Luiss
School of European Political Economy

Assessing Next Generation EU

Lorenzo Codogno and Paul van den Noord

Working Paper 9/2020

LUISS

November 30, 2020

Assessing Next Generation EU*

Lorenzo Codogno** and Paul van den Noord***

Abstract

The unprecedented fiscal package adopted by the European Council in the summer of 2020 —dubbed Next Generation EU—is vital for the recovery of the euro area from the pandemic shock. However, there are risks that targets will not be met and that it may prove difficult to muster the same degree of European 'solidarity' in the future. Computations with a stylised macroeconomic model indicate that an alternative approach, with ex ante risk sharing through the creation of a Eurobond and permanent fiscal capacity at the centre, would be at least as powerful, yet it would be more sustainable, automatic and timely.

Keywords: Fiscal policy, Business fluctuations, Safe sovereign assets, Fiscal capacity

JEL Classification: E32, E63, F33

* Paper prepared for the workshop 'The EU in a Globalised World', 30 November - 01 December 2020, organised by the EU-Asia Institute, Angers, France. Highlights from this paper appeared earlier on https://blogs.lse.ac.uk/europpblog/2020/10/07/assessing-next-generation-eu/.

** **London School of Economics and Political Science**
Email: l.codogno@lse.ac.uk

*** **Amsterdam School of Economics**
Email: p.j.vandennoord@uva.nl

1. Introduction

The magnitude of the Covid-19 shock to the European and global economies is unprecedented in post-war history, dwarfing the impact of the financial crisis that erupted a decade ago and that was already of historic significance. The OECD, for instance, currently expects the Eurozone economy to shrink by 7.9% in 2020, almost twice the contraction in 2009 (OECD 2020). The mechanisms through which the pandemic has affected the economy are multiple, including sharp increases in uncertainty, falls in certain strands of household consumption, the disruption of supply chains and the devastating impact of policies to stem the pandemic, such as social distancing, lockdowns and travel bans. The recession after the financial crisis could also be described as the result of demand shocks stemming from a major deleveraging effort by households, governments, banks and businesses. The pandemic is affecting the economy both through demand and supply shocks striking at the same time.

The macroeconomic policy responses to mitigate the economic impact of the pandemic have been equally unprecedented, however, both in Europe and globally. In Europe, policy action at both the national and supranational levels involved state guarantees on bank loans, compensations for income losses for the most heavily affected entrepreneurs and workers, and the postponement of tax collection. Alongside national fiscal policy relief, the pandemic prompted unprecedented action also at the EU level. Most significantly, the Covid-19 pandemic broke the taboo on a pan-European fiscal policy, dubbed 'Next Generation EU' (Verwey, Langedijk and Kuenzel, 2020). For the first time in the history of the EU, large scale bond issuance at the centre is used to finance top-down grants and loans to national governments.

The literature on the impact of the pandemic and the ensuing policy responses is rapidly expanding. Still, so far there has been no strong focus on estimating the pandemic's effect on the Eurozone economy. Its hallmark is the centralisation of monetary policy with an incomplete banking union and a large degree of fiscal policy autonomy (though subject to coordination). The vulnerabilities in this set-up are well known, including the risk that fiscal and banking distress can be mutually reinforcing and that a lack of fiscal capacity at the centre leads to an excessive (and politically contentious) reliance on monetary policy.

Many calls have been made for Eurozone reform, including the creation of a European safe asset to replace national sovereign bonds in their role as collateral for banks in repos and inter-bank loans (Alogoskoufis and Langfield 2019, Bénassy-Quéré et al 2018, Leandro and Zettelmeyer 2018). Proposals have also been put forward to create a fiscal capacity at the centre of the euro area to finance deficit spending (Arnold et al. 2018). It is a version of the latter proposal that now appears to be materialising in response to the pandemic. However, the approach is ex post, ad hoc, and geared towards (politically contentious) fiscal transfers between Member States. The central tenet of the present paper is that now there is an opportunity to develop a framework for ex ante risk sharing which would contain the need for fiscal transfers. The creation of a safe asset, based on the new bonds issued by the EU in response to the pandemic, is a key element of this alternative proposal.

The paper is set up as follows. Section 2 briefly reviews the policies that have been adopted in the EU/Eurozone to mitigate the macroeconomic impact of the pandemic, including Next Generation EU. In Section 3 we develop the case for an alternative approach in which, at least in the Eurozone, ex-post risk-sharing (whereby the EU funds transfers to the most hard-hit countries) is replaced with a system of ex-ante risk-sharing built into the governance framework of the Eurozone – with an essential role for a single safe asset. In Section 4, we tentatively quantify the differences in impact responses between these two approaches in the face of the pandemic shock, using a stylised calibrated macroeconomic model for the Eurozone (reported in the Annex). Section 5 concludes the paper.

2. Policy responses to date

On 21 July 2020, the European Council adopted a €750bn package (around 7% of the EU's GDP) to allocate funding to governments in distress due to the pandemic. The novelty of the package is its financing, which is based on the issuance of EU bonds against the EU budget, with the debt servicing funded by (a slightly increased) EU budget. Although the programme is not yet finalised, it is set to contain the following elements:

1. The bulk of the fiscal expansion is provided in the form of grants and loans to Member States by the Recovery and Resiliency Facility (RRF) amounting to €312.5 and €360 billion, respectively, summing up to roughly 5% of the EU's GDP. While the exact parameters depend on GDP and unemployment in 2020-21, the intention is to spread out the transfers over the 2021-2026 period, with the biggest part of the support going to those countries that have been hit the most by the crisis.

2. Alongside the RRF, Member States would receive €77.5 billion in a range of other programmes, of which €47,5 are for 'ReactEU' and €10bn for the 'Just Transition Fund'. All other programmes, which include Horizon Europe, InvestEU, Rural Development, RescEU, amount to €20bn.

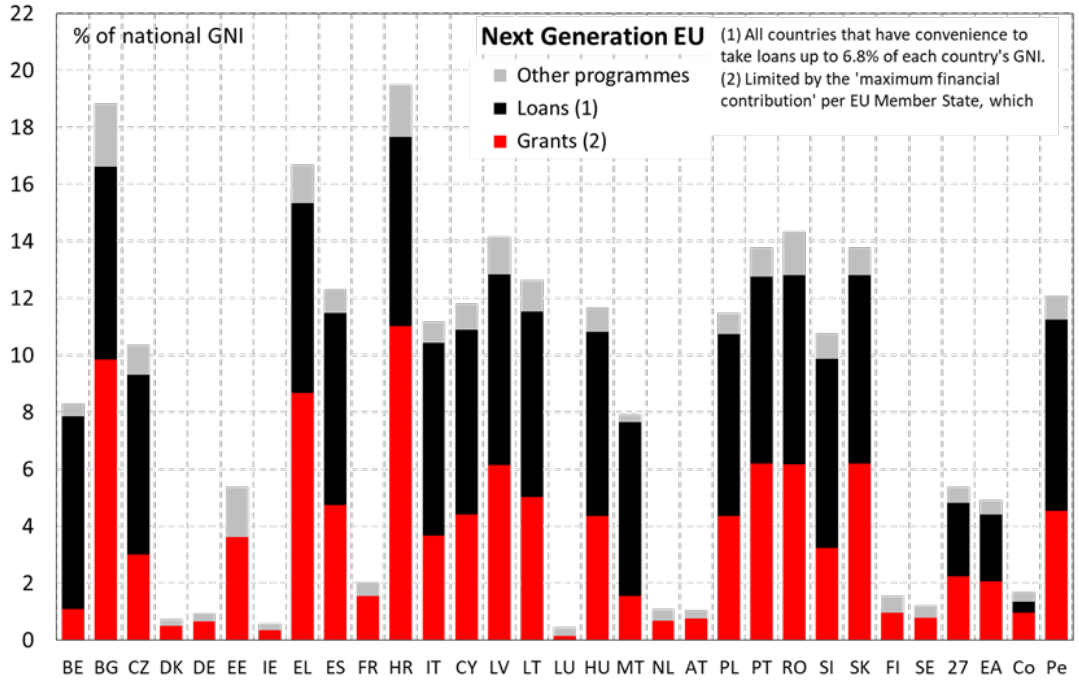
This package came on 23 April after the European Council adopted a €540bn package (around 5% of GDP), comprising up to €100bn for a European unemployment fund ("SURE"), €200bn worth of SME loans by the European Investment Bank (EIB) and a €240bn credit line made available by the European Stability Mechanism (ESM) for funding health-related expenditure. These amounts are envelopes, and not all the amounts may be taken up. This, in turn, came on top of massive national fiscal stimulus, with discretionary measures of about 4.5% of the EU's GDP, and broadly in line with the Eurozone (EU Commission, 2020).

