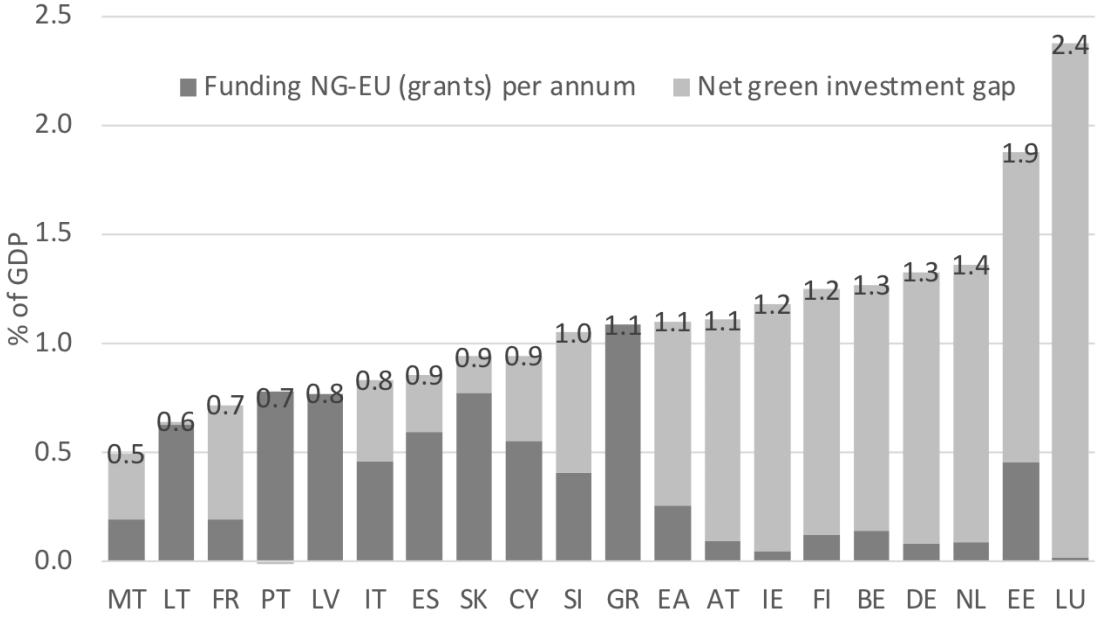
(northern) Eurozone countries, in particular *Austria*, the *Benelux countries*, *Finland*, *Germany* and *Ireland*. By contrast, comparatively small 'net 'green investment gaps result for *France*, *Italy*, *Spain* and several other smaller (mostly southern) Eurozone countries.

As noted, NG-EU is set up as a temporary facility, but in the computations presented below it is assumed that the part of NG-EU funding allocated to green public investment will be made permanent, broadly in line with the intention to allocate around 0.25% of GDP of the EU budget to co-funding of green investment under the European Green Deal (European Commission, 2020a). This would leave a net public green investment gap to be funded by member state budgets of 0.8% of GDP per year.

All in all, the net green public investment gap (the difference between the investment need and the receipt of NG-EU grants) is quite unevenly distributed, with northern member countries portraying the largest funding gaps and southern countries the smallest ones. This means that low carbon emitters are rewarded while high carbon emitters are penalized.

Figure 9: The public green investment gap



Sources: Codogno and Van den Noord (2021), authors' computations. The numbers indicate the gross green investment gap, before subtracting funding contributions from the EU.

4.2.A green golden rule

From the point of view of intergenerational equity, it may be reasonable to finance at least some of the net green public investment gaps by issuing new debt. As always, there is risk associated with higher debt, reflected in higher sovereign bond yields and lower potential economic growth. How much fiscal risk is acceptable to reduce environmental risk is ultimately a political trade-off.

