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Macroeconomic stabilization, monetary-fiscal interactions, and Europe's monetary union

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Abstract

The euro area has been experiencing a prolonged period of weak economic activity and very low inflation. This paper reviews models of business cycle stabilization with an eye to formulating lessons for policy in the euro area. According to standard models, after a large recessionary shock accommodative monetary and fiscal policy *together* may be necessary to stabilize economic activity and inflation. The paper describes practical ways for the euro area to be able to implement an effective monetary-fiscal policy mix.

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"(...) [T]he Fed, especially with short-term interest rates close to zero, couldn't do it alone. The economy needed help from Congress (...)." Bernanke, 2015, p. 504

"(...) [T]he central bank in [the United States and Japan] could act and has acted as a backstop for government funding. This is an important reason why markets spared their fiscal authorities the loss of confidence that constrained many euro area governments' market access." Draghi, 2014

Executive Summary

The euro area has been going through a prolonged period of weak economic activity and very low inflation. Motivated by this experience, this paper reviews models of business cycle stabilization with an eye to formulating lessons for policy in the euro area. One takeaway from the literature is that monetary policy alone may fail to stabilize economic activity and inflation satisfactorily. Following a large adverse shock, the lower bound on nominal interest rates can constrain conventional monetary policy for a significant length of time. Unconventional monetary policy, while helpful, may turn out to be indecisive, especially if long-term interest rates are low to begin with and financial markets are undisrupted. Another takeaway is that at a time when the central bank's policy rates are at or close to their lower bound, one can expect accommodative fiscal policy to have sizable effects.

Achieving and maintaining an accommodative fiscal policy stance has proved difficult in the euro area. A key problem is that debt issued by the fiscal authorities in the euro area is subject to the risk of default or restructuring. As the recent experience shows, in this setting fiscal accommodation can indeed give rise to expectations of default or restructuring that counteract or reverse any initial stimulative effects. To make matters worse, the expectations of default or restructuring can be self-fulfilling. Although the Outright Monetary Transactions program launched by the European Central Bank in 2012 has eliminated or at least reduced the possibility of self-fulfilling creditor runs on a euro area member state, the program per se falls short of creating the conditions necessary for an accommodative fiscal policy stance to be achieved.

This paper attempts to define the conditions necessary for the euro area to have an effective stabilization policy. We organize the discussion around an example of a specific – by no means the only possible – institutional setup with two key elements. The first element would be the introduction of a non-defaultable Eurobond issued by a "euro area fund," similar to the European Stability Mechanism. By "non-defaultable" we mean that the fund and the ECB would ensure that maturing Eurobonds, issued as part of a concerted policy intervention, would be convertible into currency at par, analogously to maturing reserve deposits at the ECB. The fund would stand ready to purchase national public debt of each member state so long as the member state's fiscal policy satisfied ex-ante set criteria. The fund, subject to democratic control, would be given a strictly limited ability to tax uniformly across the member states (e.g., a small VAT surcharge) and could be endowed with seigniorage revenues from the Eurosystem. The fiscal criteria would be formulated so as to make fiscal accommodation possible after a severe recessionary shock, while being consistent with fiscal discipline for each country.

The second element would be the ability for euro area member states to be able to restructure national public debt as a last resort in an orderly way, without prejudice to full participation in the

European Union or the euro, with the fund being treated equally with private creditors, in case a member state failed to meet the fiscal criteria and was unable or unwilling to borrow exclusively from private creditors. The fund would stand ready to resume lending after national public debt had been restructured, as soon as the member state satisfied the fiscal criteria again.

The fund would also be able to backstop, when necessary, the Single Resolution Mechanism and the proposed European deposit insurance scheme. With a euro-area-level backstop in place, the Single Resolution Mechanism could wind down, in an orderly fashion, banks that might become insolvent because of restructuring of national public debt, while the common deposit insurance scheme would act to prevent bank runs in all member states of the euro.

One could argue that, since a euro area institution able to issue non-defaultable debt already exists, the ECB, the simplest solution would be for that institution to act as the fund described here. Indeed, a policy mix consisting of the ECB keeping its interest rates low and expanding the monetary base in order to purchase national public debt – as implemented in the Public Sector Purchase Program – *together* with fiscal accommodation by the member states would have had sizable effects on the economy and remains a sensible short-term option. In the paper we explain why the institutional structure including the fund, outlined here, appears preferable in the medium and long run.

1 Introduction

Standard macroeconomic models explain why fluctuations in aggregate economic activity can be excessive and suggest that appropriate stabilization policy can dampen the undesirable variability.

The member states of the euro have been experiencing a prolonged period of weak economic activity and very low inflation. At the end of 2015, real per capita GDP of the euro area was 1.6 percent *below* its level *eight years* before, at the end of 2007, as a consequence of the Great Recession, the second recession of 2012-2013 and the subsequent slow recovery. The average annual rate of inflation for the euro area measured in terms of the Harmonized Index of Consumer Prices dropped to zero in 2015, having decreased in each year starting in 2012. The inflation rate quantified with the GDP deflator – a more direct indicator of home-grown price pressures than the HICP – remained between 0.7 percent and 1.3 percent in every year from 2009 to 2015. Since 2008 the ECB has brought its policy interest rates essentially to zero and has engaged in multiple kinds of unconventional monetary policy. Meanwhile, while national fiscal policies were accommodative in the immediate aftermath of the global financial crisis, they became non-accommodative soon thereafter, even in the member states with relatively strong fiscal fundamentals. The primary budget balance for the euro area as a whole improved in each year between 2009 and 2015, from -3.5 percent of GDP in 2009 to 0.3 percent of GDP in 2015, including in 2012 and 2013, two years in which euro area output contracted.¹ The current recovery appears tepid. If a sizable negative shock were to occur again in the near future, there would be few reasons for optimism about the euro area's resilience to it.

Below we review standard business cycle models commonly used in academia and in policy institutions. **The key lesson is that accommodative monetary and fiscal policy *together* – not only accommodative monetary policy – may be necessary for macroeconomic stabilization in the wake of a large adverse disturbance such as the global financial crisis of 2008.** We describe practical ways for the euro area to be able to pursue an effective stabilization policy.

2 Monetary policy alone may fail to stabilize economic activity and inflation

Standard models and the recent experience of a number of advanced economies suggest that monetary policy alone may fail to stabilize economic activity and inflation satisfactorily due to the lower bound on nominal interest rates.

