Geneva Reports on the World Economy Special Report 3

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PADRE

Politically Acceptable Debt Restructuring in the Eurozone

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ICMB INTERNATIONAL CENTER FOR MONETARY AND BANKING STUDIES

CEPR

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Executive Summary

The PADRE plan starts from the view that several Eurozone countries have accumulated unsustainable public debt. Unsustainability here does not imply that the governments are bankrupt; technically, given sufficient time, governments are rarely unable to raise adequate resources one way or another. Some governments may run out of time when they lose market access or face high borrowing costs, which is a case of illiquidity, not insolvency. Unsustainability here means that, once the sovereign debt crisis is over, several governments will face a debt burden that will stunt economic growth, prevent the use of fiscal policy – the only macroeconomic instrument left in a monetary union – to deal with cyclical swings and, generally, make them excessively vulnerable to market sentiment. The implication is that public debt must be restructured.

Debt restructuring, however, is highly contentious, to say the least. One reaction is that 'European states do not default'. This view runs counter to a long history of debt restructurings. More crucially, it ignores the costs of not restructuring and it assumes that any restructuring must lead to dire consequences, including bank crises and contagion. A rational approach must balance the pros and cons of all options. It must also allow for a careful preparation of each option, including a well-planned, non-disruptive debt restructuring.

Other objections to debt restructuring are political. It is pretty clear that the less-indebted countries of the Eurozone refuse to pay for the highly indebted countries. Also, all governments are determined not to provoke yet another banking crisis. These constraints are the starting point of the PADRE plan.

The plan involves an agency that acquires at face value a share of existing public debts and swaps them into zero-interest perpetuities. In practice, therefore, the corresponding debts are wiped out. The agency borrows the amount needed to acquire the debts on the financial markets and, as it pays interest on its obligations and receives no interest on the perpetuities, it makes losses. As it rolls over its obligations, its losses are perpetual. This is where the costs of the debt restructuring are borne. Existing bondholders are fully protected, eliminating any risk of a banking crisis.

The agency may be the ECB or another one like the ESM. The ECB, however, must be involved one way or another for three main reasons. First, it is the only institution that can mobilise the required resources (in our main example, we assume that half of existing debts are bought and swapped, which amounts to some €4.5 trillion). Second, because central banks do not have to worry about their capital, they have a unique credibility and can sustain large losses. Third, the ECB passes on its profits to Eurozone member countries; this applies to losses as well.

The way to eliminate politically unacceptable inter-country transfers is to require that the agency acquires and swaps public debts of all Eurozone member countries in proportion to each country's share of its capital, which determines how profits and losses are passed on to governments. This feature means that, over time, each government will 'pay back' the agency, over the indefinite future, the total amount – in the present value sense – of the initial debt cancellation in the form of reduced distributed profits. The debt restructuring thus amounts to a transfer of the debt burden from current to future generations within each country, without any transfer from one country to another or from current debt holders. It is just a restructuring, without any giveaway. The main, and only, merit is that a portion of public debt is not traded anymore. The remaining portion is moderate enough to dispel the threat of a run.

The PADRE plan is not inflationary, because it is not a monetisation of public debts. It does not involve any money creation; the agency borrows to acquire public debt. In practice, the ECB might use its money creation capacity to finance the acquisition of the public debt and then fully sterilise the money created in the first place, but the order of actions is immaterial.

As it finances, directly of indirectly the bond purchase, the central bank profits will be reduced forever, in line with the nature of a perpetuity. However, over time as GDP grows, the costs will become increasingly small. In the mean time, the costs are likely to exceed the regular seigniorage income of the agency. Indeed, under our base case example, the Eurosystem will suffer losses for a long time, measured in decades, but it will eventually return to profitability. The question is whether seigniorage revenues are sufficient to make up for the losses in a present value sense. Our calculations show that this is indeed the case, provided that the interest rate at which

the ECB borrows is not too high and that economic growth is on a normal path, which occurs under most plausible scenarios.

Then comes the crucial issue of moral hazard. If debt restructuring can be painless, would that not become an incentive for governments to accumulate again and again unsustainable public debts? Moral hazard can be contained, indeed eliminated, if implementation is subject to some conditions. The first condition is a tight and precise covenant. The PADRE plan specifies that, should a country accumulate debt again, the agency is obligated to swap the zero-interest national perpetuities back into interest-yielding bonds. Such an action, which is bound to trigger strong market reactions, should deter governments from sliding again into fiscal indiscipline. In order to prevent other governments from trumping the covenant in solidarity with a hard-pressed government, a second condition of the implementation also specifies that any such action would require a vote and automatically imposes the resulting agency losses on to the taxpayers of those countries that voted in favour of a relaxation of the conditions. Finally, the plan calls for the full implementation of the Treaty on Stability, Coordination and Governance (TSCG) – the adoption by each Eurozone country of a constitutional debt break rule, if possible through a referendum. This stands in contrast with the current situation where a number of countries have modified their constitution and where they adopted arrangements that depart in significant ways from the debt brake solution.

Finally, the plan puts the ECB in the highly exposed position of a fiscal agent. Other institutional arrangements are possible, but if the ECB is recognised as the best-suited agent, it is essential that the decision to undertake debt restructuring be made formally and publicly by governments and that the ECB be free to accept this role. In particular, the ECB must have complete freedom to independently set its conditions.

In conclusion, the PADRE plan offers a painless and efficient way of solving the debt overhang that, if not treated, will haunt Europe for decades to come. The plan stands to effectively bring the sovereign debt crisis to a definitive end and save the euro for good. If the plan is adopted, the market reaction is bound to be enthusiastic, which would provide the boost to growth and the broad political support that the Eurozone so desperately needs.

1 Introduction

The average public debt level of Eurozone countries now stands at 95.5% of GDP, and it is much higher in a number of countries. There is a lively debate about whether public debts can be too big and, if so, what the threshold is. At the very least, large public indebtedness is unhelpful, and at worst it is unsustainable. For many reasons, some of which are specific to monetary union, we take the view that in some countries the public debts are unsustainable, and will therefore not be sustained. If this conclusion is right, the choice is between orderly and disorderly debt cancellation. Given the tight economic and institutional integration of Eurozone countries, a disorderly debt restructuring by one country could easily trigger a systemic crisis of untold dimensions.

This report presents a plan to restructure public debts in a way that is not just orderly, but also economically efficient and politically feasible. Economic efficiency requires that debt restructuring does not lead to systemic consequences such as bank crises. Political feasibility recognises that Eurozone member countries have forfeited *de facto* their right to decide whether and how to restructure their debts.[1] It also recognises that the better-off countries are staunchly opposed to bearing the burden of any debt restructuring, either directly or indirectly via the ECB or the European Stability Mechanism (ESM), which the no-bailout clause of the European Treaty (Art.125) indeed rules out.

The Politically Acceptable Debt Restructuring in the Eurozone (PADRE) proposal starts from the obvious observation that any debt restructuring involves costs that must be borne by someone.[2] If the present value of the debt is to be reduced by, say, €100 billion, some people somehow will have to lose €100 billion. As suggested by the time-honoured permanent consumption theory, we consider that currently unsustainable public debts are a legacy of past policy errors and that the restructuring costs must be absorbed as gradually as possible. Imposing these costs on current debt holders has the merit of eliminating the moral hazard of debt write-offs, but it has the potential to create economic, and therefore political, havoc. A much better approach is to spread these costs across future generations. Since public debts have been accumulated at the national level, possibly reflecting poor institutions or irrational voter preferences, it makes good sense that the restructuring costs must also be incurred at the national level. This, in fact, is a key criterion of political acceptability. Of course, bailing out the current generation, in particular current debt-holders, represents a major moral hazard. For this reason, the debt restructuring must be organised in a way that minimises, possibly even eliminates, the moral hazard.

The PADRE plan meets all these requirements. It consists of transforming some of the existing debts into zero-interest rate perpetuities, which means that the corresponding amounts are effectively wiped out (and should no longer appear in the reported debt figures). The agency in charge of this transformation raises the necessary resources by borrowing at the market rate, thus incurring carrying losses. These infinitely repeated annual losses, in turn, are absorbed over time by taxpayers. We evaluate these costs and show that they can be of a manageable size. It remains to be determined which agency can be put in charge. In the base case, we show that the ECB plays a crucial role and can be the agent in charge. It is entirely possible, however to minimise its role and we describe an alternative. Of course, the process that we suggest may face some legal hurdles, an issue that we do not tackle, if only because the violation of the no-bailout rule since 2010 has shown that ways can be found around.[3]

Section 2 develops the case for debt restructuring and Section 3 examines the political constraints. Our proposal is articulated and evaluated in Section 4, which includes an alternative arrangement that minimises the role of the EBC. A number of variants are presented and evaluated in Section 5, while some caveats are presented in Section 6. The last section concludes.

1 It is not clear why this is so and the issue does not seem to have been analysed. The casual explanation – peer pressure – is not fully convincing in view of the failure of soft constraints such as the Lisbon agenda, and even the half-soft Stability and Growth Pact.

2 Many words are used to soften expressions such as default, cancellation, write-down, etc. We use debt restructuring, by which we mean an organised reduction of the present value of existing debts.

3 We do not condone the 'flexible' interpretation of the Treaty that justifies the bailouts since 2010. We simply note that legal objections to our proposal, if they exist, may be circumvented.

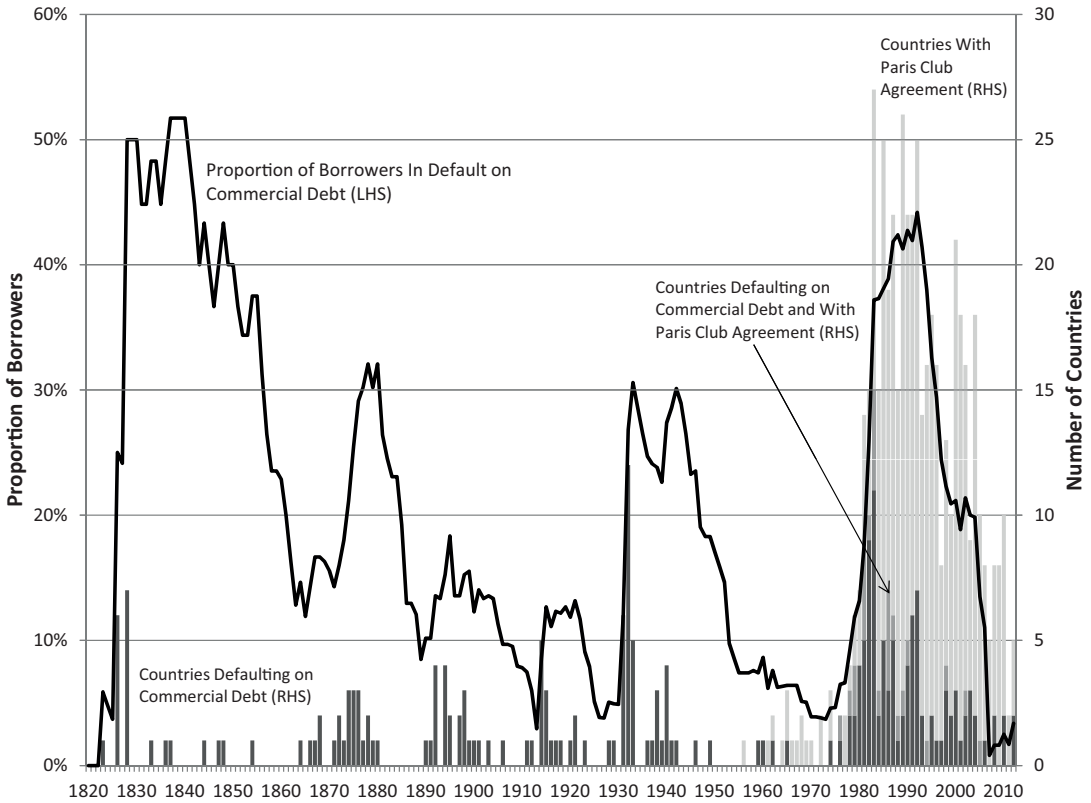
2 Economic Rationale for Debt Restructuring

Contrary to a widespread view, public debt restructurings occur quite frequently, as documented in Figure 1. From 1820 to 2012, there were 251 sovereign defaults. Since World War II, there have been 425 debt renegotiations under the Paris Club, which usually involve some debt reduction (Tomz and Wright, 2012). To be sure, defaults occur sporadically and a few countries account for a large share of these episodes. This explains why the developed countries, which have witnessed no defaults since the aftermath of World War II, do not feel concerned. This is a questionable position.