As noted, the bulk of the funds are channelled through the Recovery and Resilience Facility. Each country has a right to claim a fraction of the total pot for grants and loans, based on a prior agreed formula relying on a set of objective indicators. Figure 1 depicts the allocation of Next Generation EU funding throughout the Member States, broken down into grants and loans. Figure 2 shows the estimated Next Generation EU cash flows over time, together with

the cash flows from the European Commission's Support to mitigate Unemployment Risks in an Emergency (SURE) programme and the support from the European Stability Mechanism (ESM), if it is activated.

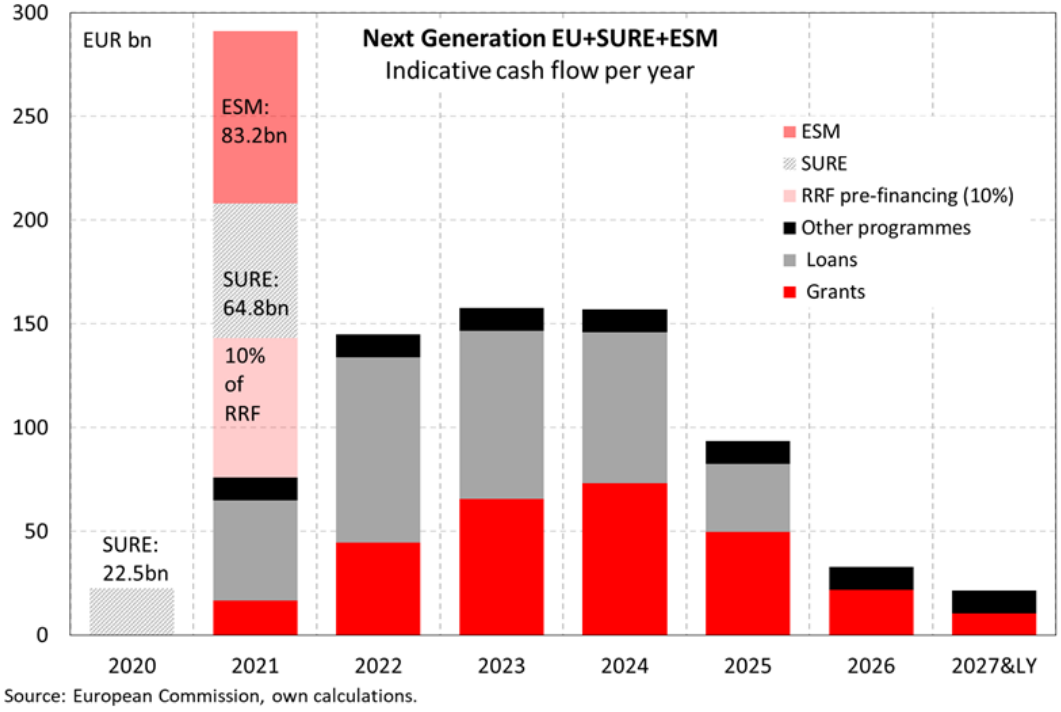
Next Generation EU is a commendable endeavour. It aims to boost public investment with a three-pronged objective: (i) to boost aggregate demand; (ii) to support the most hard-hit countries in the pursuit of cohesion; and (iii) to strengthen the economic growth potential of the Union (e.g. Verwey et al. 2020, European Commission 2020a, 2020b, European Council 2020). Indeed, Next Generation EU is about more than just supplementing demand in the short and medium run. It is the EU's 'Roosevelt moment' (Codogno, 2020), not only aiming to compensate the near-term collapse in demand, but also promoting deep structural reforms and reallocating resources to raise the economy's growth potential and achieve common policy objectives such as climate control.

Figure 1: **Next Generation EU – allocation across Member States**



Source: European Council, European Commission, own calculations.

Figure 2: **Next Generation EU – allocation over time**



Source: European Commission, own calculations.

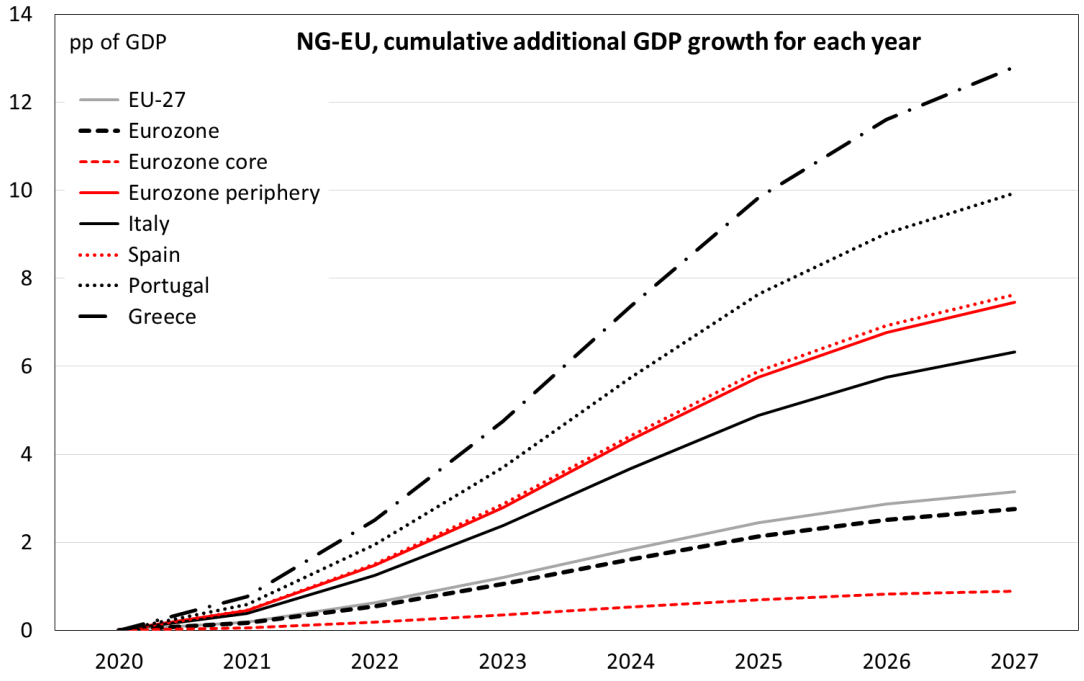
It could be argued that it is more of a medium-term project and it has no ambition as a means of macroeconomic stabilisation. This latter function is left to national budgets instead and is helped by the suspension of budgetary rules. Yet, in the Recovery and Resilience Facility, the word 'Recovery' stands for macro stabilisation support, although not as timely as it would be desirable in the current circumstances.

The pandemic can be seen as an example *par excellence* of a common shock hitting the 'periphery' of the Eurozone asymmetrically more strongly than the 'core' in a context where the former was already more vulnerable than the latter. In such an environment, monetary policy can only partially absorb the shock, while debt sustainability concerns heavily constrained fiscal policy in the periphery. The standard policy prescription – reforms of product and labour markets in the pursuit of smooth adjustment, and fiscal consolidation to build up fiscal buffers – cannot be used to address the acute emergency either.

Against this backdrop, the New Generation EU approach appears as a rational response. Using conservative assumptions on the multiplier effects, we estimate the impact on Eurozone economic growth to be a cumulative 1.5% by 2023 and 3.0% by 2027 (Figure 3). Most of this will benefit the Eurozone periphery, where the cumulative effect could be as large as 4% by 2023 and well over 8% in 2027.[1]

[1] Core includes Belgium, Germany, France, Netherlands, Austria, Finland, Luxembourg, Estonia and Ireland. All other Eurozone countries are included in the periphery.

Figure 3: Next Generation EU -- estimated multiplier effects



Source: European Commission, European Council, own calculations.

Yet, the approach is subject to several risks, which are common to most EU policy initiatives that rely on countries submitting their own plans (even when subject to coordination such as the European Semester), and of which some are acknowledged to have long plagued the effectiveness of EU projects (see Beetsma, Codogno and Van den Noord 2020):

- The additionality of the plans may turn out limited as countries use EU funds to finance existing projects or projects that would have been undertaken anyway. In that case, support funding can, at the most, limit the deficit/debt increase of countries with limited fiscal space, or simply represent cheap funding in the case of loans.

- Countries could shun the take-up of conditional loans, preferring grants and market loans without strings attached. The latter are cheap even for the worst affected countries owing to the ECB's quantitative easing and the indirect effects of the common bond issuance of the EU package itself.

- Countries have limited administrative absorption capacity of projects: experience shows that money is left on the table because countries are unable to initiate adequate proposals which, at any rate, may clash with capacity constraints among private contractors or crowd out other viable activities.

- Countries may be tempted to channel EU funding to social transfers or tax cuts or to launch pet infrastructure projects that are not financially viable, which may result in a waste of resources.