To see the role of the lower bound in macroeconomic stabilization, it is helpful to distinguish between small or moderate business cycle shocks and less frequent, large adverse disturbances. Models and the historical record between the mid-1980s and the Great Recession suggest that **conventional monetary policy can smooth out the effects of typical business cycle shocks.** In the face of small or moderate disturbances to the demand side of the economy, the central bank can stabilize economic activity and inflation by setting its policy rates such that the implied real interest

¹ The source of the data on GDP per capita and inflation is AMECO, the annual macroeconomic database of the European Commission's Directorate General for Economic and Financial Affairs. The source of the data on the primary budget balance is the ECB.

rate mimics the “natural” real rate of interest, i.e., the real rate at which no inflationary or deflationary pressures materialize. For instance, counteracting a deflationary fall in demand requires a reduction in the policy rates sufficient to make the real rate match the new, lower natural rate. A decrease in the real rate stimulates economic activity thereby alleviating deflationary pressures. In addition, fiscal “automatic stabilizers” such as unemployment benefits can help dampen undesirable business cycle fluctuations and reduce their social costs. Of course, complexities that policymakers face in practice make it impossible to achieve the desirable level of macroeconomic stabilization at each point in time. That being said, **conventional interest rate policy, supported by fiscal automatic stabilizers, appears capable of producing more or less satisfactory business cycle outcomes in “normal times,”** that is, after small or moderate disturbances.²

By contrast, **the recent experience has demonstrated that following a large adverse shock the lower bound on nominal interest rates can constrain conventional monetary policy for a significant length of time.** Consider a private sector deleveraging disturbance of the kind that many observers believe caused the Great Recession. As households and firms attempt to save more, the natural real rate falls into negative territory. The real rate can then remain stuck above the natural rate because the central bank cannot cut the policy rates below their lower bound, which is approximately zero. **The real rate can be too high and economic activity and inflation too low – possibly for a long time – relative to what would be desirable.**³

A further challenge for policymakers is that when the policy rates are constrained by the lower bound, **the economy can follow many trajectories and the central bank may fail to influence which path the economy assumes.** Monetary policy may even be unable to ensure that fluctuations in the inflation rate concentrate around the central bank's inflation objective. **Long spells at the lower bound with inflation varying around a level *below* the central bank's objective become possible.**⁴

To circumvent the lower bound constraint, central banks have engaged in two kinds of unconventional monetary policy: the communication about future policy rates known as “forward guidance” and a variety of balance-sheet policies. **Macroeconomic models and the historical record suggest that unconventional monetary policy can help stabilize the economy but they also caution that, in some circumstances, forward guidance and balance-sheet policies may prove indecisive.** Models imply that forward guidance should involve the central bank telling the public that the policy rates will remain low *even after the economy has recovered*. To the extent that forward guidance is successful, long-term real interest rates decline stimulating economic activity and counteracting deflationary pressures.⁵ While forward guidance can help improve macroeconomic outcomes, its effects are bound to be limited if long-term interest rates are low to begin with. Furthermore,

² The simple, standard model of conventional monetary policy can be found in, e.g., Woodford (2003) and Galí (2015). Quantitative versions of the standard model have been shown to fit macroeconomic data (see, e.g., Christiano et al., 2005, and Smets and Wouters, 2007). The model has been extended in a number of directions, for instance, to incorporate frictions in the labor market (e.g., by Christiano et al., 2015) and in the financial sector (starting with Bernanke et al., 1999).

³ The classic model of interest rate stabilization policy in the presence of the lower bound is in Eggertsson and Woodford (2003). Buiter and Panigirtzoglou (2003) and Agarwal and Kimball (2015) write about the possibility of eliminating the lower bound constraint.

⁴ Formally, economic activity and inflation can be indeterminate. See Benhabib et al. (2001), Schmitt-Grohé and Uribe (2013), Mertens and Ravn (2014), and Aruoba et al. (2015).

⁵ The classic treatment of forward guidance is in Eggertsson and Woodford (2003). See also Krugman (1998).

private agents may fail to respond to forward guidance if they have little history of central bank communication about future policy rates to rely on and have been accustomed to the policy rates reacting swiftly to signs of economic recovery and rising inflation in the past.

Balance-sheet policies can have sizable effects on asset prices, economic activity, and inflation at times when financial markets are disrupted. Instances are the balance-sheet policies implemented during or in the immediate aftermath of the recent financial crisis in order to repair or substitute for malfunctioning markets such as the market for mortgage-backed securities and the interbank money market. When limits to arbitrage are pervasive (for example, when many investors face tightening borrowing constraints and consequently find themselves forced to dispose of assets), asset purchases by the central bank can have powerful stabilizing consequences. However, **the favorable effects of balance sheet policies – in particular, of an expansion in the monetary base to finance purchases of government bonds by the central bank – are likely to become more limited as the functioning of financial market improves.**⁶ Admittedly, some limits to arbitrage exist even in “normal times” and some investors value government bonds not only for their pecuniary returns. Consequently, purchases of government bonds by the central bank can produce some stimulus also when financial markets operate smoothly. Furthermore, such purchases can have beneficial consequences in conjunction with forward guidance, if long-term interest rates are not too low to begin with and if the private sector interprets the purchases as a signal of future accommodative interest rate policy. Finally, purchases of government bonds by the central bank may coordinate agents' expectations on a desirable path for economic activity and inflation. All in all, though, unconventional monetary policy may prove insufficient to stabilize the economy satisfactorily.

3 Monetary policy and fiscal policy together can stabilize economic activity and inflation

Precisely at a time when the central bank's policy rates are expected to stay at or close to the lower bound for an extended period of time, monetary and fiscal policy together can have a sizable impact on the economy.

Macroeconomics has emphasized that fiscal policy is an effective stabilization tool in or near a liquidity trap. Following the literature, it is helpful to focus on **two types of stylized fiscal interventions** that, while being complementary, rely on distinct transmission mechanisms. **The first intervention consists of a temporary increase in government spending, keeping constant the present value of primary budget surpluses.**⁷ “Temporary,” in this context, means that the fiscal accommodation is to last approximately as long as the central bank's policy rates remain at the lower bound. “Keeping constant the present value of primary surpluses” means that the fiscal accommodation is to be followed by an adjustment to taxes, transfers, or government spending such that overall the present value of primary surpluses is the same with the intervention as without it.

⁶ See, for instance, Eggertsson and Woodford (2003), Cúrdia and Woodford (2011), Del Negro et al. (2011), Gertler and Karadi (2011), Chen et al. (2012), Gertler and Karadi (2013), and Engen et al. (2015).

⁷ To clarify, we always mean “real government spending” and “real primary surplus”, adjusted for inflation. Moreover, we define each fiscal policy intervention relative to a baseline in the absence of an adverse disturbance that we assume has occurred. If the baseline involves a decrease in government spending, it suffices that government spending falls less than in the baseline.