While history matters, reflecting national traditions and institutions, economic considerations also matter. There may come a point when defaults are less costly than the alternative. Defaults are costly because they produce a stigma that hurts the country in terms of market access and interest rates, including for trade credit. Borensztein and Panizza (2009) report that, in a global sample that includes repeat-defaulters, exclusion from markets lasts from four to eight years and interest rates rise by 250 to 400 basis points. The penalties for one-off defaulters are much less severe. Crucially, the stigma originates from the fact that lenders bear the costs of defaults. If this is not the case, as we propose, the stigma effect is likely to be short-lived, if it occurs at all.

The relevant question, therefore, concerns the costs of *not* restructuring high public debts. This is the subject of the present sections, in which we track down the conclusions that emerge from the literature. Cecchetti et al. (2012) note that we still have not developed the relevant theory, so that the literature mostly attempts to describe stylised facts.

Figure 1 Frequency of sovereign defaults, 1820-2012



Source: Tomz and Wright (2012).

2.1 Growth and the debt burden

A first argument is that excessively high public debt leads to subdued growth. Government borrowing can be growth-enhancing if it finances directly or indirectly productive spending. Investment in infrastructure (roads, railroads, telecommunication, etc.) directly contributes to production. Indirect benefits arise from spending on education, justice, health, and so on. Because the benefits from such spending materialise slowly, over many years or even decades, it is desirable to spread the financing over similar horizons. In this sense, public debt accelerates growth, as emphasised by much of the development literature.

On the other hand, a higher debt service requires raising more income through taxation, and taxation is known to have adverse effects on growth. It is plausible, therefore, that as debt increases, the associated tax burden will gradually erode the benefits from debt-financed spending. This will be the case if the tax burden rises more than proportionately to tax rates. It will also occur if the authorities substitute the inflation tax for standard taxation. Indeed, all episodes of high inflation are the consequence of such a process, and they are invariably accompanied by quickly declining economic activity.

The implication is that, starting from a low level, public borrowing initially boosts growth but eventually slows it down. The existence of such a debt threshold was first detected by Reinhart and Rogoff (2010), who reported a threshold of 90% of GDP, beyond which growth declines by 1% per year. Since high debt levels tend to persist over decades, the eventual impact is very large. Further work by Kumar and Woo (2010), Cecchetti et al. (2011) and Reinhart et al. (2012) confirmed the presence of a threshold, which would occur on average when the debt levels reaches between 80% to 100% of GDP, and at significantly lower levels for the developing countries. These results have been challenged by Panizza and Presbitero (2012), who do not find such a threshold, although they do not firmly rule it out either.

While the '90% rule' is now controversial,[4] it fits well some well-known cases. Japan, the current record-holder in terms of public indebtedness, has gone through 20 years of economic stagnation. Similarly, over the period 1992-2007, Italy has barely been able to stabilise its public debt at around 100%, but its economy has not been growing.

2.2 Sensitivity to shocks

A second reason why high public debt is undesirable is that it reduces the governments' ability to deal with adverse economic disturbances. Facing a recession, governments are expected to adopt expansionary fiscal policies. The downside is that deficits appear – or increase – on two counts: 1) the recession reduces tax income; 2) the fiscal expansion raises spending or reduces taxes, or both. This adds to the existing debt. If the initial level is high, the government is bound to be wary of letting the deficit deepen.[5]

Within the Eurozone, the Stability and Growth Pact restricts the counter-cyclical use of fiscal policy. Yet, at the same time, fiscal policy is the only macroeconomic instrument available at the national level since monetary policy has become a collective instrument. For this reason, it has always been understood that fiscal policies would have to become more active once the common currency is adopted (Begg et al., 1998). This is only possible if debt levels are low enough to allow each member government to use fiscal policy in a counter-cyclical way. This has not been the case since the onset of the sovereign debt crisis, when austerity has been imposed on the most indebted countries in spite of a historically deep and protracted recession.

The result is the continuing existence of a vicious circle. High public debt prevents the adoption of expansionary policies, which thwarts a growth solid enough to automatically reduce the public debt. The highly indebted countries face a long, drawn-out reduction of public debt likely to limit the use of fiscal policy, and in fact to induce a contractionary bias for one or two decades.

4 Part of the controversy is due to the European Commission's assertion that austerity is less contractionary than debt in excess of 90%. The existence of a threshold does not imply that the Commission's argument is correct.

5 There is substantial formal evidence that, ceteris paribus, cyclically adjusted deficits are negatively related to the pre-existing debt level; see, for example, Fatas and Mihov (2012), Gali and Perotti (2003), or Wyplosz (2005).

2.3 Financial market instability

Yet a third reason why high public debts are undesirable is related to debt service. Increases in the interest rate mean that borrowing costs rise. The effect is most potent when public debts are of short maturity or are indexed to interest rates. Even when the debt is of long maturity, higher interest rates impact new borrowing and therefore directly raise the cost of expansionary fiscal policies when they are needed. At any rate, the effect is directly proportional to the size of debt.

According to Hartwig Lojsch et al. (2011), in 2010 total public debt residual maturities of Eurozone countries were roughly divided into one third of less than one year, one third of between one and five years, and one third of more than five years. Of course, the situation differs from one country to another but, to fix ideas, for a country with a debt ratio of 100% and a similar maturity structure, a six percentage point increase in the interest rate – a likely change when monetary policy is brought back to normal – raises the debt charge by 2% of GDP within one year. This is a very significant amount.

Then there is the vicious circle that was a crucial trigger leading to the sovereign debt crisis. Rising debt alarms markets, which impose higher risk premia, which in turn raises borrowing costs and pushes the debt further up. The result is escalating interest rates that affect the whole economy, including banks and other financial institutions, as explained further in the next section. This vicious circle is more likely to develop when the public debt is large.

Thus, a large public debt is a major source of economic and financial fragility. In a world where financial markets move quickly and easily foresee adverse *scenarios*, a high debt can easily turn into a debt crisis when the two vicious circles described above get under way.

2.4 The special case of the Eurozone

A remarkable characteristic of the sovereign debt crisis is that it has been circumscribed to the Eurozone, so far at least. Even if a number of countries started off with large public debts, which then grew rapidly, other countries with similar debt levels and subsequent increases have escaped the same fate. Clearly, belonging to the Eurozone is a further source of fragility.

Another characteristic has been the emergence of a 'diabolic loop' between public debts and banking systems (Brunnermeier et al., 2011). Once governments face rising interest rate costs, often followed by the loss of market access, they naturally use moral suasion to convince domestic banks to keep on lending. The result is that bank portfolios soon become overweight with local government bonds that are increasingly looked upon with suspicion, which weakens the banks.[6] They face rising borrowing costs, or even a loss of market access. Having helped out the governments, banks naturally ask for government support, which the governments cannot afford; indeed they cannot raise the necessary funds from anyone else other than the domestic banks. Even though UK and US banks have lent massively to their governments, directly or indirectly starting from already weak positions, we have not witnessed the diabolic loop that has been a feature of Eurozone crisis countries.

De Grauwe (2012) offers a convincing explanation for why the Eurozone is special. In developed countries at least, where governments borrow in their own currencies, it is understood that the central bank can and will act as lender of last resort in extreme circumstances. Indeed, this is what the Federal Reserve and the Bank of England did when their banks came under pressure in 2007-8. They then acquired vast quantities of public debt instruments as they kick-started their economies. In the Eurozone, until quite recently, the ECB has refrained from similarly large-scale interventions. This is why the governments of Ireland and Spain had to borrow considerable amounts to bail out their banks, to the point that they too faced a sovereign debt crisis even though their pre-crisis debt levels were moderate.

This particular situation explains the diabolic loop that followed. It can be argued that this is what triggered the sovereign debt crisis. Aware that the ECB would not undertake 'whatever it took' to support public bonds, the markets effectively ran on the debts of the countries with high initial debts, or those that were facing a banking crisis. The European Summits that took place at frequent intervals from 2010 to 2012 only showed the disarray of policymakers facing a most challenging situation.

6 This is of course an argument for a strict asset quality review.

The best proof that the interpretation offered by De Grauwe (2012) is the correct one comes from the policy change that took place at the ECB in June and September 2012. The ECB committed to providing effectively unlimited support to impaired public bonds. The effect of the announcement was immediate and occurred without the ECB having disbursed any money. In effect, the announcement meant that the unique characteristic of the Eurozone – that is, a central bank that does not wish to act as lender of last resort – had been eliminated. Unfortunately, the ECB's commitment was, and remains, conditional on the adoption of IMF-Commission-ECB programmes whose characteristic is to impose pro-cyclical fiscal policies, also known as austerity policies. In that sense, the central bank's job is only partly done.

This analysis carries important implications for both ending the sovereign debt crisis and improving the governance of the Eurozone. It means that either the ECB recognises, and is allowed to carry out, its role as lender of last resort to both banks and governments, or that governments should maintain at all times sufficiently low debt levels such that they are able to support their banks if needed and to undertake expansionary fiscal policies when their economy slows down. In fact, both changes are required to secure the continuing existence of the euro.

2.5 Low debts are required in a monetary union

2.5.1 Dealing with bank crises

In 2007, public debt in Ireland and Spain stood at 28.7% and 42.5% of GDP, respectively. By international standards, these were low levels. By the end of 2013, they amounted to 132.3% and 99.6% of GDP, largely above what is considered sustainable (see Section 2.1). As explained in the previous section, this is the unavoidable consequence of a banking crisis when a country has given up its own currency and when the common central bank is not acting as lender of last resort.

There were good reasons for the ECB to be highly reluctant to intervene as lender of last resort for banks. First, the ECB had no direct real-time information on individual banks. It could request information from national supervisors, but this could take time and could not be independently verified. National supervisors, on the other hand, had reasons to present a favourable picture such that the ECB would conclude that the troubled bank was solvent and therefore provide funds. Second, acting as lender of last resort is inherently risky. The ECB stood to suffer losses, which would then reduce its income. As ECB profits are rebated to the Eurozone shareholders, all member countries would share in the losses. This created a perverse incentive and, in turn, a deep aversion to interventions that could penalise national taxpayers.[7] Third, the ECB had no authority to organise bank rescues, depending instead on the authorities of troubled banks. Here again, the incentives of purely national bank resolution authorities were perverse.

Yet, as noted in the previous section, this reluctance turned out to be directly responsible for the sovereign debt crises in Ireland and Spain, and this is why the ECB subsequently called for the creation of a banking union. A real banking union would intimately involve the ECB in bank supervision and resolution, and include an agreement on who would bear the losses. At this stage, the banking union agreed upon is an important step in the right direction. It is partial, however, as the ECB's supervision authority does not extend to all banks and the resolution mechanism still relies on national authorities, involving the ECB and other national authorities in a highly complex, and therefore flawed, process. Finally, the issue of who will bear potential losses is likely to be sidestepped.

The implication is that the ECB will remain reluctant to provide ample resources when needed and that national governments will remain ultimately responsible for rescuing their banks. It means that national debts must be sufficiently low to avoid dragging countries otherwise as fiscally disciplined as Ireland into a debt crisis.

7 These perverse incentives are a manifestation of the moral hazard problem, which arises when someone can take actions with the near certainty that eventual adverse consequences will be borne, partly at least, by others. This is usually the case when the adverse consequences affect others and are grave enough to create an immediate incentive to effectively share the burden.

2.5.2 Dealing with unsustainable national debt

The cases of Greece, Portugal and Italy illustrate another function of central banks. As already argued, several high-public-debt countries have so far escaped market pressure because it is generally understood that their central banks will act as lender of last resort to the governments in emergency situations. As with bank rescues, there are good reasons why the ECB has been highly reluctant to take on this classic function.

To start with, the Treaty explicitly rules it out. The fact that the no-bailout clause was disregarded in 2010 and since is not reassuring; quite the contrary. The clause was intended to reduce the risk of individual countries running up their public debt in the expectation that it would eventually be partly assumed by the other member countries, directly or through the ECB.