- Spreading funds too thinly over small projects without a common strategy could lead to resources being misallocated or again wasted.

Because of the bottom-up planning and submission of projects, and the desire to leave ownership to the Member States, EU-wide projects are unlikely to be of sufficient weight. Therefore, the spillover effects inherent to large EU-wide infrastructure projects may be small as well. Sometimes, the scale of such investments may be too large for national administrations to handle on their own. Not only do individual countries fail to internalise positive spillovers, but they also find it inherently complicated to work together on large trans-border projects. In a way, the subsidiarity principle would argue for the top-down, rather than bottom-up, approach in the case of large infrastructure projects.

3. An alternative approach

All in all, Next Generation EU, in combination with the spring package and the national fiscal policies, looks set to provide major relief to absorb the pandemic shock, at least over the medium run, notwithstanding our reservations. But it comes with a price, which is of a political economy nature. Specifically, the policies currently in place rely to a large extent on ad hoc transfers from the core to the periphery via the EU budget. This is not something that can be easily replicated in future calamities – be they a next pandemic, a migration crisis or a climate catastrophe. Our alternative proposal laid out below, in contrast, being largely rules-based and relying on (ex-ante) risk-sharing so as to stem the 'doom loop', may be more sustainable. This is the primary motivation for our approach, which contains the following elements:

1. A 'safe asset' is issued at the centre and underpinned by a stable revenue source, i.e. a proper central tax base or an obligation of national governments to secure a predictable revenue flow to the centre. According to our proposal the amount issued should immediately reach at least 30-40% of the EU's GDP. Then, it is swapped at market prices for national sovereigns on the balance sheets of banks. It replaces national sovereign bonds in their role as collateral for banks in repos and inter-bank loans. Moreover, the safe asset enjoys exclusive eligibility for ECB asset purchases. It thus replaces national sovereign bonds on the ECB's balance sheet. To allow proper price discovery, a sizeable enough new issuance of the safe asset will precede the swap operation.

2. The safe asset receives seniority over national sovereign bonds. This also ensures that it is seen as an attractive investment for banks. The profit banks generate by the sale of sovereign bonds is allowed to be spread over several years. This is to smooth the transition to a bank business model that no longer relies on carry trades with sovereign bonds and to allow sufficient time for banks to achieve higher profitability from other sources. The swap operation would not imply any fiscal transfer. The ECB would enable banks to close in advance their financing operations to offset the selling of national sovereign bonds on their balance sheet.

3. Beyond the issuance of the safe asset to purchase national sovereigns, the role of the central fiscal capacity could be expanded to allow borrowing for the purposes of fiscal

stabilisation policy. The ECB would be allowed to purchase the safe asset in the secondary market, as is already the case for debt issued by supranational EU agencies (such as the ESM). This would underpin the safe asset's role as a liquid, risk-free benchmark.

As noted, the total amount of safe assets needed to purchase national sovereigns in the hands of the ECB and on the balance sheets of the banks would be at least 30-40% of GDP. This implies that, on average over the cycle, the issuer of the safe asset would need a revenue flow roughly in the range of 0.5% to 1.0% of GDP, the bulk of it being covered by interest receipts on the national sovereigns owned at the centre.

The additional issuance of the safe asset in bad times to fund deficit spending at the centre depends on the depth of the slump. It could – according to the model simulation discussed below – be in the range of 5% to 10% of GDP in the current exceptional circumstances. If this were repaid over a period of ten years, it would require an additional annual revenue flow to the centre in the range of 0.5% and 1% of GDP, given that the yield would be low in today's conditions.

Aside from the stabilisation effects of this package (see below), the financial and policy landscape of the euro area would permanently improve. The replacement of national sovereigns with a safe asset on banks' balance sheets serves to break the 'doom loop' between the cost of bank funding and sovereign yields in the euro area 'periphery'. With the safe asset enjoying exclusive eligibility for the purposes of quantitative easing, the ECB would obtain a monetary policy instrument that does not interfere with national fiscal policies via national sovereign debt purchases. Moreover, as large amounts of national debt are swapped with safe European-level debt, the default risk at the national level is reduced, with fewer calls on rescue programmes.

4. A numerical comparison

We use a stylised macroeconomic model (see Annex) to compute the impact of the pandemic and policy responses thereupon over the medium run. The model distinguishes two economies, 'core' and 'periphery', with the latter prone to financial instability due to high public debt – much of it owned by local banks alongside loan books whose quality is (also) questionable. This gives rise to an adverse feedback loop between high public debt and weak banks, usually referred to as the 'doom loop'. Importantly, this mechanism gives rise to asymmetries in shock-responses, even in the case of a symmetric shock, with the 'periphery' more adversely hit. As explained in the Annex, the model parameters are calibrated on the basis of empirical findings in the mainstream literature and as such, not controversial. Even so, the model is necessarily a simplification of reality. Hence the numbers should not be taken as precise estimates but rather as broad indicators of the direction and order of magnitude of the effects.

In Section 4.1, we present the computed shock responses with regard to the actual policies (national and supranational) that were put in place in the Eurozone in the spring. We proceed

in two steps, broadly reflecting the chronology of events. First, we look at the impact of the outbreak and both the national and pan-European responses which were shaped during the initial stages of the outbreak, including domestic fiscal stimulus, SURE, the ESM credit line as well as the ECB's monetary policy response. This is labelled as 'scenario I'. Next, we ship in Next Generation EU alongside the shocks and measures mentioned above, with the results marked 'scenario II'.

The thrust of the findings is that the initial policies embedded in Scenario I fail to sufficiently mitigate the impact of the shock and that Next Generation EU, therefore, proves vital. However, as discussed in Section 4.2, better outcomes could be achieved by the approach laid out in Section 3 in which an alternative macroeconomic policy and governance framework is assumed, labelled 'Scenario III'. Specifically, in light of the discussion in Section 3 we assume (i) a single Eurobond to replace national bonds on banks' balance sheets so as to break the link between banking and sovereign distress, (ii) Eurozone fiscal capacity, including automatic stabilisers and discretionary (but rules-based) policy, and (iii) a new quantitative easing (QE) scheme that mandates the ECB to purchase Eurobonds (while national sovereigns lose QE eligibility and those still on the ECB's balance sheet are swapped for Eurobonds as well).

The results are reported in Table 1 and Figures 4 and 5, which show the cumulative impact of the shocks or policies in the medium run relative to a steady-state baseline without shocks or changes in policy stances.

Table 1: **Impact-responses**

	Actual Policy				***Actual Policy***		
Scenario	***I***	***II***	***III***	***Scenario***	***I***	***II***	***III***
Output (%)				***Primary deficit ratio (%-pts)***			
Core	-9.0	-3.1	-0.5	Core	9.7	6.2	5.3
Periphery	-14.4	-2.8	-3.3	Periphery	11.5	5.3	5.1
Aggregate	-11.7	-2.9	-1.9	Central	0.4	3.6	4.0
Inflation (%)				***Debt ratio (%-pts)***			
Core	-1.0	0.5	1.1	Core	14.7	7.9	7.9
Periphery	-3.4	2.4	2.1	Periphery	36.0	11.2	9.9
Aggregate	-2.2	1.4	1.6	Central	0.4	6.4	6.9
Yields (%-pts)				***Fiscal stance (%-pts)***			
Core	0.1	-0.1	0.4	Core	5.2	4.7	5.2
Periphery	4.9	0.0	1.3	Periphery	4.3	3.9	4.3
Central	2.4	-1.6	-1.0	Central	0.4	3.6	3.6
Bank credit (%)				***Monetary policy (%-pts)***			
Core	-9.2	-1.9	2.9	Policy rate	-0.3	-0.3	-0.3
Periphery	-38.4	1.0	2.6	Asset purchase	24.6	24.6	12.3

Note: Scenarios refer to: *I* = National fiscal responses + SURE + ESM credit line + monetary policy, *II* = *I* + 'Next Generation EU', *III* = Safe asset + permanent fiscal capacity.

4.1 Actual policy

The first column in Table 1, labelled 'I', shows the combined impact of the supply, demand and risk premium shocks attributed to the pandemic as well as the first set of policy responses. As explained in the Annex, the following exogenous impulses have been included:

1. The core and the periphery are hit by an adverse demand shock of respectively -10% and -15% of GDP and an adverse supply shock of respectively -5% and -7.5% of GDP. This is a crude gauge of the COVID-19 shock, but roughly in the ballpark of a recent estimate by Gomez-Pineda (2020). We also include a favourable risk premium shock of -200 bps in the core due to a flight to safety in capital markets (this is aside from the endogenous change in the yield spread in response to the changes in debt positions embedded in the model).
2. Monetary policy stimulus consisting of a sustained 25bp cut in the policy rate[2] and asset purchases amounting to 12.3% of GDP per annum sustained for two years.[3] We also assume an exogenous cut in the periphery sovereign yield by 200 bps, over and above the endogenous impact of the ECB's asset purchases, to reflect the availability of the new ESM credit line (even though this may never be used because of the stigma effect impacting the governments in office).
3. Domestic fiscal stimulus – gauged by an exogenous increase in the primary deficit -- amounting to 5.2% of GDP in the core and 3.2% of GDP in the periphery.[4] Besides, we factor in the pan-EU measures adopted in the spring, such as SURE, that involve fiscal stimulus of the order 0.35% of GDP.