An increase in government spending can be expected to stimulate demand and output at the current price level. Marginal costs rise as output increases. Higher marginal costs translate into higher contemporaneous prices and – in the presence of some degree of price stickiness – into higher expected inflation. With the policy rates at the lower bound, the rise in expected inflation reduces the real interest rate, which stimulates investment and consumption, setting in motion a beneficial feedback loop. By how much an increase in government spending drives up economic activity and inflation depends on a plethora of characteristics of the economy. However, under realistic conditions **the multiplier effect of government spending on output at the lower bound can be sizable. For the multiplier to be sizable it is essential that monetary policy accommodate the fiscal stimulus**, by keeping the policy rates unchanged at the lower bound sufficiently long. Only if the policy rates fail to increase (or at most increase weakly) can the real interest rate fall creating the beneficial feedback loop.⁸

The second intervention consists of measures amounting to a decrease in the present value of primary surpluses.⁹ To see how such measures can provide stimulus, suppose for the moment that public debt is *non-defaultable*. By “non-defaultable” we mean that public debt is denominated in a fiat currency and the fiscal and monetary authorities ensure that maturing government bonds are convertible into currency at par, analogously to maturing reserve deposits at the central bank.¹⁰ If public debt is non-defaultable and the fiscal authority lowers the present value of primary surpluses, the value of debt in real terms must fall correspondingly, implying that the price level will increase and – in the presence of some degree of price stickiness – output will expand in the short run.¹¹ This can be a desirable outcome if economic activity is weak and inflation is too low to begin with. By way of example, consider **an increase in transfers from the government to households** lasting approximately as long as the policy rates remain at the lower bound. As the present value of transfers rises, households are wealthier at the current price level. Households raise their demand for goods, and output and marginal costs increase. Higher marginal costs translate into higher contemporaneous prices and higher expected inflation. With the policy rates at the lower bound, the rise in expected inflation reduces the real interest rate, which boosts investment while further stimulating consumption. **The multiplier effect of a change in transfers on output at the lower bound can be sizable.** As in the case of the first fiscal intervention, however, **it is essential that monetary policy accommodate the fiscal stimulus**, by keeping the policy rates at the lower bound (or at most raising them weakly).¹² It is also worth emphasizing that the paths of economic activity

⁸ For analysis of the macroeconomic effects of government spending see, e.g., Romer and Bernstein (2009), Christiano et al. (2011), Eggertsson (2011), Woodford (2011), Coenen et al. (2012), Werning (2012), Schmidt (2013), Nakata (2015), and Rendahl (2015).

⁹ To reiterate, we define each fiscal policy intervention relative to a baseline in the absence of an adverse shock that we assume has occurred. If the baseline involves an increase in the primary surplus, it suffices that the primary surplus rises less than in the baseline.

¹⁰ It is unnecessary for maturing government bonds to be convertible into currency at par in all states of the world. It suffices if maturing government bonds issued as part of a concerted policy intervention, e.g., when the economy finds itself in a liquidity trap, are convertible into currency at par.

¹¹ Any economic model with public debt includes a relationship stating that the value of public debt, in real terms, is equal to the present value of primary surpluses. For simplicity, we abstract here from the present value of seigniorage.

¹² While keeping the policy rates at the lower bound may require the monetary base to rise, it is unimportant how the central bank expands the monetary base (e.g., by purchasing government debt or by making loans to

and inflation are uniquely determined in an economy in which fiscal stimulus of either kind described here occurs when the economy finds itself in or near a liquidity trap. **Accommodative fiscal policy adopted at an appropriate time can steer the economy onto a desirable path despite the lower bound.** See Box A for an expanded discussion.¹³

While it is instructive to think of the two fiscal interventions as distinct, it may be difficult to distinguish them in practice. For instance, if policymakers increase government spending (first intervention) without being explicit about subsequent budgetary adjustment, private agents are likely to attach some probability to the event that the present value of primary surpluses has declined (second intervention).

In a monetary union, of course, economic activity may fluctuate excessively in individual member states even if the single monetary policy of the union succeeds in stabilizing union-wide economic activity and inflation. **The possibility of asymmetric business cycles provides an additional reason, specific to the context of a monetary union, to use fiscal policy stabilization tools.** The business cycle fluctuations in the euro area have in fact been asymmetric, in particular following the onset of the sovereign debt crisis in 2010, in that the macroeconomic outcomes have differed markedly across the member states.¹⁴

It is also important to recognize the connection between fiscal policy and the effectiveness of central banks' purchases of government bonds. Suppose that fiscal policy makes the primary surplus rise with the real value of government bonds *including government bonds held by the central bank*, at least eventually. Under this kind of fiscal policy, an expansion in the monetary base to finance purchases of government bonds by the central bank leaves unaffected private agents' wealth (the sum of the monetary base and government bonds in the hands of the public) relative to the primary surpluses. By contrast, consider the case in which fiscal policy makes the primary surplus respond only to the real value of government bonds *in the hands of the public*. Then a permanent expansion in the monetary base to finance purchases of government bonds by the central bank increases private agents' wealth relative to the primary surpluses (because the primary surpluses decline as the quantity of government bonds in the hands of private agents falls). This wealth effect can be expected to boost economic activity. One can anticipate identical, sizable effects on economic activity if the central bank prints currency and transfers it to households ("**a helicopter drop**"), *provided that* fiscal policy does not raise the primary surpluses by the amount of the helicopter drop.¹⁵

banks). For analysis of the effects of a decrease in the present value of primary surpluses at the lower bound see, e.g., Bianchi and Melosi (2015) and Leeper et al. (2015).

¹³ In standard models of monetary policy there is, in addition, a different kind of indeterminacy than the one we focus on: Monetary policy alone cannot rule out that private agents lose confidence in a fiat currency, which will lead to inflation. Tax revenues (i.e., fiscal policy) are necessary. Note that this indeterminacy arises under the assumption that fiscal policy does not undertake the accommodative interventions that we describe. See, e.g., Obstfeld and Rogoff (1983), Cochrane (2011), and Sims (2013).

¹⁴ For example, at the end of 2015 real per capita GDP of Germany was 6 percent above its level from the end of 2007, whereas in the same period real per capita GDP decreased by 11 percent in Italy, 6 percent in Spain, 1 percent in the Netherlands, and 8 percent in Finland. Concerning the importance of fiscal policy for business cycle stabilization in a monetary union see, e.g., Galí and Monacelli (2008) and Ferrero (2009).