Given that fiscal policy remains a national prerogative, the Maastricht Treaty recognised the need for a mechanism that would impose fiscal discipline at the national level. The chosen route, the Stability and Growth Pact, was doomed from the start, and indeed failed. Wyplosz (2005) argues that the Pact creates a conflict between two legal principles: fiscal policy is part of national sovereignty, and yet the Commission, with approval from the European Council, can impose specific policy actions. Unsurprisingly, the pact was suspended by the European Council when it was first called into action in 2003 and subsequently failed to limit debt build-up in a number of countries, thus leading to the sovereign debt crisis. The failure of the Stability and Growth Pact has led to changes, none of which breaks the legal contradiction. The upshot is that fiscal discipline remains an elusive requirement of the European monetary union. We return to this issue in Section 5.2.

Fiscal discipline is inherently a long-run concept: year in and year out, the debt must not be allowed to grow. Yet, in any given year, temporary deficits may be needed to deal with adverse cyclical conditions or even particular adverse shocks, such as the need to recapitalise banks or natural disasters. When unexpected budgetary needs arise, they can be provided for either by other member countries or by the ECB; both courses of action are formally against the no-bailout clause and involve perverse incentives.

This is one reason why a number of policymakers and analysts have argued in favour of a 'fiscal union' or Eurobonds. It is never clear what exactly a fiscal union is, but the purpose is to somehow allow for the unexpected financial needs of one country to be provided by the others.[8] Eurobonds similarly aim at a mutual guarantee of national public debts. Both are presented as a desirable alternative to ECB funding or guarantees, since monetary financing of debts and deficits has historically led to high and often uncontrolled inflation.

Both schemes are correctly presented as a mutual insurance system. Insurance makes sense when adverse shocks may happen. A mutual arrangement is desirable when everyone may be hit; helping others in need, and being helped when in need, is a perfectly logical solution. The problem is that any insurance scheme involves perverse incentives. These arise when the shocks are not entirely random or when their occurrence can be mitigated by appropriate preventive actions. In these circumstances, one may accept to take unreasonable risks under the expectation that the costs, if they arise, will be shared while the benefits will not. In the present case, the risk is that a country will run up its public debt, with large political (and maybe economic) benefits, only to be bailed out in the event that it loses market access. Greece has provided an illustration of such a pattern, whether explicit or not.

In order for a fiscal union to function with carefully limited moral hazard, there must be collective oversight of national fiscal policies. This would require a transfer of sovereignty, which is likely to be politically unacceptable. Alternatively, as in the US, national fiscal sovereignty could be upheld, but then bailouts should be formally ruled out.[9] The difficulty of restoring the credibility of the no-bailout clause is a key reason why the fiscal union or Eurobonds are not practical options at this stage.

Nor are such arrangements necessary. The reason is the equivalence principle, which can be described as follows. When a country is hit by an adverse economic shock, the government can (and should) counteract the shock with an expansionary fiscal policy, which requires financing. The financing can come from a mutual insurance system of the type discussed, as is the case in the US, or it can be obtained by borrowing the same amount. In the first case, the amount received will be paid back when other countries are in need of help; if the shocks are truly random, receipts and payments should balance out in a present value sense. In the second case, the debt will be reimbursed in better times; the reimbursements will match the amount borrowed, again in

8 A fiscal union can take many forms and shapes, ranging from a large 'federal' budget, as in the US, to more limited arrangements like a Eurozone-wide unemployment insurance system.

9 For a comparison between the German federal model – which has inspired the governance of the Eurozone – and the US model – which would be better suited to the Eurozone – see Wyplosz (2013)

present value. Thus, mutual insurance and borrowing are equivalent ways for a government to navigate adverse economic shocks.

For the Eurozone, this means that the objectives of a collective insurance system – the goal of the fiscal union – can be met as well through borrowing in case of need. This equivalence assumes that a government can borrow, at normal interest rates, the same amount that it can expect to receive under the insurance system.[10] For that to be the case, the debt should be small enough to leave ample space for temporary increases without rising interest rates. This is an additional argument in favour of low debt, especially if one assumes, as we do, that a fiscal union is far off.

2.5.3 Wrap-up

There are many reasons for governments to keep their indebtedness low. All of these reasons apply to Eurozone countries, along with some additional ones. Lacking their own national central banks – these central banks merely act as subsidiaries of the ECB – Eurosystem countries cannot in principle count on the ECB to provide the kind of implicit and explicit backstop that other central banks offer. In effect, they borrow in a foreign currency, which can be a source of vicious cycles. Even though the no-bailout clause has been ignored and solidarity has been invoked to provide some form of insurance to the crisis countries, these loans have come with stern conditions that have created a long-lasting recession.

Keeping public indebtedness low – much lower than in countries with autonomous central banks – is an unrecognised implication of belonging to a monetary union. Currently, public debts average almost 100% of GDP, which is unsustainable for countries that have their own central banks, and therefore far too much for the Eurozone countries.

To what level must they be brought down? Reinhart and Rogoff (2012) find that the public debt threshold at which economic growth slows down is 60% of GDP for developing countries, and 90% for developed countries. One explanation for this is that, until recently in the case of emerging market countries, most developing countries borrowed in foreign currencies, which is also a characteristic of the Eurozone countries. To make things worse, currency devaluations, which help weather adverse shocks and thus partly substitute for fiscal policies, are not available to Eurozone countries, in contrast with developing countries. This suggests that Eurozone countries should aim at debts significantly below 60% of GDP.

Running down these debts through disciplined policies to achieve comfortable levels will take decades, and it is unlikely that no adverse shock will disrupt such a strategy. The unmistakable conclusion is that public debts must be deeply restructured some time soon.

10 An interesting example is the mutual insurance system adopted in Asia after the 1997 crisis – the Chiang Mai Initiative (CMI) adopted by the ASEAN countries plus China, Japan and Korea. In 2008, Korea faced an acute shortage of dollar liquidity. It did not consider calling in the CMI, largely because of the IMF conditions attached to it, preferring to borrow directly from the Fed.

3 Political-Economic Principles

Debt restructuring is a fairly mundane operation, with many extensively tested options. What makes the Eurozone case special is the size of the required operation and the political constraints. The size issue is taken up in Section 4. Here, we focus on the highly challenging political constraints, which combine governance and redistribution issues.

3.1 Governance

It was never anticipated that Eurozone governments might be in need of debt restructuring. Indeed, there has be no restructuring in the area since the aftermath of World War II, and very few in the 20th century. The paradox here is that the existence of the monetary union is the reason why such a need arises now. It was always known that the loss of monetary policy would be costly at times, and that fiscal discipline was a requirement. The loss of discipline was not ruled out and it was anticipated that this would lead to occasional crises (Begg et al., 1998), but the size of the debt build-up has defied all predictions. The Eurozone faces a situation for which it was totally unprepared.

In principle, each country is sovereign as far as its debt is concerned, which means that a restructuring is a national decision. Why, then, has it become a collective issue? A precedent was set in early 2010, when Greece lost market access. The normal procedure would have been for Greece to go to the IMF for immediate assistance and, quite possibly, to arrange for a debt restructuring. Back then, its public debt stood at 138% of GDP, compared with 189% by the end of 2013 after a first restructuring (the 'voluntary' private sector involvement of 2012). The view then was that 'European states do not default' and that any difficulty was an internal matter to be settled collectively without outside interference, including by the IMF. There was no legal basis for this approach and Greece could have ignored the friendly pressure of its EU partners. However, policymakers were worried about the risk of contagion and about the blow that some large European banks, already weakened by the subprime crisis, stood to face. They also were concerned by the implications of bank and insurance regulation in the event of an involuntary restructuring.

All these concerns remain present. A country could decide on its own to restructure its debt, but it would have to eschew all external support, including from the IMF where the EU countries might be able to block programme agreements. Furthermore, a solo restructuring could trigger legal actions that would sap the Single Market. Thus, any debt restructuring must be collectively agreed upon.

Since there is no pre-determined procedure for deciding on a country debt restructuring, the process can only be political, that is, initiated and managed by the governments. Why should other countries agree to a debt restructuring? One reason could be that the country in question is in dire straits, as happened with Greece. Another reason could be that some other countries also need to restructure their own debt. Admitting to that, however, is bound to carry a stigma – not to mention financial market reactions – such that only desperate governments would ever consider it. The bias towards inaction is simply overwhelming. If it is true that high public indebtedness reduces growth, inaction is bound to cut European incomes in huge proportions. For example, if the Eurozone were to 'normally' grow by 1.5% a year, a 1% reduction in its growth rate would result after 20 years in a GDP level 17% lower. The present value of cumulated annual losses would amount to 166% of current GDP, using a 2% rate of discount. As with Japan' two lost decades, the cost of inaction is simply vertiginous. As this cost is spread over time, however, it is tempting to deny it *ex ante*.

The implication here is that the state of inaction must be broken. This calls for a collective political decision that debt restructuring is the normal way of dealing with the legacy of huge and crippling public debts. At this juncture, such a decision appears completely unrealistic. One reason is the collective fear of stigma, another is the perception that debt restructuring must be a dangerous and uncontrollable experiment. The stigma would disappear once the decision is taken collectively. The PADRE plan, put forward in Section 4, shows that debt restructuring can be managed in a perfectly controlled way.

3.2 No redistribution

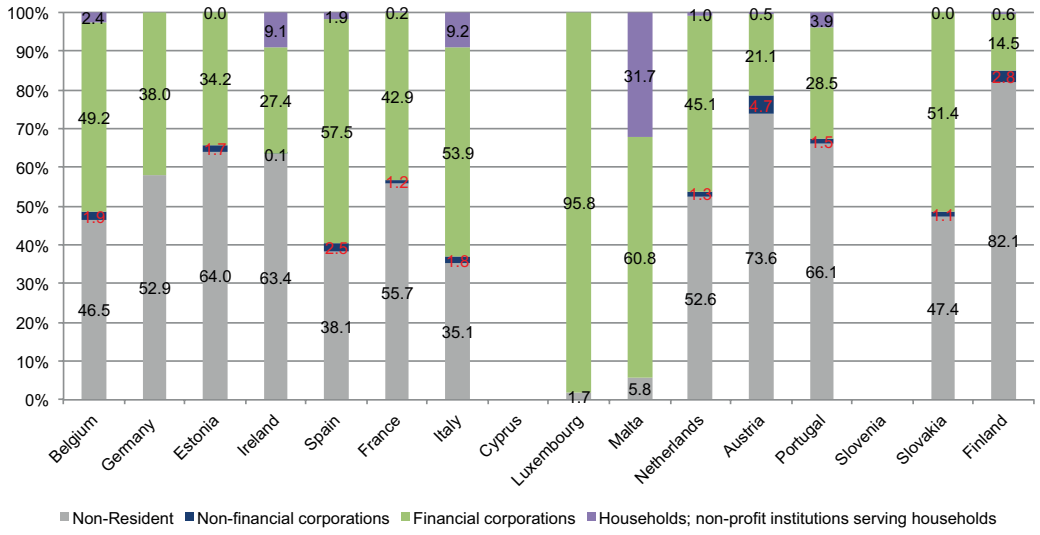
Debt restructurings have a terrible reputation because they usually amount to robbery, as the debtor singlehandedly chooses not to fully pay back the creditors. Obviously, there can be no debt reduction without someone suffering a loss, and herein lies the other source of opposition to any restructuring. In the Eurozone case, two main concerns play a prominent role.

First, one country's taxpayers are unwilling to pay for debts incurred by another's taxpayers over decades of fiscal indiscipline or as the result of bubbles fed by unchecked credit creation. Such transfers are grudgingly tolerated within a country out of solidarity borne out of a long history of shared efforts and culture. Even though solidarity is a fundamental aim of the EU, it is plainly not deep enough to make large transfers among countries acceptable to those on the giving end.[11]

Second, as noted above, banks hold a significant share of existing public debt. A deep restructuring that imposes losses on banks might easily trigger another global financial crisis. After all, Eurozone public debts are about $10 trillion, compared with the $6 trillion stock of US mortgages on the eve of the Great Financial Crisis in 2007, of which some $1.5 trillion were in subprime and Alt-A mortgages. No one wishes to take the risk of imposing big losses on banks, especially as many governments cannot borrow anymore to lend to failing banks.