The results indicate that the initial policy measures taken in the spring would not suffice to rein in the adverse impact of the pandemic to a satisfactory extent. The Eurozone's loss of real GDP would add up to almost 12%, with the core losing 9% and the periphery losing more than 14%. The periphery-core sovereign yield spread widens by an average of 480 bps, severely compromising the funding of periphery banks, as reflected in a near collapse of bank credit. Periphery sovereign debt would soar by 36% of GDP.

If these numbers are anything to go by, the need for additional measures is clear. As Commission officials Verwey, Langedijk and Kuenzel (2020) put it: "as impressive as these measures are, they will not be enough to ensure a rapid recovery and to avoid permanent damage to the EU economy", with "large negative second-round effects on investment, employment, growth and prosperity." Moreover, "beyond the short term, countries will unavoidably be left with significantly higher debt to be financed in the future – a particular challenge for countries that already had elevated debt and deficit levels before the pandemic struck."

Against this backdrop, the implementation of New Generation EU looks vital, and our numbers strongly support this assessment. Scenario II in Table 1 and Figures 4 and 5 embody the outcomes of the combined sets of policies in the spring as well as Next Generation EU. The

[2] This refers to the PELTROs which are available at a rate 25 bps below the REFI of -0.5%.
[3] This comprises the additional envelope of the Asset Purchase Programme (APP) of €120 billion adopted in March 2020 and the Pandemic Emergency Purchase Programme (PEPP) with an envelope of €1350 billion adopted in June 2020 (including an initial envelope of €750 billion adopted in March). Both are assumed to be extended by another year to a total of €2940 billion or 24.6% of 2019 GDP.
[4] Estimates based on Bruegel (2020), with some modifications.

changes in policy variables in the model to gauge the policies in Next Generation EU in this simulation are:

1. Grants under the Recovery and Resilience Facility allocated to the core and periphery amount to 2.15% and 6.45% of local GDP, respectively. The associated increase in the supranational primary deficit would be around 4.3% of Eurozone GDP.

2. Loans are allocated to the tune of 0.4% of local GDP in the core and 6.7% of local GDP in the periphery. They increase the deficit and the debt. However, if they were used to replace domestic borrowing, the effect would be zero and the country would simply enjoy the cheap financing. Still, it does have an impact on EU debt (and a corresponding issuance of common bonds) to the tune of 3.6% of Eurozone GDP.

3. It is assumed that about 20% of grants under the Next Generation EU package will be used for funding existing national measures, which therefore reduce the national fiscal stimulus.

The main results of the simulation can be summarised as follows:

1. The output loss is considerably smaller (-0.9%), with almost no divergence between the core and periphery (strikingly, the output loss would be slightly smaller in the core than in the periphery). The yield spread would be neutralised, while bank credit would not shrink. The aggregate price level would show an increase as opposed to the deflationary impact in Scenario I.

2. On the fiscal side, we see the primary deficits at the national level increasing substantially by 5.5% of GDP in the core and 4% of GDP in the periphery. Yet, especially in the periphery, this is a much smaller increase than in Scenario I, which is helped by a more favourable macroeconomic environment, less prevalent automatic fiscal stabilisers and the use of transfers from the centre to fund national programmes. The same holds for the public debt position. In Scenario I the public debt ratios in the core and periphery soar, respectively, by 14.7% and 36% of GDP, but in Scenario II these increases amount to only 6.2% and 6.1% of GDP, respectively. Meanwhile, public debt at the centre in Scenario II would be 7.9% of Eurozone GDP, as opposed to only 0.4% in Scenario I.

4.2 The alternative approach

Scenario III incorporates the impact of policies under the alternative approach discussed in Section 3. The computations are based on the following assumptions:

1. We maintain all national policy measures as well as the creation of the ESM credit line as assumed in Scenarios I and II. We also take the supranational fiscal stimulus (both loans and grants) on aggregate to be the same as in Scenario II, but

instead with the fiscal stimulus used to fund pan-European (as opposed to national) programmes and projects. The rationale for this choice is to avoid crowding out national spending programmes and to stay in line with the subsidiarity principle, as discussed in Section 3. We also slash the ECB asset purchases by half.

2. Alongside discretionary fiscal expansion at the centre, we assume supranational automatic fiscal stabilisers to cater for some horizontal redistribution. This could be the result of a centralised unemployment insurance or re-insurance scheme or the creation of a rules-based European buffer fund (see Van den Noord 2020), for example. Specifically, we assume that for every 1 percentage point contraction in national GDP, there is an automatic transfer of 0.2%-points of national GDP. This transfer replaces equivalent national automatic stabilisers to provide genuine fiscal relief.

3. We assume that a safe asset (the same common bond that is issued to raise money for fiscal stimulus at the centre) is created and swapped for national sovereigns on banks' balance sheets to remove the bank-sovereign doom loop. We also assume that the safe asset has been made eligible for purchases by the ECB while national sovereigns lose this eligibility. Hence all asset purchases carried out by the ECB in this scenario refer to purchases of the safe asset.

The main results can be summarised as follows:

1. The aggregate stabilisation is slightly more potent than in Scenario II, though this is entirely attributable to the stabilisation of output in the core. This is not surprising given the absence of (discretionary) fiscal transfers to the periphery. Yet the periphery is not (much) worse off relative to Scenario II. On the other hand, the yield spread of the periphery widens somewhat relative to Scenario II, reflecting the absence of sovereign debt purchases by the ECB. Still, without affecting bank lending by much as the doom loop is now broken.

2. The fiscal-monetary policy mix has shifted towards the former, with the aggregate fiscal deficit at the centre widening slightly more than in Scenario II—as the supra-national automatic stabilisers kick in—and the asset purchases halves. Since the ECB would purchase the common bond only, its yield is now disconnected from the national yields and falls relative to them. Even so, the total increase in government indebtedness (be it national or supranational) is not much different in Scenario III as compared to Scenario II. On the other hand, the supranational debt numbers reported in the table and figure refer to consolidated gross debt, that is without the purchases of national sovereign debt by the fiscal capacity at the centre and the issuance of supranational debt (the safe asset) to finance these purchases.

All in all, with a safe asset and a (partly rules-based) fiscal capacity, even more of the pandemic shock would be absorbed, with less quantitative easing needed. Moreover, the asset purchases

would be directed to the safe asset rather than national sovereigns and hence avoid the political conflict this could entail and the need to keep the purchases in check with the capital key. Even more importantly, there are no ad hoc transfers from the core to the periphery via the EU budget. The transfers that remain are rules-based, relying on the automatic stabilisers built in social security systems.