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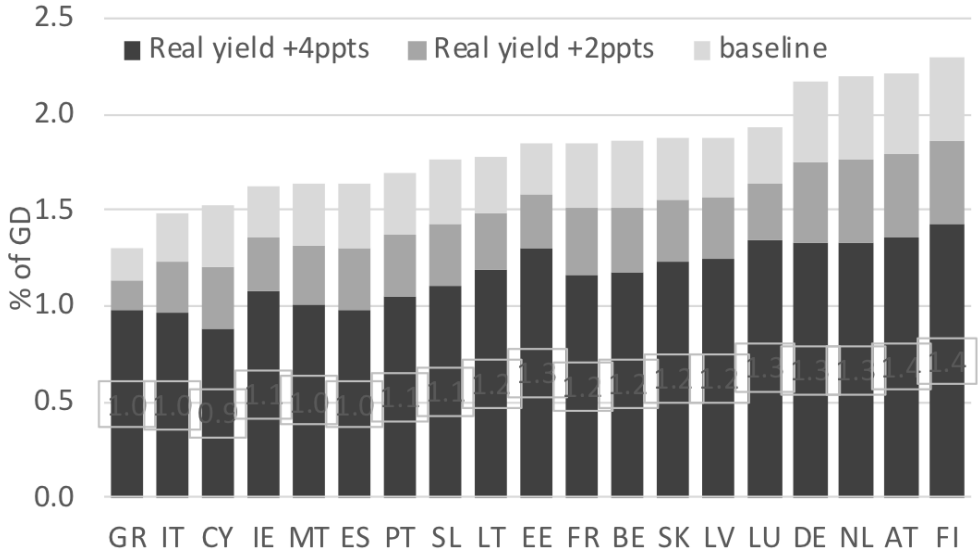
As noted, the net green investment gap is estimated to be of the order of 0.8% of GDP per annum, with significant differentiation across countries, reflected in a standard deviation of 0.6% of GDP. This suggests that a *green golden rule* allowing countries to increase their MTO by 1 percentage point of GDP to help fund their net green investment gap should, at least in aggregate, be more than sufficient, but for some (the largest carbon emitters) it would fall short of their funding need. Obviously, this comes with a higher debt ratio to GDP in the long run. Therefore, an additional constraint is adopted, which is that the equilibrium or steady-state debt ratio should not be allowed to exceed 60% of GDP.

The results are presented in Figure 10, which shows the reduction in the 'fiscal effort' (permanent increase in the primary balance as a per cent of GDP) under a green golden rule. This computation is done, as before, for three scenarios for real bond yields: baseline (no change from 2020, bond yields shocked by 200bps and bond yields shocked by 400bps). The main result emerging from Figure 10 is that the effective fiscal space created by the adoption of a green golden rule generally exceeds the allowable increase in the structural deficit. This 'multiplier effect' stems from the fact that – except in the case where real bond yields are assumed to increase by 400bps from baseline – the growth-yield differential would remain negative. Only if real bond yields are shocked by 400bps from baseline the fiscal space created by the green golden rule broadly matches the green public investment gaps, at least on aggregate.

Figure 10: Extra fiscal space liberated by a green golden rule



Source: author's computations. Fiscal space liberated is defined as the reduction in the required fiscal effort relative to what would be needed to maintain a structural deficit of -1% of GDP owing to the adoption of a green golden rule allowing a structural deficit of -2% of GDP. The numbers indicate the fiscal space liberated when real bond yields are shocked by 400bps from baseline.