¹⁵ See Sims (1999), Benhabib et al. (2002), and Woodford (2003).

Box A: How fiscal policy can guarantee that economic activity and inflation are uniquely determined

This box explains how fiscal policy can eliminate the indeterminacy problem arising from the presence of the lower bound on nominal interest rates in the context of a standard monetary business cycle model with rational expectations. The discussion focuses on fiscal interventions that keep the present value of primary surpluses constant. For fiscal policies that avoid indeterminacy by means of lowering the present value of primary surpluses see Benhabib et al. (2002) and Woodford (2003).

The behavior of inflation, interest rates, output and its components is represented by a forward-looking Phillips curve, a consumption Euler equation, an aggregate resource constraint, and a conventional Taylor-type nominal interest rate rule that accounts for the lower bound. In the baseline setup the government keeps public spending constant. The presence of the lower bound implies that the model has two deterministic steady states. That is, abstracting from exogenous shocks and assuming that all variables remain constant over time, there exist, in general, two permissible outcomes for the inflation rate, real activity, and the short-term nominal interest rate. In the *intended steady state*, inflation is at the central bank's target, the policy rate is strictly positive, and real GDP is at potential. In the *lower bound steady state*, inflation is below target, the policy rate is stuck at the lower bound, and real GDP is subdued. The rationale behind the existence of the lower bound equilibrium is as follows. If inflation expectations are sufficiently below target, the monetary policy rule triggers a reduction of the policy rate to the lower bound. At the lower bound, low expected inflation raises the real interest rate. In response to the higher real interest rate, households reduce consumption and increase labor supply. In order for the labor market to clear, real wages have to fall, thereby reducing firms' real marginal costs. A decline in real marginal costs leads to a decline in prices, validating the low inflation expectations.

Accommodative fiscal policy can rule out the lower bound steady state. At the heart of the remedy is the Phillips curve, which prescribes a relationship between inflation and average real marginal costs. In steady state this relationship takes the form

$$\frac{\phi}{\theta}(1 - \beta)(\pi - 1)\pi = mc - 1$$

where π is the gross inflation rate, mc denotes average real marginal costs, and $\phi, \theta > 0$ and $\beta \in (0,1)$ are parameters.¹⁶ According to the Phillips curve, a below-target inflation rate ($\pi < 1$) can be a steady-state outcome if and only if real marginal costs are subdued ($mc < 1$).¹⁷ Marginal costs are, however, not independent of fiscal policy. An increase in public spending raises firms' labor demand, which in turn puts upward pressure on wages and thereby on real marginal costs. A fiscal policy rule that stipulates a sufficiently aggressive increase in government spending if inflation and real activity were to be too low can therefore insulate the economy from the lower bound steady state. The

¹⁶ In this example, price rigidities take the form of quadratic adjustment costs. Parameter ϕ reflects the size of the price adjustment costs, θ denotes the price elasticity of demand, and β is the households' subjective discount factor.

¹⁷ In the intended steady state $\pi = 1$ and $mc = 1$.

intended steady state becomes the unique steady state. The response of economic activity and inflation to disturbances is uniquely determined.

A formal treatment and several extensions are in Schmidt (2016).

4 Why achieving an accommodative fiscal policy stance is difficult in the euro area

Achieving and maintaining an accommodative fiscal policy stance has proved difficult in the euro area, in the current institutions setting. To see why, it is helpful to **reconsider the two fiscal interventions** from the previous section in the context of Europe's monetary union.

Suppose that a government increases spending and the budget deficit, aiming to keep constant the present value of the primary surpluses through future fiscal consolidation. In a country that issues its own fiat currency, the national fiscal and monetary authorities together can ensure that public debt is non-defaultable and the interest rates on public debt stay low as the fiscal accommodation unfolds. In the euro area, especially during the sovereign debt crisis, national public debt of several member states has been perceived to be subject to the risk of default or restructuring, to various degrees (and one member state, Greece, has restructured its euro-denominated public debt).¹⁸ In this setting, if a member state increases government spending and the budget deficit, it is *possible* that government bond yields remain low and the economic outcomes improve, in line with the discussion in the previous section. However, a key lesson from models of public debt with default risk is that **government bond yields can be driven by purely self-fulfilling beliefs**. Thus, given the same fiscal fundamentals, it is *also possible* that bond holders coordinate on an adverse scenario in which yields rise. In this case, reminiscent of the recent experience of several euro area member states, **expectations of default or debt restructuring risk becoming self-fulfilling: a government that would have been solvent if the yields had stayed low can end up being insolvent**, because it finds itself unable or unwilling to stabilize debt by increasing primary surpluses sufficiently after the yields have risen.¹⁹

The mere perception by bond holders that government default or debt restructuring is possible has immediate adverse effects on the economy, even if primary surpluses ultimately increase to ensure solvency. First, when government bond yields rise reflecting the probability of default or debt restructuring, the fiscal authority typically cuts spending and raises taxes. Either action depresses economic activity, reducing or reversing any desirable effects of the original stimulus. Second, as the perceived probability of government default increases, firms and households often also face rising

¹⁸ Sims (2012) emphasizes the distinction between sovereign debt denominated in a fiat currency that the sovereign can control and euro-denominated sovereign debt of euro area member states.

¹⁹ For recent models of public debt with default risk see Lorenzoni and Werning (2013), Nicolini et al. (2015), Corsetti and Dedola (2016), and Jarociński and Maćkowiak (2016). Bond yields are typically indeterminate in these models unless public debt is low (or very high). Therefore, one could argue that to avoid the indeterminacy a euro area member state should reduce its public debt. The problem is that decreasing government debt is costly for economic activity and social welfare. Accordingly, models of optimal fiscal policy suggest that it is preferable to reduce public debt slowly, if at all. See Barro (1979), Sims (2001), Schmitt-Grohé and Uribe (2004), and Adam (2011). Furthermore, in the wake of an adverse shock it is generally optimal to increase public debt, which can reintroduce the possibility of indeterminacy.

borrowing costs, and they respond by lowering investment and consumption.²⁰ Third, an expectation can arise that a default by a member state may lead to the member state's exit from the euro area. The specter of exit from the euro can be very detrimental to economic activity, in particular because creditors may withdraw funds even from perfectly solvent banks if worries arise that deposits and other private debt contracts may be redenominated. Finally, the costs stemming from the possibility of government default in one member state of a monetary union are likely to be transmitted to some degree, via economic spillovers and market contagion, to other member states.