Don't impose losses on foreigners, including Eurozone governments, the European Stability Mechanism and the ECB. Don't impose losses on banks. Who, then is to bear the burden of restructuring? Figure 2 shows who owns the public debts of Eurozone countries.[12] Except for Malta, and to a lesser extent Italy and Ireland, there are no significant remaining domestic non-bank bondholders.

Figure 2 Holders of public debts, 2012



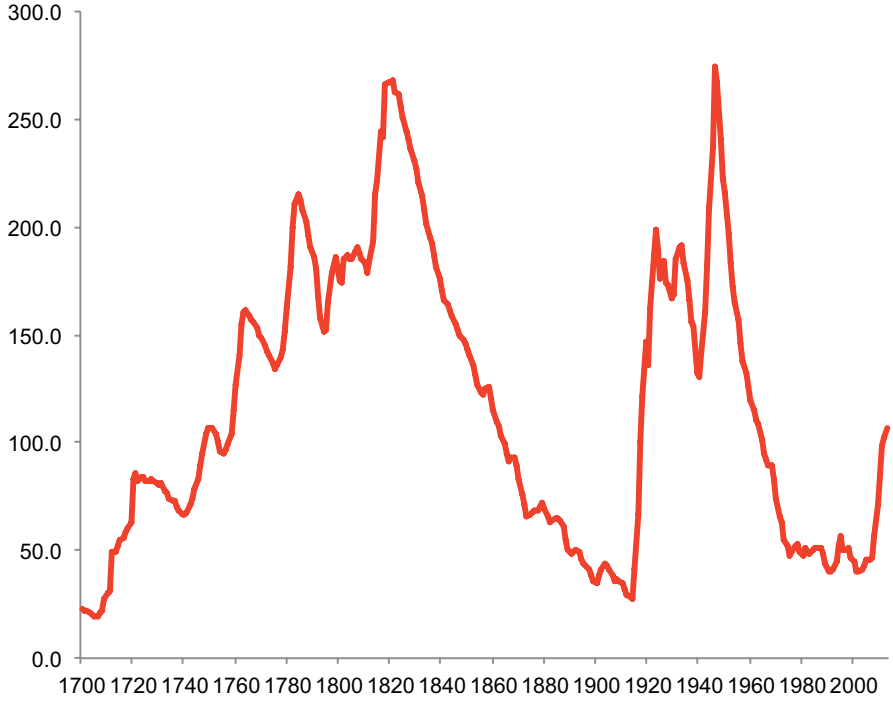
Source: Eurostat

The only remaining solution is to impose the unavoidable losses on future taxpayers, which does not redistribute income at all. Indeed, in the absence of a default, future taxpayers will pay current debts. The common practice of rolling over maturing bonds means that the debt climb-down can be spread over a very long horizon. This is in fact how large public debts have been reduced in the past. For example, British public debt stood at almost 300% of GDP at the end of the Napoleonic wars. It then took nearly a century of small budget surpluses to bring the debt down to 27% on the eve of World War I. Figure 3 shows that British public debt went back to its previous peak after World War II. It then took three decades to bring it back to 50% of GDP, this time more through growth and inflation than through budget surpluses, which was possible in a period of financial repression (Buiter, 1984).

11 Art 3(3) of the Treaty states that the EU "shall promote economic, social and territorial cohesion, and solidarity among Member States." Yet, the Treaty preamble is cautious as it describes the desire "to deepen the solidarity between their peoples while respecting their history, their culture and their traditions", i.e., it recognises that history, culture and traditions – the reasons behind solidarity – remain national.

12 Data for Cyprus and Slovenia are not available from Eurostat.

Figure 3 British public debt, 1700-2013 (% of GDP)



Source: 1700-1995 from Sylla and Ferguson as reported in Burda and Wyplosz (2012); 1996-2013: OECD.

The idea of restructuring the debt while leaving the losses on the very same taxpayers who bear the burden of the debt anyway may seem vacuous, because circular. In fact, the recipe is at the same time old and original, as the next section explains.

4 Policy Options

To present the idea without all the technical and institutional complexities, we start with a much simplified case of one country that restructures its debt with the support of its central bank. We then develop the PADRE plan fully but in a framework that still directly involves the central bank, i.e. the Eurosystem. Finally, we can consider a number of variants, including one that does not rely on the Eurosystem.

4.1 The PADRE proposal made simple

We start with the case of one country, not a member of a monetary union. Assume that the country has a debt of 120% of GDP and wishes to reduce it to 50%. It asks its central bank to buy at face value a total of public bonds amounting to 70% of GDP. This is the well-known debt monetisation process. At this stage, we note that the bondholders do not suffer any loss.

Debt monetisation is known as the source of run-away inflation, often even hyperinflation. The reason is that the central bank has injected cash into the economy, in this case worth 70% of GDP. If the money base was, say, 10% of GDP, this is an increase that should indeed soon be followed by destructive inflation. In order to avoid inflation, the central bank immediately reabsorbs the cash that it has injected by issuing its own debt instruments, for which it offers the interest rate that the market requires. Since there is no risk of inflation, the central bank debt is likely to be considered as safe and the interest rate is therefore 'normal' – likely to be lower than the rate required from the government, but we ignore this issue.

All that happened is a swap of a debt of the Treasury for a debt of the central bank. If we consolidate these two branches of the public sector, there is no change. Within the two branches of the public sector, the Treasury will pay the interest rate to the central bank on debt worth the 70% of GDP, which will allow the central bank to honour its own debt service. It is understood that the Treasury debt held by the central bank will be rolled over when the bonds come to maturity, pretty much as the central bank will roll over the bonds that its has issued. Budget surpluses, if they occur (see below), will allow rolling over less than the maturing government debt, which will be matched by similar partial rollovers of the central bank debt. Note that the government has no incentive to default on its debt to the central bank, since it owns it. Over time, as the economy grows, the value of the bonds owned by the central bank will decline as a proportion of GDP. In the long run, the ratio goes to zero and the problem disappears.

If interest rates on the government debt and on the central bank debt differ, there will be a transfer between the two branches of governments. If, as is likely, the central bank borrows at a lower rate than the government, it will make a profit. But since the central bank rebates its profits to the government, the difference is immaterial.

This all seems perfectly useless. Yet, there is a crucial difference. A big part of the government debt has been retired from the market, which now holds a debt worth only 50% of GDP, which it will consider as safe. Of course, the market may worry about the central bank debt. There is no doubt, however, that this debt can always be repaid since the central bank can create money at will. If the market trusts the central bank to abide by its low inflation mandate, and if the central bank does so, the threat of a run on the public debt has been eliminated. A sterilised debt monetisation has simply transferred debt service from a potentially dubious borrower (the government) to a trustworthy borrower (the central bank). This is just another instance of the power of central banks as lender of last resort. This power can be misused, but we assume that it will not and that the market knows that. A recent illustration of this power is the ECB's Open Market Transations (OMTs) programme established in September 2012, whereby the ECB would purchase unlimited ("whatever it takes") amounts of public debt under market pressure. Risk premia immediately declined without any disbursement by the ECB.

There is of course a risk of perverse incentives (moral hazard). A government that is so easily bailed out has every incentive to let its debt grow again. This means that the bailout must be accompanied by an institutional

change that guarantees that, from now on, fiscal discipline will be strictly respected by all current and future governments.

4.2 Application to the Eurozone: Key elements

Bond acquisition
The case of the Eurozone is more complicated because many governments share a common central bank. If the ECB acquires bonds issued by, say, the Portuguese government, it takes the risk that the bonds could be defaulted upon in the future, which would impose losses to all the other countries since they are the shareholders of the ECB via their national central banks. On the other hand, the interest rate on Portuguese debt is likely to be higher than the borrowing costs of the ECB, which would imply a transfer from Portugal to the other member countries. These features violate a key condition of political acceptability: the absence of transfers, or risk of transfers, among countries.

The answer to this condition and to the stigma effect, which is a cause for inaction, is that all Eurozone countries would jointly ask the ECB to acquire debts from all countries at face value. These acquisitions should be in proportion to the ECB shares owned by each national central bank. For example, the Bundesbank owns 26.97% of the ECB; the ECB would therefore dedicate 26.97% of its purchases of debts to the acquisition of German government bonds.

The decision to undertake the PADRE plan must be taken by the governments for another reason. Because it is fundamentally a fiscal action, it does not belong under the ECB mandate. Neither can it be an order given to the ECB, which is an independent institution. Formally, the official request signed by all governments can be turned down by the ECB, and it should be turned down if the ECB is not satisfied with the conditions, as explained below. Alternatively, the ECB can be bypassed as explained in Section 4.4.

Swap into a perpetuity
Currently, national debt instruments carry sharply different interest rates, at least those that were issued since the onset of the sovereign debt crisis. This implies transfers, which we want to rule out. In addition, as noted above, governments will have an incentive to renege on their bonds held by the ECB because the corresponding losses will be shared by all member countries, in proportion to their ownership.

The solution to both problems is to transform the bonds acquired by the ECB into perpetuities that bear a zero interest rate. This would effectively extinguish the debts acquired by the ECB since a promise to reimburse in the infinity of times, with no interest payments in the interim, is effectively no promise at all. The perpetuities would have the same face value as the bonds that they replace.[13] Technically, though, these perpetuities would appear at face value on the asset side of the ECB's balance sheet.

ECB Notes
The ECB would finance its purchase of bonds by issuing its own debt instruments, which we call ECB Notes. It would choose whatever maturity structure it sees fit. These instruments would appear on the liability side of its balance sheet.

Rebating losses to national central banks
At the end of this process, the ECB will hold perpetuities owed by member governments and, in equal amounts, it will owe the Notes that it issued. The former bear no interest, the latter do. Thus, the ECB would incur perpetual losses – the carrying cost. These losses will reduce the seigniorage income of the ECB. Since the central bank's profits are rebated to member countries, the losses will be passed over to each government in proportion to the shareholding key.

Crucially, over time the present discounted value of losses will exactly cancel the debts that have been cancelled through the swap into perpetuities, because these amounts are also proportional to the shareholding key. This way, *there is no inter-country transfer*. Each country will pay back – in the infinity of time – its debt through reduced profit transfers from the ECB.

13 An alternative would be that the perpetuities would have the same value as the present value of the bonds. This would reflect different interest rates but since the debt is extinguished, the merits of this option are not explored further.

As in the one-country example of Section 4.1, taxpayers will face the full cost of the initial debt. These costs are simply transferred over time to (present and) future taxpayers, exactly as when the debt is indefinitely rolled over. The gain is elsewhere: as a portion of the existing debt is retired from the market, it is not subject to a market run. If the portion is large enough, the remaining debt held in the market will be small and therefore safe, at least if governments remain fiscally disciplined.

It might be argued that the ECB could become bankrupt. The simulations presented in Section 4.3 show that this may happen under the relevant configuration of interest and growth rates. At any rate, the fact is that central banks cannot be bankrupt. Indeed, bankruptcy occurs when an establishment cannot honour its commitments. Central banks are special in the sense that they can always produce the money needed, in any amount and thus can never be bankrupt (Frait, 2005).[14] Should a central bank see its capital depleted, it can always replenish it slowly over time through retained earnings. Yet, the emergence of losses, along with reduced redistributed profits may become a political issue between the government(s) and the central bank, as explained by Archer and Moser-Boehm (2013). This is why Cukierman (2006) argues that the issue of distributed profits and losses should be contractually set, which seems to be the case for the ECB. Yet, the presentation of the situation has a powerful symbolic meaning. We return to this issue in Section 6.3.

Establishing fiscal discipline

In principle, the best solution is to make the operation conditional on institutional changes that would make it impossible for any government to be fiscally undisciplined. Section 2.5.2 notes that the chosen approach, the Stability and Growth Pact, has failed because it directly contradicts the fact that member states are sovereign. Ideally, therefore, either the pact should be abandoned and replaced with an arrangement that is compatible with sovereignty in fiscal matters, or sovereignty should be reduced. This is a tall order of requirement, unlikely to be adopted in the near future. This policy failure should not stand in the way of preventing an orderly debt restructuring.

The covenant

If enacted, the PADRE would provide a major boost to highly indebted Eurozone countries. The tradition is that rescues of this kind are conditional, as is the case of IMF loans or of the Troika loans to the Eurozone countries in crisis. The powerful logic behind conditionality and associated surveillance, however, does not apply here. In the fiscal area, conditionality concerns *flows*, as it aims at reducing deficits and possibly achieving surpluses over a few years. Debt restructuring is a one-off *stock* reduction; once it is done, the issue is gone, except that indebtedness should not be built up again. For this reason, the proposed mechanism does not involve a commitment to traditional macroeconomic medium-turn objectives, but instead focuses on long-term debt stability.