Figure 4: Impact-responses of key macroeconomic variables

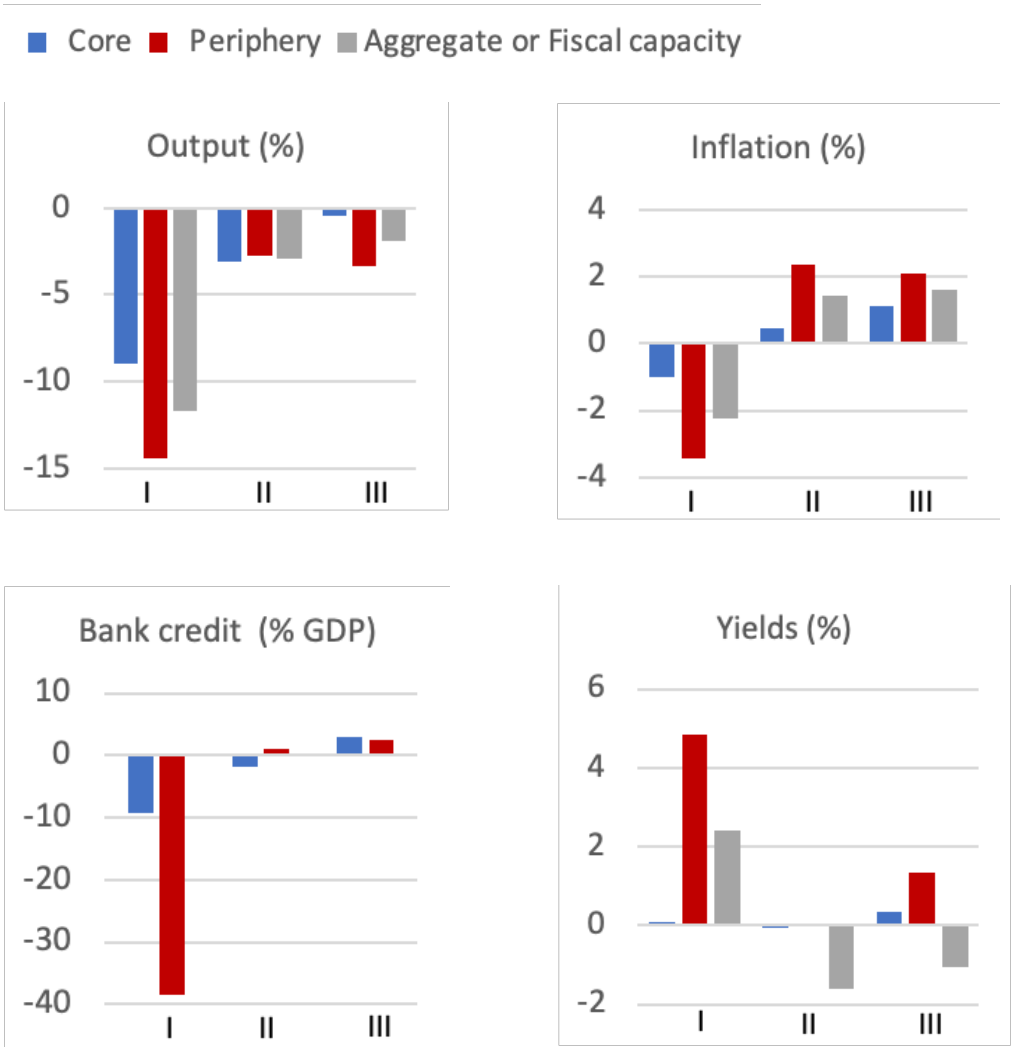
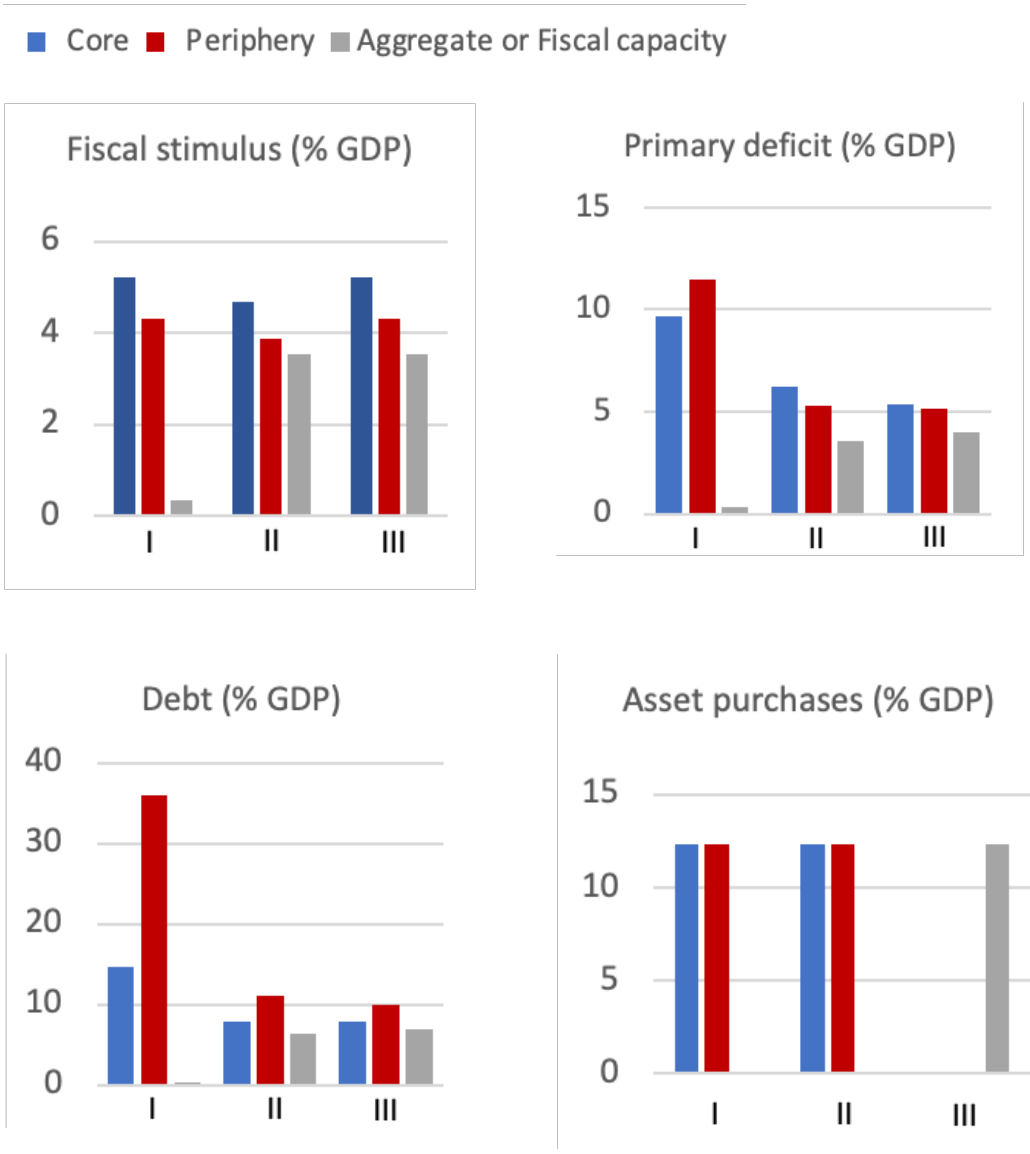


Figure 5: **Impact-responses of key policy variables**



The current policy response could be seen as a second best, i.e. a less efficient way to respond to an economic shock, although still powerful, if not vital. But as noted, it cannot be easily repeated in the future without political economy setbacks. Therefore, it would be worthwhile to consider a more permanent macroeconomic stabilisation mechanism in the future along the lines of our proposal.

5. Conclusions

The EU/Eurozone policy response to the pandemic crisis is unprecedented and impressive, putting together monetary, fiscal and regulatory aspects. The macroeconomic stabilisation role is implicitly given to monetary policy and national budgets, with Next Generation EU mostly focused on delivering investment projects and reforms that will increase resilience and enhance potential growth over time. In this paper, we argue that this policy response should be effective

in mitigating the impact of the economic shock. However, the EU fiscal package is one-off, will become effective with a delay, and relies on politically delicate fiscal transfers. An automatic mechanism based on a centralised fiscal capacity and a safe asset would have produced a better outcome in stabilising the economy, without any risk of the doom loop between the sovereigns and the banks, and without impinging on the ability of the central bank to manage monetary policy effectively. Therefore, policymakers should consider moving from an ad hoc policy response to a more permanent mechanism in the future.

References

Alogoskoufis, S and S Langfield (2019), "Regulating the Doom Loop", ECB Working Paper No 2313, September.

Acharya, V., I. Drechsler, and P. Schnabl (2014), "A pyrrhic victory? Bank bailouts and sovereign credit risk". *The Journal of Finance*, *69*(6), 2689-2739.

Baldacci, E. and M. S. Kumar (2010), "Fiscal Deficits, Public Debt, and Sovereign Bond Yields", IMF Working Paper, WP/10/184, August.

Barrell, R., D. Holland, and I. Hurst (2012), "Fiscal Multipliers and Prospects for Consolidation", *OECD Journal: Economic Studies*, 2012(1), 71-102

Baum, A., M. Poplawski-Ribeiro, and A. Weber (2012), "Fiscal Multipliers and the State of the Economy", *IMF Working Paper* WP/12/286.

Bayoumi, T., R. Harmsen and J. Turunen (2011), "Euro Area Export Performance and Competitiveness", *IMF Working Paper* WP/11/140.

Bénassy-Quéré A, M Brunnermeier, H Enderlein, E Farhi, M Fratzscher, C Fuest, P-O Gourinchas, P Martin, J Pisani-Ferry, H Rey, I Schnabel, N Véron, B. Weder di Mauro and J Zettelmeyer (2018), "Reconciling risk sharing with market discipline: A constructive approach to euro area reform", CEPR Policy Insight No 91, May.

Bini-Smaghi, L. and M. Marcussen (2018), "Delivering a safe asset for the euro area: a proposal for a purple bond transition", VOX CEPR Policy Portal, 19th July.