The Outright Monetary Transactions program launched by the ECB in 2012 has eliminated or at least reduced the possibility of self-fulfilling creditor runs on a euro area member state, but the program per se falls short of creating the conditions necessary for an accommodative fiscal policy stance to be achieved. The reason is that to qualify for the OMTs, a country's fiscal policy must be pre-approved by policymakers from the other member states, and this pre-approval has been almost certain to require that the country's fiscal policy be non-accommodative. In practice, national fiscal policies appear to have remained effectively non-accommodative after the start of the OMT program, close to the policies that presumably would have been required to activate government bond purchases by the ECB under the OMTs.²¹

Turning to **the second fiscal intervention** from the previous section, we stressed there that if policymakers lower the present value of primary surpluses, the price level can be expected to rise and output to expand in the short run if public debt is non-defaultable. This kind of fiscal accommodation is effectively off the table in the euro area today. If an individual government attempted to reduce the present value of its primary surpluses, interest rates on its debt would rise due to the expectations of default or debt restructuring. There would be little stimulative effect on the economy, if any. Thus, as in the case of the first fiscal intervention, **a key problem is that debt issued by the fiscal authorities in the euro area is subject to the risk of default or restructuring. Clearly, there are no simple solutions to this problem. For instance, if all national public debt in the euro area were non-defaultable, member states might engage in fiscal accommodation excessive from the viewpoint of the monetary union as a whole.**²²

See Box B for an expanded discussion of self-fulfilling creditor runs on public debt and how a central bank backstop such as the OMTs can stop them.

²⁰ See Corsetti et al. (2013, 2014) for recent business cycle models that emphasize the link between government bond yields and interest rates faced by private agents.

²¹ Recall that the OMT program foresees purchases by the ECB of government bonds, focused on bonds with a maturity of between one and three years, in the secondary market.

²² See Bergin (2000) for a formal model of how an increase in fiscal transfers to households in a single member state of a monetary union can, if all national public debt is non-defaultable, lead to excessive inflation throughout the union.

Box B: Self-fulfilling creditor runs on public debt and a central bank backstop

Corsetti and Dedola (2016) model how a central bank backstop such as the OMT program can eliminate the possibility of self-fulfilling creditor runs in the market for public debt.

The economy consists of risk-neutral private investors, a fiscal authority, and a monetary authority. The fiscal authority issues debt denominated in a fiat currency and can decide ex-post to default on debt. The monetary authority supplies the currency as well as reserves that bear interest. The two authorities share the same objective: they dislike inflation, taxes, and default. The cost of inflation and the cost of taxes rise smoothly, whereas the cost of default has a fixed component independent of the size of the haircut. Both authorities optimize under discretion.

In general, the model has multiple solutions for the interest rate that private investors demand on bonds issued by the fiscal authority. If investors do not expect default, they ask for a low interest rate. Servicing the stock of public debt is then not too burdensome, and it is optimal to use taxes to repay it, thus validating the investors' expectation. If investors expect default, they demand a high interest rate. Debt service can in this case be so large that default becomes optimal, again validating the investors' expectation.

The monetary authority can intervene in the market in which the fiscal authority's bonds are traded. The monetary authority can issue reserves and purchase a fraction of the bonds. Since maturing reserve deposits are convertible into currency at par in every state of the world, the interest rate on reserves is always weakly smaller than the interest rate on the fiscal authority's bonds. Because of the interest rate differential, the overall cost of borrowing for the public sector falls if the monetary authority issues reserves to purchase bonds issued by the fiscal authority, making full repayment via taxation a more likely outcome than default and partial repayment. Thus equilibria with a self-fulfilling run by private investors on the fiscal authority followed by default can disappear if the central bank announces its willingness to intervene in the bond market.

However, in some states of the world the fundamentals might be so bad that default could occur independently of whether bond purchases by the monetary authority have taken place. In the case of default, the monetary authority suffers a capital loss and, if its balance sheet is sufficiently impaired, excessive inflation may result. On the one hand, the inflationary consequences of central bank balance sheet losses may strengthen the effectiveness of the backstop. Indeed, by engaging in bond purchases the central bank can reduce the fiscal authority's incentives to default to the extent that the latter recognizes the social costs of high inflation. In this case, the fiscal authority will perceive default as less desirable after central bank bond purchases have occurred. On the other hand, when the fiscal authority downplays inflation costs, the central bank would be willing to engage in bond purchases only if the risk of inflation is not too high and if the magnitude of extra inflation coincident with default is not too large.²³

²³ See Section 5 for more discussion of the link between the central bank's balance sheet and inflation.

5 A central bank's balance sheet may need fiscal support

Before turning to the future of the euro area, it is worthwhile to discuss another dimension of monetary-fiscal interactions that has attracted attention in the wake of the recent, large expansions of the balance sheets of the major central banks. The most important liabilities of a modern central bank are fiat currency and bank reserves. Assets of a central bank can include claims on private agents (often banks) and on the fiscal authority or, for instance in the euro area, on multiple fiscal authorities. Since the market value of assets fluctuates, a central bank can suffer capital losses. When the quantity of reserves is small, risks to the monetary authority's balance sheet stemming from this source are typically low. However, as reserves and the central bank's assets expand balance-sheet risks can become sizable.

Suppose that the market value of a central bank's assets declines significantly. The intertemporal budget constraint of a central bank states that the present value of remittances from the central bank to its ultimate owners (in the euro area, the fiscal authorities of the member states) must equal the market value of the central bank's assets minus reserves plus the present value of seigniorage. Therefore, **following a significant decline in the value of the central bank's assets**, it is possible that the present value of remittances will have to become *negative* if the present value of seigniorage is to remain consistent with price stability. In other words, **the monetary authority may have to be recapitalized** (i.e., remittances to the central bank may be necessary) **if it is to meet its price stability objective**; otherwise seigniorage and inflation will have to rise.²⁴

In addition to the risk of the central bank losing control of the price level after a balance-sheet disturbance, ex-ante distortions could arise. **Uncertain about fiscal support to its balance sheet, the central bank might avoid lending-of-last-resort interventions and balance-sheet policies** for fear of capital losses, even if such policies were beneficial for economic activity, price stability, and financial stability. A harmful bias towards weak economic activity, too-low inflation, and financial fragility might arise.