The plan includes a stringent covenant that relies on a simple, automatic and widely understood criterion that can be easily understood and monitored, for instance an upper limit to the debt to GDP ratio. The ceiling would be set at the post-restructuring level plus, say, a 10% flexibility allowance. For instance, if the theoretical post-restructuring debt ratio is 45%, a trigger would kick in automatically when the ratio rises to 55%. For most countries, this should leave sufficient room for manoeuvre to cope with cyclical downturns.

The trigger mechanism would work as follows. When a government breaks its debt ratio ceiling (say, by going 1% above the target level), the ECB will be obligated to call in 1% of the perpetuities for reimbursement. In effect, the ECB would unilaterally exercise a put on the covenant-breaking governments. It would ask for cash reimbursement for some of the perpetuities, at nominal value (an option would be to ask for all forgone interest to be paid, to make it even more dissuasive). Most likely, the delinquent government would need to issue new bonds to pay down the 'put'. This would lead to an increase of its debt level and subsequently the cost of its debt, since the market will expect a higher remuneration to compensate for the risk.

In order to guarantee transparency and a perfect execution of the put mechanism, the perpetuities will be deposited with an independent and international custodian, such as Euroclear or Clearstream. The custodian will be mandated to apply the terms and conditions of the covenant to prevent risks of political interferences.

The covenant will be measured every six months to avoid an excessively large, sudden deterioration. A covenant-breaking government would be sanctioned twice. As it needs to issue new bonds to reimburse the

14 In practice, a few central banks have been operating for a long time, and still operate, with negative capital. Among them, the Central Bank of Chile and the Bank of Israel are considered as among the most credible in the world.

ECB, the interest charges on new bonds will rise. In addition, the interest itself will increase as markets grow concerned and rating agencies downgrade the bonds. This clause respects the principle of no mutual insurance against unreasonable policies. It should create a strong incentive to avoid any slippage, severely limit the moral hazard, and ultimately promote fiscally responsible policies in the Eurozone.[15]

In the event that a country breaches its covenant and refuses to recognise the bonds swapped back from perpetuities, the situation would be treated as a default situation. The government would likely lose market access or face unsustainably high interest rates. In that case, the perpetuities held by the ECB would be treated as follows:

- A partial write-off in the ECB books, which would trigger the establishment of a provision to be covered by the governments on a *pro rata* of their shareholding in the central bank. The purpose of the write-off is to create some peer pressure on potentially delinquent states.
- The ECB would have the right to sell at a discount the perpetuities to private investors that are debtors of the delinquent government, such as multinationals or investors paying taxes there. Following the Brady bonds mechanism, these perpetuities could be used at face value to pay back debts to the delinquent government. This means that, when initially issued, the perpetuities should have a built-in transferable feature and the same enforceable value as bank notes.
- The ECB could also be given the right to transfer to the EU budget the perpetuities in exchange for the EU financial contributions earmarked for the delinquent state. In that way, the EU Commission would transfer cash to the ECB in exchange for the perpetuities. To make it less painful and more politically acceptable, a percentage of EU annual transfers could be shelved from this mechanism, but it would be paid to delinquent governments in the form of remittances of their perpetuities. This would not only create a strong disincentive to become delinquent, but it would also protect the interests of the EU and virtuous governments. All these potential perpetuities repayment schemes will be contractual (including a *pari passu* clause with all outstanding debt) when issued, and it is expected that the independent custodian – see next paragraph – will execute them, unless of course, the government decides to default for good.

Independent custodian

The risk will always remain that a delinquent government convinces the other governments to prevent the ECB from exercising the put option or to adopt some form of forbearance. Although the ECB is independent, and even with the use of an external agent, the privilege of sovereigns is that they can break or change any law that they wish. The trampling of the no-bailout clause in 2010 is a case in point. It was based on the solidarity principle of the EU. With the PADRE plan, however, the incentives work differently. Were a country to simply renege and refuse to pay back the put, the covenant would require that the ECB write down the corresponding debt. The loss would then gradually rise. Crucially, all Eurozone countries would share the losses suffered by the ECB. Solidarity would now have a precise and predictable tag.

Realistically, however, the governments could still be tempted to invoke special circumstances and block the implementation of the covenant. This eventuality should be recognised in the form of material adverse change (MAC) clauses. The list of admissible events should not be open-ended, but should specify the situations that would justify a suspension of the covenant. It could include sudden renewed high indebtedness. The decision to invoke a MAC clause should be taken by all the other governments involved in the PADRE plan. Moreover, the plan could be further strengthened by specifying that all potential financial losses will be borne by the countries that vote in favour of such a waiver on a *pro rata* of their equity stakes in the ECB adjusted for the non-voting governments. This would prevent purely political and unreasonable support.

The ECB is not indispensable

The presentation so far puts the ECB at the centre of the process as it provides the financing, sets and enforces the covenant. The reason is that a central bank has a unique financing capacity. This capacity can, and is often misused by cash-strapped governments, which invariably results in inflation, sometimes hyperinflation. The PADRE plan firmly closes down the inflation risk as it requires 100% sterilization, which breaks any link between

15 Still, a government might gamble again for an eventual bailout. There is just no shortcut to reimposing the no-bailout clause. The gradual and early warning nature of the scheme should, however, makes a bailout politically impossible. In addition, the covenant would explicitly state that the debt restructuring procedure cannot be carried out ever again.

the financing of the debt restructuring and money supply. Yet, a number of aspects are worrisome. The plan further softens the all-important distinction between monetary and fiscal policy and contradict sthe no-bailout rule. In addition, the apparent – yet misleading – debt monetisation nature of the proposal is bound to raise strong political opposition. These are all valid and serious objections. Here we answer the objections; in Section 4.4, we provide an alternative.

The main answer is that this is to be a one-off undertaking. Of course, doing one thing and promising never to do it again is hardly credible. The promise would be considerably more convincing if the Eurozone were to reform its fiscal discipline apparatus and re-dedicate itself to the no-bailout clause. Even if that does not happen, the covenant would all but guarantee that governments will have a powerful incentive to behave responsibly. In that case, there will be no reason to ever restructure public debts again.[16] It also bears restating that the debt monetisation will be entirely sterilised so that it will not be inflationary.

How about the risk of politicisation of the ECB? As it will be in charge of 'punishing' fiscally undisciplined governments, the ECB will become an easy scapegoat. This is why the covenant must make these punishments as automatic as possible. In addition, the decision to trigger the swap of perpetuities back into interest-bearing bonds could be assigned to another, fully independent body.

The decision to undertake debt restructuring should not be taken by the ECB alone; this would gravely undermine its credibility, as it would be open to the criticism that this is a debt monetisation by a central bank. Instead, it should be a formal request by the EU Council, explicitly characterised as unique in view of the historical legacy. The ECB should be given the opportunity to reject the request, if only because it is its legal right. It should also be offered the possibility of attaching covenants of the type described above.

4.3 The base case

This section presents an illustrative example of the proposed mechanism. There is no claim that this is the most desirable amount of debt restructuring. Instead, the objective is to develop a feel for the magnitudes involved.[17] Variants are presented in Section 5 in order to better understand how the mechanism can be put in place.

Debt restructuring

By end 2013, total gross public indebtedness of the Eurozone countries amounted to €9,184 billion, i.e. 95.5% of Eurozone GDP, with national debts ranging from 10.0% in Estonia to 176.2% in Greece (see the two first columns in Table 1). We describe a reduction of half of the existing debt, i.e. €4,592 billion. Next, we use the ECB capital shares to compute the amount of debt restructured for each Eurozone country, simply by multiplying €4,592 billion by each country's capital share.[18] The resulting amounts to be restructured are shown in the third column of Table 1. The fourth column, which displays these amounts as a percentage of national GDPs, shows that Latvia, Greece and Portugal are among the large beneficiaries because they have capital shares that are high relative to their GDPs. Conversely, the ratio of restructured debt to GDP is relatively small for Austria, Finland, Germany and the Netherlands.

The last column displays the post-restructuring gross debt ratios. With a ratio of 106.2%, Greece remains in the danger zone, which may justify the special treatment (official section involvement, or OSI) likely to be decided upon in 2014. The other countries with very large initial debts end up with relatively big debt ratios: Cyprus (62.1), Ireland (80.2), Italy (80.4) and Portugal (57.5). This is the drawback of banning inter-country transfers.

At the other end of the initial debt spectrum, a number of countries (Estonia, Latvia, Luxembourg and Slovakia) end up with *negative* gross debts. The natural solution would be for the ECB to buy all the existing bonds issued by the governments of these countries and to borrow at market rate the rest in the form of specially issued bonds. The resulting interest payments from the ECB would ensure equal treatment.

16 Instantaneous debt increases occurred when Ireland and Spain had to bail out their own banks. This is an additional reason why a full-blown banking union is of crucial importance.

17 We use 2013 numbers but include Latvia since it joins the Eurozone in January 2014.

18 Formally, all EU countries are shareholders of the ECB. However, only the Eurozone countries are entitled to receive profits. We adjust each country share accordingly. The resulting capital shares are shown in the Appendix.

Table 1 Base case

	Initial debt (2013)		Debt reduction		Post-restucturing debt	
	€ billion	% of GDP	€ billion	% of GDP	€ billion	% of GDP
Austria	235	74.8	127	40.5	108	34.3
Belgium	386	100.4	159	41.4	227	59.0
Cyprus	19	116.1	9	53.9	10	62.1
Estonia	2	10.0	12	63.3	-10	-53.3
Finland	114	58.4	82	41.9	32	16.6
France	1,932	93.5	929	45.0	1,003	48.5
Germany	2,178	79.6	1,234	45.1	944	34.5
Greece	322	176.2	128	70.1	194	106.2
Ireland	206	124.4	73	44.1	133	80.2
Italy	2,073	133.0	819	52.5	1,254	80.4
Latvia	10	42.4	18	77.2	-8	-34.8
Luxembourg	11	24.5	11	25.2	0	-0.7
Malta	5	72.6	4	58.7	1	13.8
Netherlands	451	74.9	261	43.3	190	31.6
Portugal	211	127.8	116	70.1	95	57.7
Slovakia	40	54.3	45	62.2	-6	-7.8
Slovenia	22	63.2	22	61.5	1	1.7
Spain	967	94.8	543	53.2	424	41.6
Eurozone	9,184	95.5	4,592	47.8	4,592	47.8

Source: AMECO on line, European Commission, December 2013.

Are the costs bearable?

What will be the losses suffered by the ECB? The ECB will receive no income from its perpetuities while serving interest on its Notes. The cost will therefore simply be the debt service, which depends on the maturity of the Notes. Here we make three assumptions, but other arrangements are possible:

1. The maturity of the Notes issued by the ECB will match the maturity of the retired public debts.
2. The ECB Notes will be considered perfectly risk-free (because a central bank cannot go bankrupt, see above). The ECB should be able to borrow at the same rate as Germany, and quite possibly at a lower rate.
3. Maturing ECB Notes will be rolled over by issuing new Notes with the same maturity. This will go on indefinitely to match the perpetuities that the ECB owns.

Under these assumptions, we use an average interest rate of 3.5% over time,[19] but we return to this issue below. As the ECB will issue €4,592 billion worth of Notes, the annual cost of the debt restructuring amounts to €161 billion, or 1.7% of Eurozone GDP. This is a large number, of course, but how should it be assessed?

A first comparison is with the ECB's capital. At €10.6 billion (not all fully paid out, yet), this is simply an order of magnitude too small to absorb such an undertaking but, like many other central banks, the ECB operates with very low capital. In addition, for our purposes, it is not just the ECB resources that matter, but also those of the whole Eurosystem, the ECB and the National central banks (NCBs). In mid-December 2013, the Eurosystem's capital and reserves stood at €90 billion. If one adds €305 billion of unrealised capital gains that make up the revaluation accounts, we are still far short of the scale of the debt restructuring.