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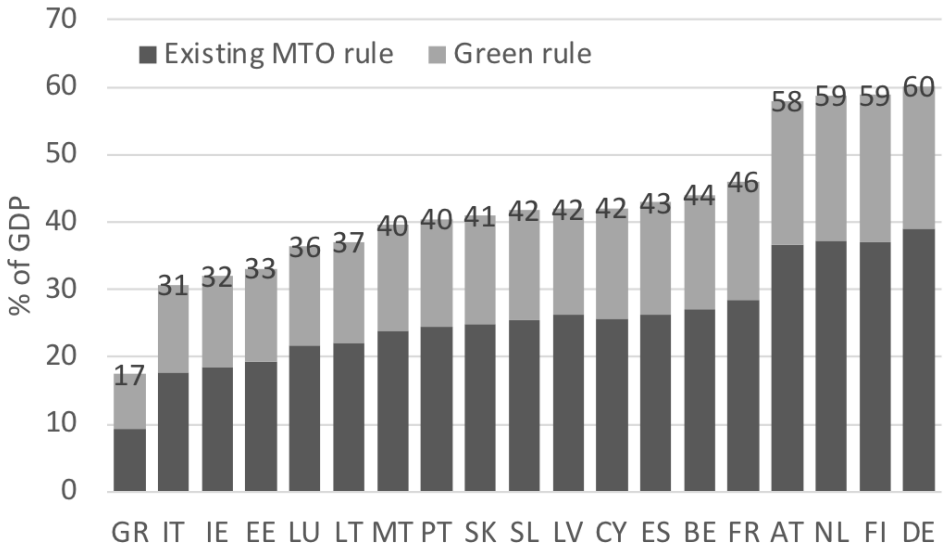
Importantly, as shown in Figure 11, in none of the Eurozone countries would the adoption of a green golden rule raise the equilibrium debt ratio to above 60% of GDP. Moreover, two other interesting features emerge from Figure 11. First, this result is independent of the assumptions adopted for real bond yields, because of the way the constraint (structural deficit is fixed as a per cent of GDP) is formulated. Specifically, the increase in the real bond yield would be exactly offset by the required reduction in the primary deficit, hence the equilibrium debt ratio would not be affected by the shock to the real bond yield. Second, the equilibrium debt ratios – both under the MTO and the green golden rule – tend to be the lowest in the countries that currently have the highest debt ratios, owing to their much higher than average primary surplus needed to offset their comparatively high interest payments.

Figure 11: Equilibrium debt ratio under MTO and a green golden rule



Source: author's computations. MTO implies a structural deficit of 1% of GDP and the green golden rule a structural deficit of 2% of GDP. The numbers indicate the steady state debt ratios consistent with the green golden rule.

The decrease in the fiscal effort (or additional fiscal space) associated with the adoption of a green golden rule can thus be used to help finance the net green investment gap identified above. However, if the former exceeds the latter, there is a net gain for the country concerned it can use to cut taxes or raise other forms of expenditure. Otherwise, there is a net loss which the country concerned would need to finance by cutting conventional spending or raising taxes.

These net losses and gains are shown in Figure 12. It indicates that with real bond yields shocked by 400bps there would be enough fiscal space to fund the net green investment gap in all but one (*Luxembourg*) Eurozone countries. Specifically, with real bond yields increasing by 400 bps, in *Belgium*, *Germany*, *the Netherlands*, *Ireland* and *Estonia*, the adoption of a green golden rule would almost exactly match the net green investment need. Other Eurozone member states would create more fiscal space than needed under a green golden rule, so receive

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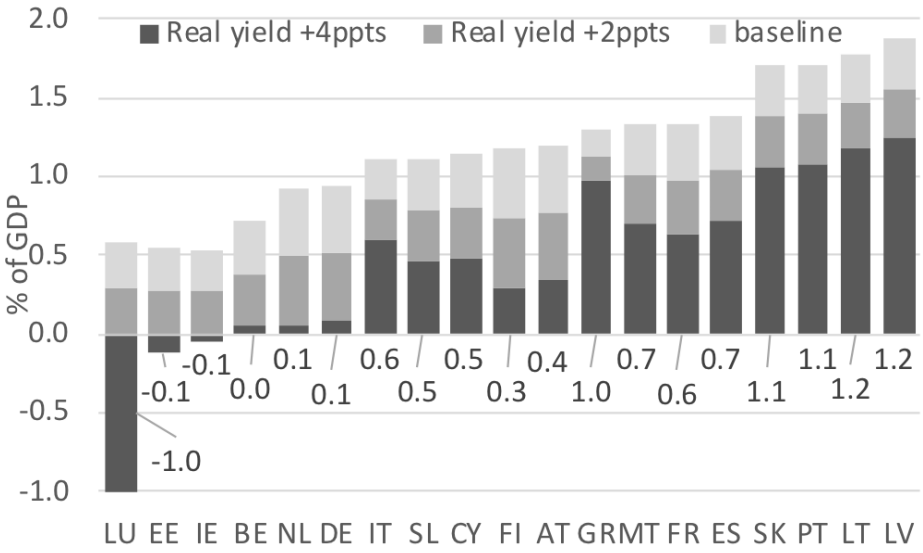
a ‘reward ’for being low green-house gas emitters, while Luxembourg would be ‘penalized ’for its emission performance.