6 Way forward for the euro area

The key lesson from the literature is that in the wake of a large recessionary shock accommodative monetary and fiscal policy together may be necessary to stabilize the economy satisfactorily. How can the euro area achieve an accommodative fiscal policy stance when desirable? While addressing this question, it is important to recognize that successful stabilization policies can be run in different institutional settings, and therefore there is not a unique way for the member states of the euro area to proceed. **A strategy for the euro area to be able to implement effective stabilization policy**

²⁴ See Del Negro and Sims (2015) and Hall and Reis (2015) for analysis of the implications of a central bank's balance sheet for macroeconomic outcomes, and Corsetti and Dedola (2016) for the role of the central bank as a lender of last resort to the fiscal authority.

could rely on the following elements: a non-defaultable Eurobond that coexists with defaultable national public debt; fiscal criteria for the member states that allow for fiscal accommodation when required by economic conditions, while being consistent with fiscal discipline for each member state; the ability for each country to restructure national public debt, as a last resort, in an orderly way without prejudice to full participation in the European Union or the euro; fiscal support for the Eurosystem at the level of the euro area so that balance sheet considerations do not interfere with the ECB's policies.

6.1 Fiscal coordination around a non-defaultable Eurobond

It is helpful to discuss this strategy using as an example a specific – by no means the only possible – institutional setup.²⁵ **A “euro area fund,” similar to the European Stability Mechanism, would be able to issue non-defaultable Eurobonds and would stand ready to purchase national public debt of each euro area member state in the primary market so long as the member state's fiscal policy satisfied ex-ante set criteria.** As in Section 3, by “non-defaultable” we mean that the fund and the ECB would ensure that maturing Eurobonds would be convertible into currency at par, analogously to maturing reserve deposits at the ECB. The “no-default principle” would not need to apply irrespective of the actions of the fund and thus would not conflict with the ECB's price stability objective. It would suffice if the fund and the ECB ensured that maturing Eurobonds issued as part of a concerted policy intervention would be convertible into currency at par. The fiscal criteria would stipulate that in “normal times” each national fiscal authority would be expected to provide automatic stabilizers and to raise its primary budget surplus in response to an increase in the national public debt-to-GDP ratio, sufficiently to stabilize national public debt. Importantly, **the fiscal criteria would contain a provision for fiscal accommodation when required by economic conditions**, e.g., after the ECB policy rates had decreased to or close to the lower bound or another unusual event (possibly affecting only a subset of the countries directly) had occurred. **The necessary fiscal accommodation might be sizable, potentially falling outside the limits of the Stability and Growth Pact**, as currently defined and implemented, and it might have to last until the economy has recovered.

If the fund announced that a need for fiscal accommodation had arisen, member states would be expected to increase government spending, relative to the baseline without the need for fiscal accommodation, to be followed by an adjustment such that the present value of national primary surpluses remained unchanged.²⁶ As another possibility, each member state could be expected to raise its primary surplus, relative to the baseline without the need for fiscal accommodation, only to the extent that this member state's share in the overall stock of national public debt in the euro area had increased. Thus countries more affected by an adverse disturbance would raise their primary surpluses, while less affected countries would *reduce* their primary surpluses. Furthermore, the more affected member states would increase their primary surpluses *less* than in “normal times.” As Box C explains, the present value of primary surpluses of all member states taken together would

²⁵ The following idea of the “euro area fund” is inspired by Sims (2012).

²⁶ This is the first accommodative fiscal intervention from Section 3.

decline, relative to the baseline without the need for fiscal accommodation, and an accommodative fiscal stance for the euro area as a whole would result.²⁷

Since Eurobonds would be non-defaultable, their yield would be tied by arbitrage to the interest rate on the ECB's deposit facility, and hence **the fund would not be subject to self-fulfilling creditor runs** of the kind that member states are currently exposed to. Furthermore, so long as a member state fulfilled the fiscal criteria and thus qualified for support from the fund, the yield on the member state's national public debt would also be tied by arbitrage to the interest rate on the ECB's deposit facility, and therefore **member states in compliance with the fiscal criteria would not be subject to self-fulfilling creditor runs.**

If a member state found itself in violation of the fiscal criteria, the fund would be obligated not to purchase national public debt of that member state. The member state would then have to borrow exclusively from private creditors and, as a last resort, it could decide to restructure its national public debt. It would be desirable for national public debt restructuring to be as orderly as possible, with ex-ante known modalities and with all national public debt – whether held by private creditors or by the fund – treated symmetrically.²⁸ Moreover, **national public debt restructuring would be without prejudice to full participation in the European Union and the euro.** In particular, the fund would stand ready to resume lending after restructuring as soon as the member state in question satisfied the fiscal criteria again.

The fund would reduce the amount of lending available to a member state in case the member state was expected not to meet the fiscal criteria with some probability in the future. Similarly, the fund would reduce the amount of lending available to a member state in case the member state had recently restructured its national public debt. Private creditors would demand higher bond yields and restrict their lending in the wake of a restructuring or to account for the possibility of a restructuring in the future. **Ex ante, national fiscal authorities would have an incentive to fulfill the fiscal criteria so as to avoid interest rate premia and credit rationing.**

The fund would be given a strictly limited ability to tax uniformly across the member states. For example, the fund could have the right to impose a small VAT surcharge or a modest levy on banks' debt throughout the euro area. The present discounted value of a 0.5 percentage point euro-area-wide VAT surcharge can be estimated to be equal to 1.2-1.7 trillion euros, under conservative assumptions. In addition, the member states could direct to the fund seigniorage from the Eurosystem. The present discounted value of non-inflationary seigniorage from the Eurosystem can be estimated to be equal to 1.6-1.7 trillion euros.

The fund's responsibilities could be extended to provide a backstop, when necessary, to the Single Resolution Mechanism, the proposed European deposit insurance scheme, and the balance sheet

²⁷ This is the second accommodative fiscal intervention from Section 3. Note also that the fiscal criteria could allow a member state to smooth out the adjustment to a "loss of competitiveness" shock, i.e., a situation in which firms and workers in that member state realize that they have been setting wages based on excessively optimistic assessments of economic growth.

²⁸ With symmetric treatment, a private creditor would not become more exposed to the risk of national public debt restructuring as the fund increased its lending. One way to achieve an orderly restructuring would be to make it subject to the fund's approval and binding for all creditors given the fund's approval.

of the Eurosystem. With a euro-area-level backstop in place, the Single Resolution Mechanism could wind down, in an orderly way, any banks that might become insolvent, e.g., due to restructuring of national public debt, while the common deposit insurance scheme would act to prevent bank runs in all member states of the euro.

It would seem desirable for the fund to be subject to direct democratic control and to be independent of the individual member states. The fund would be able to tax and it would be making politically sensitive decisions about how to apply the fiscal criteria in particular cases (does a member state fulfill or violate the fiscal criteria, does a given event justify fiscal accommodation, what quantity of government bonds of a member state to stand ready to purchase, and so on). To meet the goals of democratic accountability and independence, members of the managing board of the fund could be elected by the European Parliament or the European Council, with a mandate to act in the interest of the euro area as a whole, and subject to the requirement not to hold any other public office.