Bruegel (2020), *The fiscal response to the economic fallout from the coronavirus*, Bruegel Datasets. https://www.bruegel.org/publications/datasets/covid-national-dataset/

Brunnermeier, M. K., L. Garicano, P.R. Lane, M. Pagano, R. Reis, T. Santos, D. Thesmar, S. van Nieuwerburgh, and D. Vayanos (2016). "The sovereign-bank diabolic loop and ESBies". American Economic Review, 106(5), 508-12.

Buti, M. and N. Carnot (2018), "The case for a central fiscal capacity in EMU", VOX CEPR Policy Portal, 07th December.

Buti, M., C. Martinez-Mongay, K. Sekkat and P. van den Noord (2003), "Macroeconomic Policy and Structural Reform: a Conflict between Stabilisation and Flexibility?", in Buti, M. (ed.), *Monetary and Fiscal Policies in EMU*, Cambridge University Press, pp. 187-213.

Buti, M., W. Roeger and J. in't Veld (2002), "Monetary and fiscal policy interactions under a stability pact", in Buti, M. at al (Eds.), The behaviour of fiscal authorities – stabilisation, growth and institutions, Palgrave, pp. 241-267.

Clements, B., Z. G. Kontolemis and J. Levy (2001), "Monetary Policy Under EMU: Differences in the Transmission Mechanism?", *IMF Working Paper* WP/01/102.

Codogno, L. and P.J. van den Noord (2020), "Going fiscal? A stylised model with fiscal capacity and a Eurobond in the Eurozone", *Amsterdam Centre for European Studies*, SSRN Research Paper 2020/03. https://hdl.handle.net/11245.1/f56353ac-13af-44a8-97ff-b79d917d7ffd

Gomez-Pineda, J. G. (2020), Growth forecasts and the Covid-19 recession they convey", *COVID Economics*, CEPR, Issue 40, 30th July. https://cepr.org/content/covid-economics-vetted-and-real-time-papers-0

Corsetti G., Feld L. P., P.R. Lane, L. Reichlin, H. Rey, D. Vayanos, B. Weder di Mauro (2015), "A New Start for the Eurozone: Dealing with Debt", *Centre for Economic Policy Research*, March.

Depla J., and von Weizsäcker (2011), "Eurobonds: The Blue Bond Concept and Its Implications", Bruegel Policy Contribution, no. 2/2011, March.

ECB (2013), "Intra-Euro Area Trade Linkages and External Adjustment", ECB Monthly Bulletin, January.

EU Commission (2011), "Green Paper: Feasibility of Stability Bonds", November.

EU Commission (2020), "European Economic Forecasts, Autumn 2020", Institutional Paper 136, November.

Favero C., A. Missale (2012), "Sovereign Spreads in the Euro Area: Which Prospects for a Eurobond?", Economic Policy, 70, 231-273.

Girouard, N. and C. André (2005), "Measuring Cyclically- adjusted Budget Balances for OECD Countries", *OECD Economics Department Working Papers*, No. 434.

Hervé, K. et al. (2010), "The OECD's New Global Model", OECD Economics Department Working Papers, No. 768, OECD Publishing, Paris.

Leandro, Á and J Zettelmeyer (2018), "Safety Without Tranches: Creating a 'Real' Safe Asset for the Euro Area", CEPR Policy Insight No 93, May.

Llaudes, R. (2005), "The Phillips Curve and Long-Term Unemployment", *ECB Working Paper Series*, No. 441, February.

OECD (2020), Building confidence amid an uncertain recovery, OECD Economic Outlook, Interim Report September 2020. http://www.oecd.org/economic-outlook/

Van den Noord, P.J. (2020), "Mimicking a Buffer Fund for the Eurozone", *World Economics Journal*, 21(2), 249-281. https://www.world-economics-journal.com/Journal/Papers/Mimicking%20a%20Buffer%20Fund%20for%20the%20Eurozone%20.details?ID=795

Verwey, M., S. Langedijk and R. Kuenzel (2020), *Next Generation EU: A recovery plan for Europe*, VOX CEPR Policy Portal, June 9. https://voxeu.org/article/next-generation-eu-recovery-plan-europe,OECD.

Philippon T., C. Hellwig (2011), "Eurobills, not Eurobonds", VoxEU, www.voxeu.org.

Zettelmeyer, J. and Á. Leandro (2018), "Europe's Search for a Safe Asset", *Policy Brief*, Petersen Institute for International Economics, October.

ANNEX: A STYLISED MODEL

In an earlier paper (Codogno and Van den Noord 2019) we developed a model to examine how a new set of policy tools – in particular, a safe asset and fiscal capacity at the centre -- could improve the resilience of the Eurozone economy to (symmetric or asymmetric) demand and supply shocks. In a subsequent paper (Codogno and van den Noord 2020), we extended this analysis to include financial risk-premium shocks stemming from, for example, deterioration of asset quality in periphery banks, political turmoil in the periphery or a fall in global risk appetite. This analysis necessitated a major extension of the model, to include explicit modelling of bond yields, bank lending and public debt dynamics. In the present paper, we have modified this model to capture the impact of the COVID-19 shock and its policy responses.

The real economy

The aggregate (log-linear) demand equations follow the standard Mundell-Fleming approach adapted to the features of a (closed) monetary union and are perfectly symmetric:

$$(1)\ \begin{cases} y^d = \phi_1 l + \phi_2(f + f^{\in} + \ell + \ell^{\in}) - \phi_3(\pi - \pi^*) - \phi_4(y - y^*) + \varepsilon^d \\ y^{*d} = \phi_1 l^* + \phi_2(f^* + f^{*\in} + \ell^* + \ell^{*\in}) + \phi_3(\pi - \pi^*) + \phi_4(y - y^*) + \varepsilon^{*d} \end{cases}$$

where an asterisk (*) indicates the periphery, and variables without an asterisk refer to the core. Aggregate demand y^d and y^{*d} is determined by the supply of bank credit l and l^*, the fiscal stance — gauged by the primary government deficit f and f^* — and cross-border trade. The latter is a function of the inflation differential $\pi - \pi^*$ (a proxy for the real exchange rate) and the relative pace of economic growth $y - y^*$. In addition, we include the impact of fiscal policy conducted by the 'fiscal capacity', captured by its primary deficit as distributed to each block, denoted as $f^{\in}$ and $f^{*\in}$ as well as the impact of loans extended from the fiscal capacity to the national sovereigns ℓ and ℓ^*. Because these loans are below the line, they do not show up in the fiscal stance either at the centre or at the national level. However, they do have an impact on economic activity. For simplicity, the multipliers for national and supranational fiscal policy are assumed to be the same (i.e. ϕ_2). Finally, ε^d and ε^{*d} are demand shocks.

Aggregate supply y^s and y^{*s} is determined by the inflation 'surprises' $\pi - \pi^e$ and $\pi^* - \pi^{*e}$ relative to expectations (denoted by the superscript e) alongside exogenous supply shocks ε^s and ε^{*s}, via an inverted Phillips-curve:

$$(2)\qquad \begin{cases} y^s = (\pi - \pi^e)/\omega + \varepsilon^s \\ y^{*s} = (\pi^* - \pi^{*e})/\omega + \varepsilon^{*s} \end{cases}$$

Expected inflation is partly anchored in the official inflation target $\bar{\pi}^T$ and is partly backward looking and hence depends on actual domestic inflation:

$$(3) \qquad \begin{cases} \pi^e = (1-\eta)\bar{\pi}^T + \eta\pi \\ \pi^{*e} = (1-\eta^*)\bar{\pi}^T + \eta^*\pi^* \end{cases}$$

Since all variables are defined as deviations from a steady state in which all shocks are nil, we may assume that $\bar{\pi}^T = 0$. We allow for the possibility of an asymmetry in the formation of inflation expectations such that $\eta^* \geq \eta$, which means that potentially there could be greater inflation proneness in the periphery than in the core.

Finally, in equilibrium aggregate demand equals aggregate supply, hence:

$$(4) \qquad \begin{cases} y^s = y^d = y \\ y^{*s} = y^{*d} = y^* \end{cases}$$

The numerical calibration of the parameters is displayed in Table 1. A crucial parameter is the fiscal multiplier ϕ_2. Mainstream estimates are of the order of 0.5, see for instance Baum et al. (2012) and Barrell et al. (2012), and we adopted this value in our earlier paper (Codogno and Van den Noord 2020). However, as discussed in more detail in Van den Noord (2020), the magnitude of the fiscal multipliers depends inter alia on the cyclical position of the economy and whether or not a liquidity trap besets monetary policy. Therefore, we have augmented the multiplier to 0.8, crudely based on Batini et al. (2014).