These are not the relevant comparisons, however. The losses will accrue over time and need not be absorbed *ex ante*. Accordingly, we look at the ECB profits rebated to member countries, which are displayed in Table 2. Profits have been highly variable, including several years of no, or negative, profits as the EBC built up various reserve funds indicated above. If we take the average over 2008-12, they amount to €1.1 billion. At any rate,

19 Using current rates of non-crisis countries, the average interest rate across existing maturities is 3.3%.

these numbers are a small fraction of the estimated costs of the restructuring. Note that the US Federal Reserve is much more profitable. In 2011 and 2012 it transferred $75.4 billion and $88.4 billion, respectively, to the Treasury.

Table 2 ECB profits distributed to shareholders (€ billion)

1999	2000	2001	2002	2003
-0.2	2.0	1.8	1.2	-0.5
2004	2005	2006	2007	2008
-1.6	0.0	0.0	0.0	1.3
2009	2010	2011	2012	Average 2008-12
2.3	0.2	0.7	1.0	1.1

Source: Annual Reports, ECB

Progressive swaps

An attractive alternative to the acquisition by the ECB of sovereign bonds on the secondary market at the start of the PADRE plan is that the ECB undertakes to acquire the same amount of bonds, but only when they mature. The ECB would still bear the burden of refinancing these maturing bonds when they mature – effectively rolling them over. For each sovereign bond swapped at maturity, the ECB would receive from the government that issued it the equivalent of the nominal amount in non-interest bearing perpetuities, conditional upon some covenants (as well as solid new governance of economic policies being widely supported and approved by the people of the participating countries). The ECB would issue its own notes to refinance the sovereign debt swapped, at a chosen maturity (likely to be long term), thus fully sterilising the operation.[20]

This option bears the same cost in present value terms, since this is the total value of bonds restructured. However the annual costs would kick in progressively. For this reason, this is the procedure that the PADRE plan advocates.

Feasible annual seigniorage revenues

Past distributed profits, especially as they cover the initial years of the Eurozone, are a poor guide for evaluating the resources that will become available over a period of decades. Central banks are naturally profitable institutions because they have the monopoly on issuing currency. Since the production costs are a negligible fraction of the value of the product, issuing currency is a source of sizeable profits, called seigniorage.

With interest paid on bank deposits, the ECB raises seigniorage mainly on the currency that it issues at virtually no cost and that is a liability bearing no interest. In any year, the flow of income that accrues to the Eurosystem is measured as the increase in currency in circulation. For many reasons, the evolution of the stock of new currency put in circulation varies greatly from year to year. It is possible, however, to estimate reasonably well its future average evolution under plausible assumptions.

The volume of currency tends to grow steadily along with economic activity, and it tends to decline when interest rates rise. Over the indefinite future, we will assume that the Eurozone will grow at a constant rate and that the interest rate will be constant. Thus we will ignore business cycles, which are not of concern here as they approximately even out over the long run. We use the estimates of Buiter and Rahbari (2012), who find that the elasticity of currency relative to GDP is 0.8, so that a 10% increase in GDP is accompanied by an 8% increase in currency. The rate of growth of nominal GDP, in turn, is the sum of the rate of growth of real GDP and of the inflation rate. We need therefore to guess these magnitudes. For real GDP growth, we will start assuming a reasonably conservative 1.5% growth rate, but we will examine other possibilities later on.

The assumption about inflation is subtler. Producing more currency is a way of increasing seigniorage income. However, over the long run, a faster increase in money leads to more inflation, which raises interest rates, further increasing seigniorage revenues. This is indeed the simple calculation that several central banks have performed when pressed by their governments to produce more income. There are two major drawbacks, however, which

20 As before, full sterilisation means that there is no money creation and therefore that an institution other than the central bank can carry out this operation. Again, the advantage of going through the ECB is that there is no issue of bankruptcy and the recouping of the costs is guaranteed by reduced seigniorage revenues over the indefinite future.

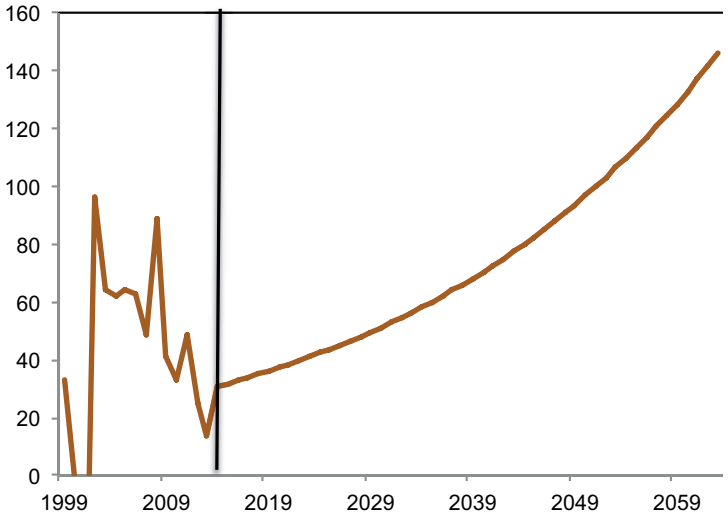
should discourage this strategy. First, as inflation and interest rates increase, demand for currency diminishes, thus hurting seigniorage. The often-repeated experience is that, starting from low inflation, small increases in the inflation rate fuelled by faster money creation initially raise seigniorage revenues but, beyond a threshold, these revenues decline. Second, higher interest rates mean a higher discount rate and therefore a reduced present value of seigniorage income.[21] This all means that inflation can, up to the threshold, help to increase central bank profits. Because an essential requirement of the PADRE plan is that it not be inflationary, we close this door and assume that inflation remains indefinitely at 2%, the average achieved in the Eurozone over its first ten years of existence. This fully determines the growth rate of currency.

Of course, no one expects real growth and inflation to remain constant forever. These assumptions allow us to simulate the average evolution of currency in circulation over the indefinite future. To a first degree of approximation, the results are acceptable as long as the actual values of these variables fluctuate around assumed values.

Figure 4 displays the historical evolution of the stock of currency until end-2013 (identified by the vertical line) and our estimates of its evolution over the next 50 years under the above assumptions. While the smoothness of the estimates is unrealistic, the order of magnitude of its trend is plausible. Remember that the annual cost of the proposed restructuring arrangement is estimated to be €161 billion forever. The figure suggests that it will take more than five decades for seigniorage to become large enough to cover these costs. Afterwards, seigniorage revenues will continue to grow – year in, year out – and increasingly exceed the costs.

This exercise implies that the Eurosystem will run a long succession of sizeable losses before profits kick in. Two questions immediately arise: 1) Will the profits make up for the losses? 2) If so, what happens in the interim? We deal with first question next and will consider the second one later.

Figure 4 Annual flow of seigniorage income (€ billion)



Source: 1999-2013: *Monthly Bulletin*, ECB; 2014-2063: authors' calculations (see Appendix 2).

Feasible seigniorage revenues over time

The first question really asks whether the present discounted value of seigniorage over the indefinite future exceeds the present discounted value of the costs of restructuring. The present value of the costs is simply the amount of debt cancelled, since the ECB will borrow that amount at market rate. In order to compute the present discounted value of seigniorage over the indefinite future, we need to assume what the interest rate will be. We have assumed above that the ECB can finance its purchases of bonds at a nominal rate of 3.5%. Another logic is, by definition, that over the long run, the nominal interest rate is the sum of the inflation rate and the 'natural' interest rate, usually estimated to be 2%. Given that we set the inflation rate at 2%, this would imply an interest rate of 4%. On the other hand, the natural rate could be lower going forward. The difference will matter greatly, mostly because a higher interest rate implies a stronger discounting of future seigniorage income.

21 We reason here in nominal terms, but the same conclusion is reached when discussing in real terms.

For that reason, we experiment with various interest rates, assuming in each case that they remain constant over the indefinite future.

We follow closely the calculations of Buiter and Rahbari (2012).[22] The present value of seigniorage income – the discounted annual increases in the stock of money in circulation (displayed in Figure 4) – is calculated over the indefinite future since the cost is generated by the perpetuities that the ECB holds against member governments.[23] We perform this calculation for various values of growth and interest rates, but we insist that annual inflation always remains 2%.

Table 3 shows the present value of seigniorage that the Eurosystem would generate under these assumptions. As expected, a higher economic growth rate increases seigniorage income because it raises the need for currency. An increase in the interest rate lowers income because future earnings are more heavily discounted, and this effect is powerful. Note that when the nominal interest rate is approximately lower than the nominal growth rate, the present value of seigniorage is infinite because the issuance of new currency grows faster than the discount factor.

The results are not completely reassuring. For a reasonable economic growth of 1.5%, if the interest rate is 3.5%, the ECB's income vastly exceeds the cost of debt restructuring. A slightly higher interest rate of 4% only generates an income of about €4,000 billion, which is insufficient to finance the debt restructuring. The shortfall of about €900 billion exceeds the capital and various loss-absorbing reserves of the Eurosystem.

Table 3 Estimated present value of seigniorage revenues (€ billion)

		Annual real growth rate		
		1%	1.5%	2%
Nominal interest rate	3%	14,552	Infinite	Infinite
	3.5%	3,946	11,133	Infinite
	4%	2,292	3,996	9,429

Source: Authors' calculations, see Appendix 2.

Note: These estimations assume constant inflation (2%), growth and interest rates over an infinite horizon. It is based on an initial stock of currency in circulation of €927 billion, as measured in November 2013.

Plausibility

Another way of looking at Table 3 is that the feasibility of the proposed debt restructuring depends on the likely permanent economic growth rate and on the interest rate that will prevail in the coming decades. Small changes in either assumption produce large effects on the present value of seigniorage income. This is illustrated in Figure 5. For different growth rates, each curve shows how the present value of seigniorage declines when the interest rate rises. The horizontal line indicates the present value of debt restructuring (€4,592 billion) that must be financed.

The nominal interest rate that will prevail in future years and decades is out of the control of policymakers. As indicated earlier, it is the sum of the inflation rate, which should not be compromised, and of the 'natural' real interest rate, which ultimately depends of world financial conditions, the balance of global saving and productive investment.[24]

22 Please refer to this article for the technical details. Appendix 2 provides a summary.

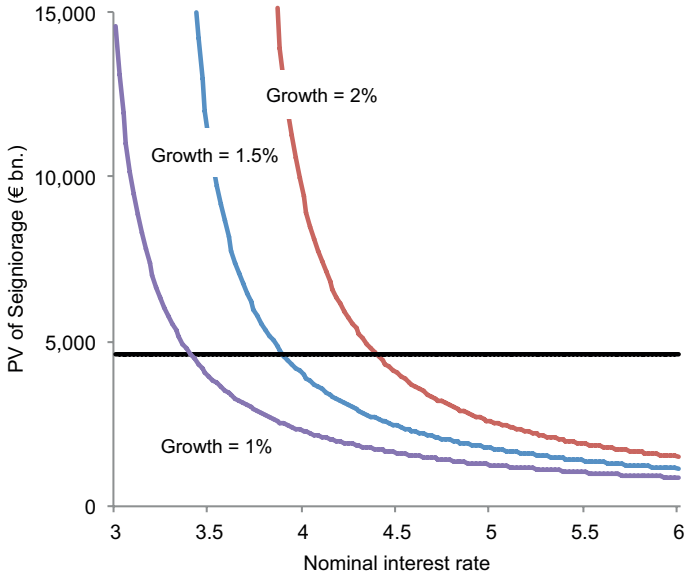
23 Under the assumptions that the real growth rate γ, the inflation rate π and the interest rate i are constant, the stock of currency will grow at an annual rate of $\mu = (1 + \pi)(1 + \gamma)^{\alpha} - 1$ where $\alpha = 0.8$ as explained above. Then the present value of seigniorage income is

$$S = \mu C_0 \frac{1+i}{i-\mu}$$

where C_0 is the pre-restructuring stock of currency (taken to be the November 2013 level of €927.5 billion). Note that if the interest rate i is less than the annual money growth rate μ, the present value is infinite.

24 Recent assertions that we are entering a period of secular low real interest rates are not comforting for they are predicated on slow world real growth, which would obviously affect the Eurozone economy.

Figure 5 Estimated present value of seigniorage revenues (€ billion)



Note and Source: See Table 3.