A key objective of the fund and of the fiscal criteria would be to allow the primary budget balance of a member state to respond slowly to the stock of national public debt in the wake of an adverse shock. It is helpful to think of the primary balance as including a component that depends on the business cycle and a component that reacts to the stock of debt. In the Great Recession, the business cycle component of the budget deteriorated throughout the euro area. As recovery began, the need to improve the other component arose. Between 2009 and 2014, the structural primary budget of Italy improved from -1.4 percent of GDP to 2.3 percent of GDP, a cumulative fiscal effort of 3.7 percent of GDP coincident with a decline in GDP per capita by 5 percent. In the same period, the structural primary budget in Spain improved from -8.5 to -0.6 percent of GDP, coincident with a decline in GDP per capita by 4 percent. And the structural primary budget in Portugal, to give another example, improved from -7.4 to 2.7 percent of GDP, coincident with a decline in GDP per capita by 3 percent. Had the fund and the fiscal criteria been in operation, the fiscal adjustment could have been more spread out over time and the GDP outcomes could have been better.

It is possible, even likely given the experience of the OMT program in which no bonds were actually bought, that the fund would not have to make significant purchases of national public debt. The necessary size of the purchases by the fund could well be smaller than the ECB's Expanded Asset Purchase Program, in which the ECB is expected to buy about 1.8 trillion euros worth of assets, mostly national public debt, by the end of March 2017.

Box C: A fiscal policy criterion for a monetary union in case of a need for fiscal accommodation

This box considers an example of a reaction function for national fiscal authorities in a monetary union that preserves fiscal discipline for each country while, at the same, allowing for accommodative fiscal policy in the wake of an adverse disturbance. The example belongs to the class of fiscal policy reaction functions proposed by Sims (1997). Consider the following equation that governs the primary budget surplus of each of N countries constituting a monetary union:

$$S_t^n = \psi^n + \psi_B \left[B_{t-1}^n - \theta^n \sum_{m=1}^N B_{t-1}^m \right] + \psi_x x_t^n, \quad \text{for } n = 1, \dots, N,$$

where S_t^n is the primary surplus of country n in year t , B_{t-1}^n is the real value of national public debt of country n in year $t-1$, x_t^n is the output gap (the difference between output and potential output) of country n in year t . ψ^n , ψ_B , θ^n , and ψ_x are parameters, all positive, and the values of θ^n satisfy $\sum_{n=1}^N \theta^n = 1$. This equation states that a country's primary surplus responds to the country's share in the aggregate stock of national public debt in the union (and to the country's output gap). In particular, country n raises its primary surplus when the country's share in overall debt exceeds θ^n while reducing its primary surplus when the share falls short of θ^n . By contrast, a standard fiscal policy reaction function relates a country's primary surplus to the country's *own* stock of national public debt. The above equation implies a more accommodative fiscal policy after an adverse shock compared with the standard fiscal policy reaction function. Suppose that an adverse disturbance affects some countries in the monetary union more than others. As a consequence, the debt shares of the more affected countries rise, while the debt shares of the less affected countries decline. In subsequent periods, the more affected countries increase their primary surpluses, while the less affected countries reduce their primary surpluses. Furthermore, since the less affected countries loosen their fiscal policies, the more affected countries need less fiscal effort to restore their debt shares to θ^n . Fiscal discipline follows because each country's share in the aggregate stock of national public debt in the union is constant in the long run and because each country is to increase its primary surplus after having been disproportionately affected by an adverse disturbance.

The above equation implies that fiscal policy of the union as a whole does not respond to the aggregate stock of national public debt. To see this, sum the equation over n arriving at $\sum_{n=1}^N S_t^n = \sum_{n=1}^N \psi^n + \psi_x \sum_{n=1}^N x_t^n$. This is a special case of an active fiscal policy in the sense of Leeper (1991). In particular, after an adverse shock the present value of the union's primary surpluses declines, as in the second fiscal policy intervention from Section 3.

Jarociński and Maćkowiak (2016) study the effects of the above fiscal policy reaction function in an otherwise standard, simple dynamic general equilibrium model with sticky prices extended to include government debt of two "countries" and a centrally operated fund that buys national public debt while issuing own non-defaultable debt. When the standard fiscal policy rule is assumed and the fund does not operate, the model's outcomes are indeterminate. The indeterminacy is due to the presence of the lower bound (see Section 2 of this discussion paper) and the possibility of self-fulfilling creditor runs on government debt subject to the risk of default or restructuring (see Section 4 of this discussion paper). After a large adverse shock, the model's predictions of the central bank policy rate stuck at zero, low growth and very low inflation match the euro area's double-dip recession and the sovereign debt crisis. By contrast, given the above equation, the fund in operation, and accommodative monetary policy, the model's outcomes are unique. Furthermore, for plausible parameter values, the model predicts much larger output and only somewhat higher inflation than in the recent euro area data. The key reason behind these improved outcomes is more accommodative fiscal policy which, however, does not lead to increased spreads on government bonds thanks to the presence of the fund.

6.2 A benchmark to think about other proposals for reform

The example of an institutional setup from Section 6.1 helps to think about other proposals for reform of fiscal decision-making in the euro area. The ideas advanced by others tend to cluster around two polar cases: a strong central authority, with a broad ability to tax and spend or the power to veto national budgets or sanction member states (e.g., Villeroy de Galhau and Weidmann, 2016), and “fiscal renationalization,” where each member state could adopt any freely chosen national fiscal policy and would bear the consequences including default, with no support from other member states (e.g., Eichengreen and Wyplosz, 2016). **The institutional setup that we describe would make effective stabilization policy possible while placing the euro area somewhere in between the two polar cases of a deep fiscal union and fiscal renationalization.** Each member state would need to abandon some sovereignty in matters of fiscal policy (e.g., think of the fund's strictly limited power to tax). However, at the same time, in some aspects member states could *gain* sovereignty relative to the status quo. This is because the fiscal criteria would be defined simply as prescriptions for the primary surplus and total government spending contingent on economic outcomes. More specific decisions concerning taxes, expenditures, social payments as well as choices regarding structural reforms could be left to individual member states. A quid pro quo in which each member state loses some sovereignty in selected areas while gaining it in others might be acceptable to European citizens.