With regard to the other parameters in the equations (1)-(4) we resort to the calibration in Codogno and Van den Noord (2020). Specifically, for ϕ_1, capturing the impact of bank credit on the real economy Antoshin et al. (2017) find for 39 European countries a 10% increase in bank credit to boost real GDP by 0.6–1%. However, Cappiello et al. (2010) find a much stronger effect for a panel of Eurozone members, with a 10% increase in credit leading to a 3.2% increase in real GDP. Accordingly, we adopt $\phi_1 = 0.333$. Estimates for the parameters that capture cross-border trade, comprising ϕ_3 for absorption and ϕ_4 for competitiveness, are based on Bayoumi et al. (2011) and ECB (2013), with $\phi_3 = \phi_4 = 0.5$.

For the parameter gauging the slope of the Phillips curve Ω we again refer to Codogno and Van den Noord (2019), who — based on Ball et al. (2013) and Llaudes (2005) — assumed that $\omega = 0.25$. Finally, Van der Cruijsen and Demertzis (2009) find a strong dependence of inflation expectations on actual inflation in the periphery, but no such relationship in the core. Therefore, we will adopt as our baseline estimate $\eta = 0$ and $\eta^* = 0.5$.

Table 2: **Numerical calibration**

Real economy		Financial sector				Government sector	
		Bank credit		Bond yields			
ϕ_1	0.333	ξ_1	3.000	ϑ_1	0.500	τ	0.500
ϕ_2	0.800	ξ_2	0.130	ϑ_2	0.050	θ	0.250
ϕ_3	0.500	ξ_3	0.000	ϑ_3	0.230	χ	0.200
ϕ_4	0.500	ξ_1^*	3.000	ϑ_1^*	0.500	b_0	0.500
η	0.000	ξ_2^*	0.250	ϑ_2^*	0.100	b_0^*	1.300
η^*	0.500	ξ_3^*	4.500	ϑ_3^*	0.260	$b_0^{\in}$	0.400
ω	0.250			σ_1	0.500		
				σ_2	0.075		

Sources: See text.

The financial sector

A hallmark of the Eurozone predicament is the so-called 'doom loop' which refers to tensions in the sovereign debt market prompting a 'credit crunch', with the resulting economic slump feeding back into the sustainability of sovereign debt. The main channel through which tensions in sovereign debt markets affect the supply of bank credit is via the cost and the availability of wholesale funding for banks. Financial distress and the associated capital flight from the periphery to core sovereign debt raise the cost and cut the availability of funding for banks in the periphery.

It may be assumed that this source of vulnerability vanishes once Eurobonds, guaranteed by the joint sovereigns, become available. As the national sovereign will lose their eligibility for purchases by the ECB, and Eurobonds would be eligible instead, national sovereigns would become inherently riskier. It, therefore, makes sense that they would also lose their zero-risk weighting. Therefore, it is reasonable to assume that banks agree to swap their sovereign debt portfolio for Eurobonds, on a voluntary basis. As a result, sovereign debt distress, and the associated capital flight from the periphery to the core, no longer matters for the cost or availability of bank funding in the periphery.

Moreover, since all banks have access to the same safe asset, the Eurobond, central bank purchases can be assumed to induce banks to convert the additional (excess) reserves thus created into loans (unlike the current situation where banks keep the excess on their balance sheets as protection against loss of access to wholesale funding). This is known in the literature as the direct bank lending channel of quantitative easing. Evidence of this channel being effective at present in the Eurozone is weak, as banks in practice have been holding on to their excess reserves or used them to pay down external funding or (re-)purchase debt securities instead of providing credit to the economy (see Ryan and Whelan, 2019). However, this may change when banks are induced to hold Eurobonds in lieu of national sovereign bonds. As

national sovereign bonds lose their zero-risk weighting, the scope for carry trades diminishes and, with the 'doom loop' broken, the need to hold on to excess reserves also diminishes, hence it looks plausible that a direct bank lending channel will open. There is indeed some empirical evidence that a direct bank lending channel is effective in cases where banks have access to a (national) safe bond, see Paludkiewicz (2018) for Germany, Joyce and Spaltro (2014) for the UK and Kandrac and Schlusche (2018) for the US.[5]

These notions are embedded in the following stylised (log-linear) equations for bank credit measured as a percentage of nominal output, in which the periphery-core yield spread $r^* - r$ is included as a gauge of sovereign debt distress:

$$(5) \qquad \begin{cases} l - (y + \pi) = -\xi_1 i + s\xi_2 q - (1 - s)\xi_3 (r - r^*) + \lambda \\ l^* - (y^* + \pi^*) = -\xi_1^* i + s\xi_2^* q - (1 - s)\xi_3^* (r^* - r) + \lambda^* \end{cases}$$

and where λ and λ^* are exogenous shocks to the respective banking systems (credit crunch or credit boon). Moreover, q denotes the purchases of sovereign bonds by the ECB as a percentage of GDP, and i is the ECB's main policy rate (for simplicity we abstract from the distinction between the deposit and the repurchase rate, and s is a dummy variable which takes the value 1 if a Eurobond is created and which is nil otherwise. We expect that $\xi_1^* \geq \xi_1$, $\xi_2^* \geq \xi_2$ and $\xi_3^* \geq \xi_3$, so generally speaking the sensitivity of bank lending to monetary policy and financial market distress would be larger in the periphery than in the core. Note also that there is an asymmetry in the sense that the adverse effect of the yield spread on lending in the periphery has the opposite sign of the safe-haven effect on lending in the core, and that both tend to widen the differential.

This takes us to the determinants of the sovereign yield spread of the Eurozone periphery against the core $r^* - r$. There is burgeoning literature on the sovereign yield spread in the Eurozone, which is usually assumed to be driven by country-specific liquidity risk, country-specific default risk and the risk appetite of global investors (see, for instance, Codogno et al. 2003). The ratio of sovereign debt to GDP (alongside the fiscal deficit feeding into the debt ratio) is usually considered to be the main driver of country-specific default risk. As several studies have shown, the relationship between debt and spread can be strongly non-linear and dependent on global risk sentiment. With the outbreak of the global financial crisis, the perception of higher sovereign default risks produced a sharp increase in yield spreads, and even more so in countries whose initial debt ratio was comparatively high.

[5] To be fair, Rodnuansky and Darmouni (2017) find no evidence of a direct bank lending channel for the US (except for purchases of mortgage backed securities) and similarly Buttz et al (2015) for the UK. Fatouh et al (2019) even observe a decline in bank lending in the UK as large corporate borrowers turned to the corporate bond market were yields had fallen in response to QE (though arguably this is a demand effect and not a supply effect on bank loans).

By contrast, as indicated inter alia by De Grauwe and Ji (2012), in developed economies with a federal/central government that issues debt in its 'own' currency, federal sovereign yields tend to incorporate liquidity and exchange rate risk premiums, but not a default risk premium. A Eurobond, issued by an appointed fiscal capacity with full democratic legitimacy, and which enjoys a joint guarantee by the national sovereigns, may be assumed to fit this description broadly. However, once a Eurobond exists, the national sovereigns would become more akin to state and local government debt in federal states, i.e. would still carry default risk premia (see Schuknecht et al., 2009). In fact, due to the joint guarantee (and assuming this guarantee is credible), national sovereign debt would become inherently riskier than at present, with their yields incorporating risk premia not only for national but also for supra-national public debt.

These features are reflected in the following set of equations for national and supranational yields:

$$(6) \qquad \begin{cases} r = sr^{\in} + (1-s)(\vartheta_1 i - \vartheta_2 q) + \vartheta_3(b + sb^{\in}) + \rho \\ r^* = sr^{\in} + (1-s)(\vartheta_1^* i - \vartheta_2^* q) + \vartheta_3^*(b^* + sb^{\in}) + \rho^* \\ r^{\in} = (1-s)\frac{1}{2}(r + r^*) + s(\sigma_1 i - \sigma_2 q + \rho^{\in}) \end{cases}$$

where r, r^* and $r^{\in}$ are the yields on core, periphery and supranational sovereign debt and b, b^* and $b^{\in}$ denote the corresponding sovereign debt as a per cent of GDP. The variables ρ, ρ^* and $\rho^{\in}$ are exogenous risk premium shocks. Moreover, q again denotes the purchases of sovereign bonds (regardless of the issuer) by the ECB, as a percentage of GDP, and i is again the ECB's primary policy rate. We expect $\vartheta_1^* \geq \vartheta_1, \vartheta_2^* \geq \vartheta_2, \vartheta_3^* \geq \vartheta_3$, so generally speaking periphery yields are the most sensitive to developments in sovereign debt and monetary policy. Let us recall that all variables (except for the dummy s) are defined in terms of deviations from a baseline in which all shock variables are nil. The idea is to not modify these equations on the assumption that the yield of Eurobonds would follow the same pattern as ESM bonds, i.e. a weighted average of the underlying national sovereign bonds.