Figure 12: Difference between fiscal space created by the green fiscal rule and the green investment gap



Source: author’s computations. The green golden rule implies an increase in the structural deficit by 1% of GDP in the steady state relative to MTO. The chart shows the reduction in the required fiscal effort as a result of adoption of the green golden rule less the net green investment gap for different scenarios for bond yields. The numbers below the bars indicate the result for the scenario in which real bond yields are shocked by 400bps relative to baseline.

All in all, under plausible assumptions for economic growth, real bond yields, the size of the green public investment gap and the degree of co-funding of this gap under NG-EU, a green golden rule allowing countries to run a structural budget deficit of up to 2% of GDP in the long run (as opposed to 1% of GDP according to the existing rulebook) would provide ample room to finance the European Green Deal while still respecting the 60% debt rule. It also allows low carbon emitters to use more debt funding for non-climate spending. However, from a point of view of setting the incentives for abatement right, some degree of (conditional) redistribution to high carbon emitters may be advisable. This is where a *European Climate Fund* could play a useful role.

4.3.A European Climate Fund

Since the appetite for a change in the fiscal rule book among member countries of the Eurozone appears small, it may prove practical to resort to supranational sources of funding instead, emulating the success of New Generation EU. There is also a more fundamental rationale for such supranational funding of the European Green Deal, which is three-pronged (Beetsma et al 2021):

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1. The energy transition has important cross-border spillover effects and therefore these effects can be seen as positive externalities. And where there are positive externalities there is a risk of under-investment if this is left to national governments alone.
2. Many green investment projects by their nature – like building a high-speed railway network, power grids with sufficient capacity to transport the electricity generated by renewable energy or infrastructure for hydrogen (produced by renewable energy to replace carbon energy) – potentially benefit from important economies of scope and scale, that can be fully exploited only if coordinated at the supranational level.
3. The EU can borrow in the market at more favourable terms than at least some member states. Hence, channelling European Green Deal spending through a supranational budget may yield a substantial reduction in the cost of funding.

An additional motivation for a European Climate Fund could be that it enables the redistribution of funding towards countries most in need of abatement. Accordingly, assuming the European Climate Fund would offer funding to match the net green investment gap in each country, Figure 13 shows how large the Fund would turn out to be in the long run steady state, with otherwise unchanged assumptions. Specifically, if real yields were to rise by 400 bps from their recent lows, the Fund would converge to about 18% of GDP. This would be including the funding of grants provided by NG-EU for green investment projects. If real yields were to rise by only 200bps, the Fund would stabilize at 14% of GDP and at 11% of GDP in the baseline case.

How such a supranational borrowing arrangement would be governed and whether it should be restricted to the Eurozone or the whole of the EU is an open question. Note though that calls to create a Eurozone fiscal capacity have become louder and that a European Climate Fund may serve as a stepping stone in that direction. This means that a European Climate Fund ideally comprises the countries of the Eurozone (though other EU countries could participate or benefit from a similar but separate arrangement).

A mixed approach, whereby part (say half) of the net green investment gap is funded by a European Climate Fund and the remainder is funded at the national level via a green golden rule, would also be an option. In that case the Fund could be half the size computed here while the green golden rule would imply an increase in countries ’MTOs by 0.5% of GDP instead of 1% of GDP to fund the remainder of their net green investment gaps. Such a mixed approach would have the advantages of securing a certain degree of incentive compatibility and the pursuit of supranational economies of scale and scope, while containing potential moral hazard associated with a relaxation of the fiscal rules.