If there is any policy conclusion to be drawn, it is that enhancing economic growth is essential for the success of the proposed debt restructuring. The benefits of economic growth are multifaceted and have been exposed in myriad policy reports and academic publications, along with the drawbacks for the environment. For two decades after World War II, the Eurozone closed its gap *vis à vis* the US. Since the 1970s, the gaps has remained virtually unchanged as average Eurozone GDP per capita remains stubbornly 30% below the US level. This gap represents a very sizeable potential for accelerated growth, which largely depends on reforms being enacted.

When it issues its own notes, the ECB will pay market interest rates. These rates will depend on its credibility and on economic conditions in the Eurozone. Credibility will be partly driven by the relative sizes of the debt write-down and by the expected present value of seigniorage, as described above. Economic conditions should soon benefit from the debt restructuring. We can reasonably assume that the ECB will pay lower interest rates on its debt than those of the US bonds or German treasuries. They might settle between the Swiss Federal bonds and the German Bunds, currently between 1% and 2% for ten-year maturities. Of course, these are historically low yields, which is why we describe the base case with a conservative interest rate of 3.5%. On the other hand, with an interest rate of 2%, the present of value of seigniorage becomes infinite even if the real GDP growth rate is nil, which means that there is no financing issue.

4.4 The plan without the ECB

Principles

While the plan is designed to protect the ECB integrity and independence as strongly as possible, an alternative arrangement is possibly and probably desirable. We carried out so far the presentation of the base plan with ECB involvement for two reasons: first because its mechanism is more transparent and comprehensible; and second because we wanted to show that the ECB could be fully protected. Sceptics, however, will note that no institutional arrangement is ever 100% waterproof. In this section, we present an alternative that removes the Eurosystem from centre stage.

It may be useful to observe that the PADRE plan is based on the securitisation of the main Eurosystem's sheet asset: its future seigniorage revenues. Indeed, as long as the system's commitment does not exceed the value of this asset, the plan is credible and the securitisation – in the form of the issuance of ECB notes – can be carried out at the lowest, safe-asset interest rate. The alternative combines seigniorage securitisation with an institutional arrangement that further shields the ECB.

To that effect, the process can be carried by another agent. A possible agent is the European Stability Mechanism (ESM), but another agent can be created. Because the ESM already exists, we use it to describe the alternative and we note further below the limitations of this solution.

The alternative mechanism

The ESM substitutes for the ECB by acquiring the public bonds and swapping them into zero-interest perpetuities. It also designs and enforces the covenant. The ESM will receive in exchange the perpetuities issued by the states. This means that the losses inherent to the debt restructuring process will be borne by the EMS and therefore the member states and their taxpayers. The logic of the PADRE plan is to securitise the ECB seigniorage revenues to make up for these losses and ensure that there is no inter-country transfer.

To that effect, the member states formally agree to waive permanently their revenues from central bank seigniorage, which will be transferred to the ESM. Equivalently, they formally commit to transfering their shares of seigniorage revenues to the ESM, and the covenant accordingly stipulates an enforcement mechanism similar to the mechanism described above. This means that, in present value terms, the ESM is completely protected.

The flow of revenues and costs of the ESM, however, will be as described above for the ECB. For a number of years, annual seigniorage income will be less than its annual losses. We present estimates below in Section 5.3 and Figure 7. Since the ESM – or any other agent – does not have the loss-absorbing capacity of a central bank, the discrepancy must be dealt with explicitly. One solution is for the ESM to issue bonds to finance the redemption of the PADRE share of the sovereign bonds and for the subsequent interest payments on the ESM bonds issued. Since it benefits from the ECB guarantee, the ESM should be able to raise these resources at the same interest rate as the ECB itself. Another equivalent, but maybe less politically appealing, solution is for the ECB to directly finance the annual shortfall of the ESM.

The arrangement still guarantees that there will be no inter-country transfers. Indeed, the transfer of seigniorage revenues to the ESM covers all the costs. Since both the losses suffered by the ESM on national bonds and the financing through seigniorage income are proportional to the corresponding capital shares of the ECB, they balance out country by country.

Limitations

Currently, the ESM does not have adequate resources to undertake the plan. It has €700 billion in capital, of which €80 billion has been paid in. Its maximum lending capacity is €500 billion, which is considerably below the cost of PADRE (some €4,500 billion at its peak).

In addition, it must be checked whether the ESM's overall mission fits the purpose of the PADRE plan. According to Art. 3 of the Treaty Establishing the ESM:

> "The purpose of the ESM shall be to mobilise funding and provide stability support under strict conditionality, appropriate to the financial assistance instrument chosen, to the benefit of ESM members which are experiencing, or are threatened by, severe financing problems, if indispensable to safeguard the financial stability of the euro area as a whole and of its member states. For this purpose, the ESM shall be entitled to raise funds by issuing financial instruments or by entering into financial or other agreements or arrangements with ESM members, financial institutions or other third parties."

This seems to be compatible with the PADRE plan with one exception: conditionality. As a one-off programme that deals with the legacy of fiscal indiscipline, the plan does not, and should not, include the kind of macroeconomic conditions that have been invoked so far in ESM lending. On the other hand, the covenant includes permanent conditions that aim at fiscal discipline. Otherwise, it can be argued that the plan deals with "severe financing problems […]indispensable to safeguard the financial stability of the euro area as a whole and of its member states".

5 Variants

Because the base case is not certain to be financeable, this section examines three alternatives designed to reduce the cost either by being less economically desirable or by loosening the political requirements listed in Section 3.

5.1 Smaller restructuring

One obvious alternative is to reduce the scale of the restructuring, so that the overall cost falls within the worse case scenario of Table 3. We look at the case when the size of the base case restructuring is half of that assumed in the base case, i.e., when total Eurozone public indebtedness is reduced by 25%. As before, the resulting €2,296 billion cut is applied to each country according to its ECB capital key (shown in Appendix 1). The outcome is shown in Table 4.

Table 4 Debt restructuring of 25% of outstanding total debt

	Initial debt (2013)		Debt reduction		Post-restucturing debt	
	€ billion	% of GDP	€ billion	% of GDP	€ billion	% of GDP
Austria	235	74.8	64	20.2	172	54.6
Belgium	386	100.4	79	20.7	306	79.7
Cyprus	19	116.1	4	27.0	14	89.1
Estonia	2	10.0	6	31.6	-4	-21.7
Finland	114	58.4	41	20.9	73	37.5
France	1,932	93.5	465	22.5	1,467	71.0
Germany	2,178	79.6	617	22.5	1,561	57.0
Greece	322	176.2	64	35.0	258	141.2
Ireland	206	124.4	37	22.1	169	102.3
Italy	2,073	133.0	410	26.3	1,664	106.7
Latvia	10	42.4	9	38.6	1	3.8
Luxembourg	11	24.5	6	12.6	5	11.9
Malta	5	72.6	2	29.4	3	43.2
Netherlands	451	74.9	130	21.6	321	53.2
Portugal	211	127.8	58	35.1	153	92.7
Slovakia	40	54.3	23	31.1	17	23.3
Slovenia	22	63.2	11	30.8	11	32.4
Spain	967	94.8	271	26.6	695	68.2
Eurozone	9,184	95.5	2,296	23.9	6,888	71.7

Source: See Table 1.

Three countries (Greece, Ireland and Italy) emerge with debt ratios in excess of 100%, which are likely to be unsustainable. Much the same can be said about Cyprus and Portugal, with debts that remain close to 90% of GDP. In many respects, this is not an appealing option. The political cost of setting up the mechanism is likely to be same as with the base case, and yet many countries would remain far too vulnerable to market panic for comfort.

5.2 Transfers across countries

The mechanism presented so far is specifically designed to ensure that no country pays for others, which we consider a key political constraint. In this variant, we explore the case of some transfers being permissible, provided that they are limited. This could lead to politically challenging negotiations. Here we adopt a formula that reduces each country's debt according to its distance from the Eurozone mean. As intended, this means that highly indebted countries benefit at the expense of the low-debt countries. We adopt the following formula:

$$R_i = \alpha_i R + k(b_i - \bar{b})\, a_i R$$

where R_i is the amount of debt restructuring for country i, $R = \sum R_i$ is total debt reduction, α_i is the country's capital share, b_i is its debt to GDP ratio and $\bar{b}$ is the Eurozone average debt ratio computed as $\bar{b} = \sum \alpha_i b_i$.[25] We find that $\bar{b} = 95.7\%$ of GDP. The parameter k is an adjustment factor that determines the intention of taking into account the differences in debts ratios; it is set at zero in the base case. For illustration purposes, we now set it as equal to 1, but higher or lower values, respectively more and less redistributive, are possible. Table 5 shows the outcome when we aim to reduce total Eurozone debts by 25%, so that it is directly comparable with Table 4.

Table 5 Debt restructuring of 25% of current Eurozone debt with adjustment

	Initial debt (2013)		Debt reduction		Post-restucturing debt		Transfer received	
	€ billion	% of GDP	€ billion	% of GDP	€ billion	% of GDP	€ billion	% of GDP
Austria	235	74.8	49	15.6	186	59.2	-14	-5
Belgium	386	100.4	82	21.3	304	79.1	2	1
Cyprus	19	116.1	5	31.9	14	84.1	1	5
Estonia	2	10.0	1	3.9	1	6.1	-5	-28
Finland	114	58.4	25	12.7	89	45.7	-16	-8
France	1,932	93.5	446	21.6	1,486	71.9	-19	-1
Germany	2,178	79.6	506	18.5	1,672	61.1	-111	-4
Greece	322	176.2	114	62.6	208	113.6	50	28
Ireland	206	124.4	46	28.0	160	96.4	10	6
Italy	2,073	133.0	555	35.6	1,518	97.4	145	9
Latvia	10	42.4	4	17.3	6	25.1	-5	-21
Luxembourg	11	24.5	2	3.4	10	21.1	-4	-9
Malta	5	72.6	2	22.0	4	50.6	-1	-7
Netherlands	451	74.9	101	16.7	351	58.1	-30	-5
Portugal	211	127.8	76	45.7	136	82.1	18	11
Slovakia	40	54.3	13	17.7	27	36.7	-10	-13
Slovenia	22	63.2	7	20.2	15	43.0	-4	-11
Spain	967	94.8	264	25.9	703	68.9	-8	-1
Eurozone	9,184	95.5	2,296	23.9	6,888	71.7	0	

Source: See Table 1.

If we look at the most indebted countries, this adjustment achieves similar results to those shown in Table 1, i.e., with a total cost twice the size. Thus, we achieve a comparable debt relief at half the cost to the ECB; a cost that is well within the likely seigniorage revenues. The hitch is that the rest has to be paid by the less indebted countries; the amounts are shown in the last two columns. This adjustment hits the smaller countries with low indebtedness particularly hard. For instance, Estonia must transfer €5 billion, a relative small sum, but it amounts to 28% of its GDP. Germany, with a large capital share, must transfer €111 billion (4% of its GDP).

25 This weighted average is required to ensure that all the transfers balance out to zero.

This solution is clearly politically impossible. This example's main interest is to illustrate the power of loading the ECB with the task of absorbing the debt restructuring through reduced seigniorage. Any other solution is bound to be too small to be worth it or to require impossibly large inter-country transfers.

5.3 The opt-out clause

Another lesson from the previous example is that lower-debt countries will not want to transfer relevant amounts to the high-debt countries. One solution is to allow them to opt out from the scheme. This raises a tricky issue. If we restrict the debt restructuring process to a subset of Eurozone countries while keeping the ECB as the operating agent, what happens to seigniorage losses? Depending on legal considerations, the solution may involve an agreement that the central bank losses will be deducted only from ECB profits rebated to the participating countries or, alternatively, to set up an ESM-type agency that only involves the countries whose debts are restructured, this agency being funded by the ECB as described in Section 4.2.We do not pursue this governance aspect further here, as it does not matter for the economic analysis.

A simple example assumes that all countries with a debt ratio lower than 80% decide to opt out. As argued above, this may still be too much for the safe operation of the Eurozone, but it is easy to imagine a lower ceiling. In this arrangement, ten countries opt out from the scheme: Austria, Estonia, Finland, Germany, Latvia, Luxembourg, Malta, the Netherlands, Slovakia and Slovenia. Among the remaining eight countries, unsurprisingly, Greece is the binding country. Reducing its debt to 80% of GDP determines the overall debt reduction, which now amounts to €3,812 billion (Table 6).[26] Note that there is no transfer across countries, as each country that decided to restructure its debt will pay for it in the form of reduced seigniorage income from the ECB.