The numerical assumptions for the system of equations (5) and (6) are again as much as possible based on the mainstream literature (see Table 1). For bank lending, Albertazzi et al. (2012) find for Italy (which we take to represent the periphery) an adverse effect of a 100bps increase in the spread $r^* - r$ of the order of 3.5% for loans to NFCs and 6.0% for household loans. Given the relative weights of NFC and household loans, this implies that approximately $\xi_3^* = 4.5$. Based on the same study we adopt $\xi_1^* = 3.0$ for the impact of the policy rate on bank credit, although estimates were based on the peak of the government bond crisis and by now the sensitivity has decreased significantly. In the core, we assume the impact of the spread $r^* - r$ to be nil such that $\xi_3 = 0$, as suggested by Altavilla et al. (2016). For the impact of quantitative easing on bank lending we adopt $\xi_2^* = 0.25$, i.e. for every euro liquidity created on banks' balance sheets in the periphery through asset purchases, one-quarter is converted into bank loans. This is in line with findings for the United Kingdom reported by Joyce and Salto (2014). Our baseline assumption for the effectiveness of quantitative easing in the core is

smaller than in the periphery, with $\xi_2 = 0.125$, to reflect the smaller holdings of sovereigns on banks' balance sheets

The numerical calibration of the yield equations is based on De Santis (2016). Accordingly, we adopt for the impacts on yields of the policy rate $\vartheta_1 = \vartheta_2^* = 0.5$, with the impact thus less than proportional to reflect that tighter monetary policy now gets countries loser monetary policy later, so bond yields will not increase as much as policy rates. With regard to the impact of quantitative easing on sovereign yields we adopt $\vartheta_2 = 0.05$ and $\vartheta_2^* = 0.1$. This implies that for every 1% of GDP equivalent of asset purchases by the ECB, yields would drop by 5 basis points in the core and by 10 basis points in the periphery. Note that total asset purchases by the ECB to date have roughly amounted to around 25% of GDP, which according to the above estimates would have slashed yields by 100 basis points in the core and 250 basis points in the periphery. Finally, based on the same study, we adopt for the impact of the public debt ratio on the sovereign yields $\vartheta_3 = 0.23$ and $\vartheta_3^* = 0.26$.

Obviously, we do not know how the yield on Eurobonds will behave in response to monetary policy. Therefore, we will assume the impact of ECB asset purchases on the Eurobond yields to average that on the national sovereign yields when $s = 0$, so $\sigma_1 = 0.5$ and $\sigma_2 = 0.075$.

The government sector

The usual debt dynamics identities capture the evolution of the debt ratio to output at the national and supranational levels. We also allow for discretionary fiscal spending (grants) and loans at the centre to differ between the core and the periphery.:

$$(7) \qquad \begin{cases} b = b_0(\chi r - y - \pi) + f + \ell + \ell^{\in} \\ b^* = b_0^*(\chi r^* - y^* - \pi^*) + f^* + \ell^* + \ell^{*\in} \\ b^{\epsilon} = s b_0^{\in}(\chi r^{\in} - \bar{y} - \bar{\pi}) + \frac{1}{2}(f^{\in} + \ell^{\in} + f^{*\in} + \ell^{*\in}) \end{cases}$$

$$(8) \qquad \begin{cases} f = -(\tau - s\theta)y + g, \;\; f^{\in} = -s\theta y + g^{\in} \\ f^* = -(\tau - s\theta)y^* + g^*, \;\; f^{\in *} = -s\theta y^* + g^{*\in} \end{cases}$$

where $\bar{\pi} = \frac{1}{2}\pi + \frac{1}{2}\pi^*$ and $\bar{y} = \frac{1}{2}y + \frac{1}{2}y^*$ and where g, g^*, $g^{\in}$ and $g^{*\in}$ denote the discretionary component of the respective deficits, ℓ and ℓ^* are loans from the national governments to the private sector, $\ell^{\in}$ and $\ell^{*\in}$ are loans from the centre national governments, and τ corresponds to the usual "semi-elasticity" of the fiscal deficit with respect to output. In this specification, $s\theta$ takes a positive value when a supra-national fiscal capacity is created, and certain tax or spending programmes are reallocated to it, and nil otherwise. The primary deficit at the central level is simply the average $\bar{f}^{\in} = \frac{1}{2}f^{\in} + \frac{1}{2}f^{\in *}$.

Let us recall that $f, f^*, f^{\in}$ and $f^{*\in}$ denote the respective primary deficits as a ratio to output that enters the system of aggregate demand equations (1) and that b_0, b_0^* and $sb_0^{\in}$ are the respective "initial" debt ratios, whereby we mean the prevailing debt ratios if none of the potential demand, supply or financial shocks occur (i.e. $\varepsilon^d = \varepsilon^{*d} = \varepsilon^s = \varepsilon^{*s} = \lambda = \lambda^* = \rho = \rho^* = 0$). As before, if $s = 0$ no Eurobonds are created, so $b^{\epsilon} = 0$. However, if $s = 1$, the debt ratio would change in response to variations in the relevant yields, economic growth and inflation alongside the conduct of fiscal policy at the centre. We make a simplifying assumption that a fraction χ of the changes in yields feed through in the implicit debt servicing cost, depending on the percentage of the total stock of debt that comes due each year. In the model simulations, it is assumed that $\chi = 0.2$.

The primary fiscal deficits $f,\ f^*, f^{\in}$ and $f^{*\in}$ are partly endogenous on account of 'automatic stabilisers' (e.g. variations in tax proceeds or social security outlays as a function of cyclical economic activity), so they comprise induced and discretionary components. For the numerical calibration of the automatic stabilisation effect, we refer to Van den Noord (2000) and Girouard and André (2005), which implies that $\tau = 0.5$. Furthermore, we assume that $b_0 = 50\%$, $b_0^* = 130\%$ and $b_0^{\in} = 40\%$. This roughly corresponds to, respectively, the public debt to GDP ratios in Germany and Italy and the amount of Eurobonds that approximately needs to be issued to cover the purchases of national sovereigns on the balance sheets of the ECB and the banks as well as any additional purchases in the market needed to secure consistency with the capital key. As concerns the parameter θ we refer to Van den Noord (2019), who assumes that half of the automatic stabilisation effect would accrue to the centre, so if $\tau = 0.5$ then $\theta = 0.25$.

Shocks and changes in policy variables

As discussed in the main text, three scenarios are computed. The exogenous changes assumed in each of these three scenarios are reported in Table 3 below. Specifically,

1. The dummy s takes a value 0 in Scenarios I and II and 1 in Scenario III.
2. In all three scenarios the same set of demand shocks ε^d and ε^{*d} and supply shocks ε^s and ε^{*s} are assumed as well as the same change in the policy rate i. Also, in all three scenarios the same exogenous risk premium shocks to sovereign yields ρ and ρ^* are incorporated to reflect a flight to safety effect on core yields and an offsetting (neutralising) effect of the ESM emergency facility on periphery yields.
3. The domestic fiscal shocks g are identical across the three scenarios except from a reduction in Scenario II to reflect the impact of grants from the centre used to replace

deficit funding of domestic spending. The same holds for the domestic fiscal shock in the core g^*.

4. In Scenario I the increase in central public spending $g^{\in}$ and $g^{*\in}$ is modest, reflecting the first batch of EU programmes in the spring such as SURE. The sharp increases in these fiscal variables (especially in the periphery) in Scenario II reflect the grants provided under New Generation EU. The same holds for the increase in loans from the centre $\ell^{\in}$ and $\ell^{*\in}$ in Scenario II relative to Scenario I.
5. In Scenario III the aggregate amounts of grants and loans from the centre are the same in Scenario II, but the distribution across the core and symmetry is now symmetric, meaning that $g^{\in} = g^{*\in}$ and $\ell^{\in} = \ell^{*\in}$.

Table 3: **Shocks and changes in policy variables**

	Actual Policy		
Scenario	***I***	***II***	***III***
s	0	0	1
ε^d	-10.0	-10.0	10.0
ε^{*d}	-5.0	-5.0	-5.0
ε^s	-15.0	-15.0	15.0
ε^{*s}	-7.5	-7.5	-7.5
i	-0.25	-0.25	-0.25
q	24.6	24.6	12.3
ρ	-2.0	-2.0	-2.0
ρ^*	-2.0	-2.0	-2.0
g	5.20	4.70	5.20
g^*	4.30	3.90	4.30
$g^{\in}$	0.35	1.45	3.55
$g^{*\in}$	0.35	5.65	3.55
$\ell^{\in}$	0.00	0.30	2.85
$\ell^{*\in}$	0.00	4.40	2.85

Note: Scenarios refer to: *I* = National fiscal responses + SURE + ESM credit line + monetary policy, *II* = *I* + 'Next Generation EU', *III* = Safe asset + permanent fiscal capacity.