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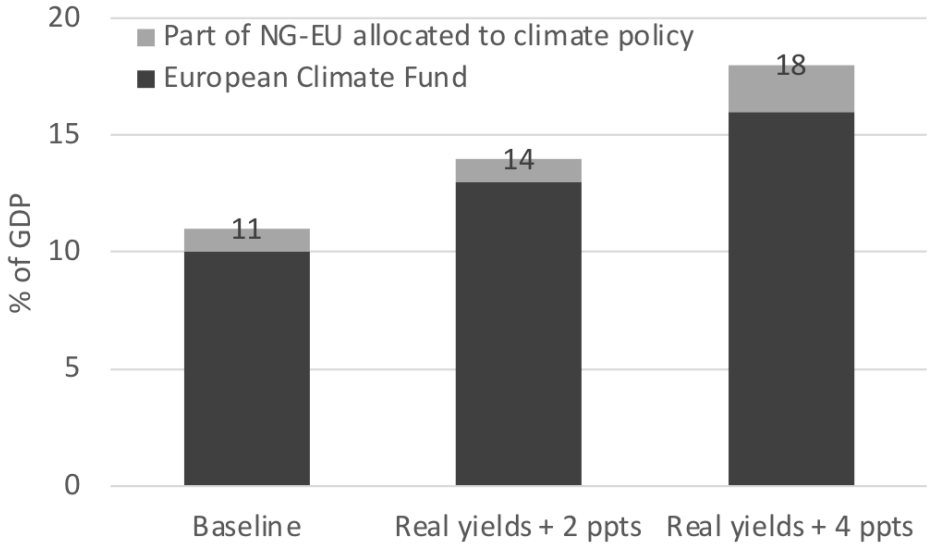
Figure 13: A European Climate Fund



Source: author's computations. The numbers indicate the size of the European Climate Fund including NG-EU climate policy funding.

5. Conclusions

While the projected debt ratios to GDP in 2023 in most Eurozone member states appear to be sustainable if real bond yields revert to their recent lows, the risk is growing that interest rates move permanently to a higher level. For instance, if real rates were to permanently increase by 400 basis points from their recent lows (meaning that they on average would return to their historical average of the period 2000-2015), major fiscal consolidations look inevitable in about half of the Eurozone member states, including notably France and Italy.

Worse yet, even if such consolidation sufficed to render debt sustainable, most Eurozone countries would still fail to comply with the 60% of GDP debt ceiling and the 'Medium Term Objective '(MTO) benchmark for the structural fiscal deficit of 1% of GDP. Achieving these objectives would require yet additional major fiscal consolidation efforts.

How to match this reality with the need to finance the climate transition? Two possible routes are explored. One is the adoption of a 'green golden rule', with the structural deficit limit (MTO) increased by 1% of GDP. Alternatively, new borrowing capacity could be created at the centre through a 'European Climate Fund'.

Under plausible assumptions for economic growth, real bond yields and the amount of green public investment required to achieve the goals of the European Green Deal, a green golden rule, allowing countries to run a long-run structural budget deficit of up to 2% of GDP (as opposed to 1% of GDP according to the rulebook), would provide ample room to finance the European Green Deal while still respecting the 60% debt rule.

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Alternatively, if countries' green public investment gap is financed by a supranational European Climate Fund, supranational debt would stabilise at up to 20% of Eurozone GDP. A combination of these two approaches – a green golden rule and European Climate Fund each providing half of the funding need – would combine the advantages of incentive and externality compatibility while containing the moral hazard of relaxing the fiscal rules.

With the Russian invasion of Ukraine, the reduction of the dependency on fossil fuels has morphed from a longer-term challenge into an acute need. Climate, fiscal and geopolitical risks always need to be weighed against each other, but the terms of the trade-off have taken a dramatic turn. Time is running out.

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