A deep fiscal union is neither a necessary nor a sufficient condition for effective stabilization policy. **A deep fiscal union with rules preventing accommodative fiscal policy would not help smooth out the business cycles.** Likewise, **national fiscal policies forced to tighten in a downturn in order to avoid creditor runs, default, and exit from the euro – a pattern that would be likely to arise under fiscal renationalization – would not help attenuate the business cycles.**

Table 1 summarizes selected other recent proposals for reform featuring Eurobonds or a euro area entity that would purchase national public debt. Often, the proposals focus on “**legacy debt,**” starting from the observation that national public debt levels in many euro area countries must be reduced discretely. The fiscal criteria outlined here could envisage a *slow* reduction of national public debt levels over time until a steady state is reached. With the fund ready to issue non-defaultable bonds to purchase national public debt, there would be no need for an upfront, sharp decrease in the stocks of that debt.

6.3 An option for the near future

Since a euro area institution able to issue non-defaultable debt already exists, the ECB, one could argue that the simplest solution would be for the ECB to act as the fund described here. Indeed, **a policy mix consisting of the ECB keeping its interest rates low and expanding the monetary base in order to purchase national public debt – as implemented in the Public Sector Purchase Program – together with fiscal accommodation by the member states would have had sizable effects on the economy and remains a sensible short-term option.** That being said, in the medium and long run the institutional structure including the fund, described here, appears preferable. The ECB does not have the ability to tax and therefore it cannot provide fiscal support for the balance sheet of the Eurosystem. Moreover, it seems desirable for an institution making decisions concerning fiscal policy

– like the fund described here – to be subject to more direct democratic control than that applied to a central bank.

7 Additional considerations

The argument for non-defaultable Eurobonds in this paper focuses on their role in business cycle stabilization policy. The economic literature also notes the favorable effects of a “safe asset” for financial stability and thus for saving, investment, and long-run growth.²⁹ To reap these benefits to a significant degree, the market for Eurobonds would have to be very liquid, or, in other words, the fund described here would have to purchase large quantities of national public debt more or less continuously. It seems preferable for the fund, at least initially, to intervene only when a need for euro-area-wide fiscal accommodation has arisen and possibly without making large purchases. The more sizable the fund's portfolio, the higher the fund's exposure to losses in case of national public debt restructuring, and therefore the more significant the tax backing that the fund would need.

The standard models of monetary policy that we have drawn on focus on the transmission mechanism from the central bank's policy rates to the interest rates faced by firms and households, and thence to investment and consumption decisions. By contrast, other models have emphasized that monetary policy affects directly firms' cash-flow and households' wages and disposable income, in an environment where borrowing constraints are pervasive.³⁰ The accommodative fiscal interventions considered in this paper, an increase in government spending and a rise in transfers, affect directly firms' cash-flow and households' disposable income, respectively, and therefore would have a sizable impact also if borrowing constraints are pervasive.

In addition, the standard models we have focused on abstract from issues such as hysteresis effects and secular stagnation that have received attention elsewhere in the literature, including recently.³¹ To the extent that hysteresis effects or secular stagnation are present, the case for resolute monetary and fiscal accommodation in the wake of a sizable adverse shock becomes even stronger.

8 Conclusions

In the wake of a large recessionary disturbance accommodative monetary and fiscal policy together may be necessary to stabilize economic activity and inflation. In the euro area, achieving and maintaining an accommodative fiscal stance has proved difficult. We described a benchmark institutional setup that would make it possible for the euro area to implement effective stabilization policy. We also suggested an option for the short run that consists of the monetary accommodation already being implemented together with fiscal accommodation by the member states.

²⁹ See, for instance, Krishnamurthy and Vissing-Jorgensen (2012).

³⁰ See, e.g., Den Haan et al. (2015), Gornemann et al. (2012), Kaplan et al. (2015), and McKay et al. (2015).

³¹ The classic treatment of hysteresis effects is in Blanchard and Summers (1986). Blanchard et al. (2015) provide a more recent, empirical analysis. Eggertsson and Mehrotra (2014) and Eggertsson et al. (2015) study models of secular stagnation.

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Table 1: The proposal in this paper compared with other proposals featuring Eurobonds or a euro area entity that would purchase national public debt

	The euro area fund in this paper	The European debt agency, Brunnermeier et al. (2011)	The Blue Bond agency, Delpha and von Weizsäcker (2010)	The European redemption fund, German Council of Economic Experts (2011)	The stability fund, Corsetti et al. (2015)	The Eurozone agency, Paris and Wyplosz (2014)
Objective of the institution	Enable a fiscal policy regime that allows stabilization of macroeconomic fluctuations	Create a safe asset	Discourage borrowing in excess of 60% of GDP (red bonds), make borrowing up to 60% of GDP cheaper (blue bonds)	One-time reduction of debt: bring government debt down below 60% of GDP	One-time reduction of debt: bring government debt down below 95% in all euro area member states	One-time reduction of debt overhang: halve debt-to-GDP ratios in the euro area member states
Purchases of government bonds by the institution	Buys government bonds of euro area member states as long as their fiscal policy satisfies ex-ante set criteria	Buys government bonds up to 60% of each member state's GDP	No	No. The fund accumulates claims on the governments by covering their funding needs in the roll-in-phase (around 5 years) of the redemption fund	Buys government bonds of the euro area member states in excess of 95% of each member state's GDP and immediately retires them*	Buys half of government bonds of the euro area member states and immediately retires them*
Assets of the institution	Government bonds of euro area member states (in case of default, all holders of government bonds, including the euro area fund, are treated equally), limited ability to tax uniformly across member states	Government bonds of euro area member states (in case of default, all holders of government bonds, including the European Debt Agency, are treated equally)	Rights to earmarked tax revenues transferred directly into the blue bond agency	Rights to earmarked mark-up on national tax revenues directly transferred to the fund plus a part of the foreign currency reserves	Rights to earmarked revenues during 50 years from wealth transfer tax, VAT surcharge and seigniorage	Rights to seigniorage, forever
Liabilities of the institution	Eurobond, non-defaultable similar to ECB reserves	Senior tranche (European Safe Bonds, or ESBies), and a junior tranche	Blue bonds, guaranteed jointly by the treasuries of the participating member states	Safe bonds, guaranteed jointly by the treasuries of the participating member states	Stability fund bills, collateralized by the earmarked 50 years of revenues and insured against liquidity shocks by the ECB	Agency's bonds
Time horizon	indefinite	indefinite	indefinite	20-25 years, in this period all government debt above 60% of GDP is repaid	50 years. By that time stability fund bills are paid back. (The proposal includes also creation of another, permanent safe asset as a senior tranche of a pool of government bonds.)	indefinite

* "Retires" means "converts into non-interest bearing perpetuities."