Except for Greece, the other restructured debts are around 60% of GDP, or lower. The overall cost is most likely to be bearable.[27] Note that Germany is now the country with the highest debt ratio, just below the 80% limit. This might persuade Germany to opt in. In that case, the overall cost is €5,506 billion, an amount that can easily exceed the financing capacity of the ECB. The reason is that the German debt is now reduced to 17.7% of its GDP because the amount of restructuring is determined by the cut to 80% applied to Greece, along with the no-transfer requirement.

Once we entertain the opt-out option, the number of possible arrangements is unbounded. We have presented an example for illustrative purposes. An attractive approach is to leave it entirely to each government to decide whether to participate under the no-transfer principle. Depending upon the number and size of participating countries, the overall cost could vary considerably. For the ECB to afford the burden, the more countries choose to participate, the smaller the size of restructuring.

26 Formally, if Greece's debt reduction is R_G, the overall debt reduction is $R = R_G/\alpha_G$. For all other participating country, debt reduction is $R_i = \alpha_i R$. The capital shares α_i are adjusted accordingly.

27 Note however that only seigniorage rebated to the participating countries should be earmarked to support this variant.

Table 6 Restructuring with opt-out

	Initial debt (2013)		Debt reduction		Post-restucturing debt	
	€ billion	% of GDP	€ billion	% of GDP	€ billion	% of GDP
Austria	235	74.8	0	0.0	235	74.8
Belgium	386	100.4	218	56.8	167	43.6
Cyprus	19	116.1	12	74.0	7	42.0
Estonia	2	10.0	0	0.0	2	10.0
Finland	114	58.4	0	0.0	114	58.4
France	1,932	93.5	1,276	61.8	656	31.7
Germany	2,178	79.6	0	0.0	2,178	79.6
Greece	322	176.2	176	96.2	146	80.0
Ireland	206	124.4	100	60.6	106	63.8
Italy	2,073	133.0	1,125	72.2	948	60.8
Latvia	10	42.4	0	0.0	10	42.4
Luxembourg	11	24.5	0	0.0	11	24.5
Malta	5	72.6	0	0.0	5	72.6
Netherlands	451	74.9	0	0.0	451	74.9
Portugal	211	127.8	159	96.3	52	31.5
Slovakia	40	54.3	0	0.0	40	54.3
Slovenia	22	63.2	0	0.0	22	63.2
Spain	967	94.8	745	73.1	221	21.7
Eurozone	9,184	95.5	3,812	39.7	5,372	55.9

Source: See Table 1.

5.4 Recouping savings from lower interest rates

The mere announcement that the ECB has been asked, and has accepted, to carry out the proposed debt restructuring is bound to instantly reduce the interest rates at which governments borrow. The rates will reflect the new, lower implied debt ratios (see Table 3). While classic debt restructurings are followed by years of painful fiscal policies, the proposal provides an immediate and significant sovereign debt reduction based on the ECB's credibility and on the commitment of the states to respect covenants. It would bring immediate and significant interest savings, thus contributing to budget balance.

Less virtuous countries will obviously benefit more. A possibility is that they share this windfall with the ECB in proportion to the savings generated. Two routes are possible: either a fixed percentage (say, 0.50%) paid to ECB on all new bonds issued by the member governments, or a proportional contribution based on the effective interest savings achieved by each government. The latter is fairer but much more difficult to implement and to justify in the long term, especially if the countries end up becoming virtuous, which is of course one of the objectives of the PADRE proposal. The interest charge will contribute to the ECB's overall cost of financing. A rebate of 0.50% of all debts would reduce the cost, but not by much - €23 billion in the base case. A rebate of, say, 3% on the crisis countries would bring in €44 billion.

In addition, there would also be a significant windfall for the existing sovereign bondholders (especially local banks, insurance companies, fixed income funds and hedge fund holdings of European sovereign bonds) who will benefit from the positive impact on the value of their assets, especially for the low-rated ones, due to the instant reduction of interest rates and improved overall sovereign risk. This huge windfall could be taxed and paid to the ECB. This issue is taken up in Section 6.1.

The case of Germany and other countries that currently borrow at relatively low interest rates should be taken into account. The 0.50% ECB interest charge should not prevent Germany from benefitting from lower financing costs than the existing ones, so that it would also be a net beneficiary of the plan. One way of

achieving this aim is to apply any of the levies only if the plan allows Germany and the other similar country to borrow at a lower (by, say, at least 0.50%) interest rate than existing ones.

5.5 Lower interest rate through financial repression?

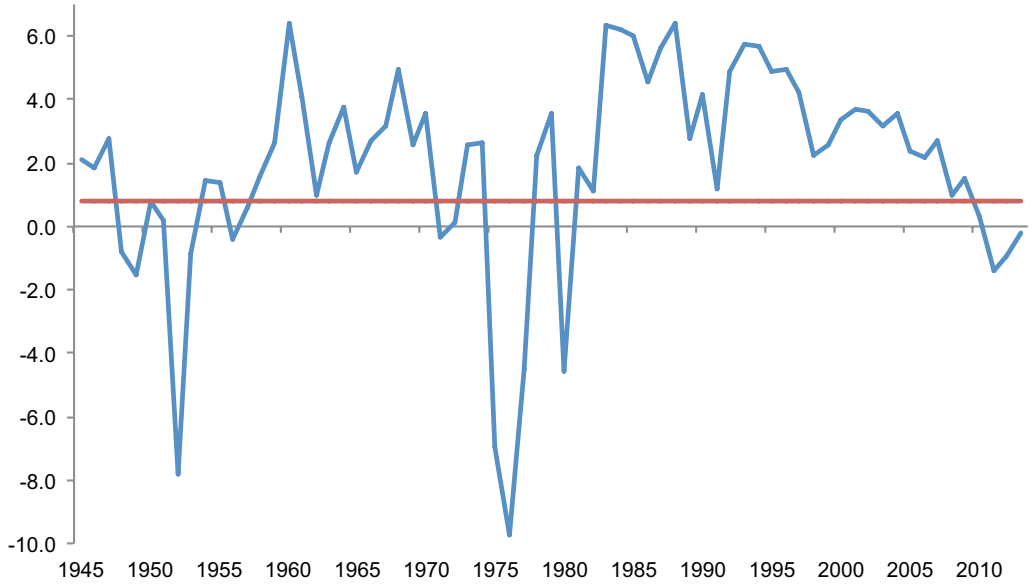
Figure 5 shows that small reductions of the interest rate can have dramatically positive effects on the present value of seigniorage. Within a globally integrated Eurozone, however, there is no scope for sustainably lowering the interest rate. History, however, tells us that countries trapped with high public debt have often resorted to financial repression. Reinhart and Sbrancia (2011) document how this powerful temptation is enacted through a combination of capital controls, interest rate caps and various other measures.

We emphatically do not advocate taking this route. We recall this historical fact to warn of the temptation that governments typically feel when they become frustrated with large debt. In the case of the Eurozone, the strong commitment to open financial markets may be eroded by poor growth in high-debt countries combined with rising fears of transfers in the lower-debt countries. The rise of anti-Europe populist parties is a signal that long-held convictions might be tested.

We found that even with low economic growth of 1% per annum and inflation anchored at 2%, an interest rate of 2.8% or under implies infinite seigniorage revenues, and therefore the ability to restructure any proportion of existing public debt without inter-country transfers. This would imply a real interest rate of 0.8%, which may seem very low and unlikely to prevail for long. This impression runs counter to the historical evidence. For instance, the real interest rate on UK government long-run debt is shown in Figure 6, along with the 0.8% line. Over the 69 years covering 1945-2013, the real rate has been less than 0.8% for 18 years, i.e., for more than one out of four years.

This all suggests that there are inefficient but tempting ways to reduce public debts. The main one is inflation, but this is unlikely in the Eurozone given the mandate of the ECB. Financial repression, on the other hand, is in the hands of governments. This is meant to be food for thought for those who see debt restructuring as unacceptable.

Figure 6 Real interest rates on long-term bonds in the UK, 1945-2013



Sources: Post 1999 data: *Economic Outlook*, OECD. Interest rates 1945-1999: Mitchell (2011). Inflation: 1945-1999: Global Financial Data.
Note: Realised rates computed as nominal rates less inflation.

6 Caveats

6.1 Bond acquisition price

As described, the PADRE plan starts with purchases on the secondary markets of public bonds at face value. Currently a number of bonds trade significantly below face value, while others (e.g., Irish bonds) trade above face value because the interest rate charged by the EMS has been subsequently reduced. The mere announcement of the plan will immediately increase the market price of the former while leaving the value of the latter unchanged. It can be objected that the capital gains on the bonds that trade at less than face value will imply an unfair transfer from taxpayers to current bondholders. Fairness and political acceptability require adequate treatment. Two solutions, which are indicated in passing in Sections 4.2 and 5.4, can be usefully recalled and detailed here.

To start with, note that, up until redemption, bonds normally always trade at less than face value, since they include interest income in addition to the reimbursement of the capital. Thus 'face value' should be read as 'properly discounted face value'.

It remains that, upon announcement, the PADRE plan will eliminate the risk premium on bonds whose current prices are lower than the properly discounted face value, hence instant windfall gains. They will come at taxpayers' expense since the acquisition will be at the new higher price. One solution is to tax away the windfall gains. The tax rate should be 100% and the ESM should be the sole beneficiary. However, if the plan requires a long public debate before being adopted, the markets are likely to adjust ahead and erase the potential windfall gain effect before announcement. The gains will instead accrue to bondholders progressively over time and will therefore be impossible to tax away, if only because taxes cannot be retroactive.

This is one additional reason why it is desirable that the PADRE plan proceeds with the progressive acquisition of sovereign bonds on the secondary market as they reach maturity, up until the programme is completed. Indeed, at that stage the redemption and face values are equalised. This applies to bonds that currently trade both above and below face value. Of course, the progressive acquisition programme will not eliminate private windfall gains. Investors who hold public bonds that trade below face value at the time of announcement will benefit from the plan. These gains, however, will not be at taxpayers' expense.

6.2 The aftermath of debt restructuring

One reason why governments dislike debt restructuring is that they fear the consequences. This is, in fact, the main and possibly the only reason why governments generally honour their debts. The immediate consequence of a debt restructuring is a loss of market access, even though the evidence is that this does not last for very long. Borensztein and Panizza (2009) find that within three years, on average, defaulting countries recover market access at normal interest rates. Another usual consequence is a deep exchange rate depreciation, which then fuels inflation (and erodes the domestic currency component of the debt).

The situation of the Eurozone is particular. Like many developing countries, member governments borrow in a foreign currency since they do not have a central bank of their own. Unlike developing countries, however, one default is most unlikely to have a significant impact on the exchange rate, unless a very large country implements it.

On the other hand, a deep depreciation boosts competitiveness, which may be badly needed if the default leads to a recession, as is often the case. Without a currency of their own, Eurozone countries are unusually vulnerable to a recession. This means that they should be careful not to harm domestic citizens, firms and banks. Our mechanism achieves this. Residents will face the costs of lost seigniorage but, in present value terms, these costs exactly match the debt write-down provided by the swap of bonds into zero-interest perpetuities.

Not should Eurozone member countries fear losing market access, since the proposed scheme does not hurt lenders. In fact, the countries that currently do not have market access, or that pay large risk premia, are likely to see these premia disappear almost instantaneously, which should lead to a steep increase in stock prices. The result should be an expansion as households and firms can borrow on much better terms all at once. After several years of misery brought about by the sovereign debt crisis, the relief is likely to be immediate and powerful.

6.3 Moral hazard

There is no doubt that a debt restructuring involves a serious moral hazard, especially if it is carried out by a multinational institution such as the ECB or the ESM. Indeed, why not let the public debt rise again after the restructuring if one can reasonably expects that a new restructuring will be forthcoming? Such a perverse incentive must be quashed in no uncertain terms.

Our response is a covenant that allows the ECB – or another agency – to swap back the perpetuities that it holds into bonds that would be disposed of and sold back to the financial markets, in gradually increasingsinstalments. The intention is to turn market pressure on governments that do not abide by strict fiscal discipline principles. As they face rising financing costs, it is hoped that delinquent governments will soon change their ways. Is this a 100% safe solution? The risk is that delinquent governments may take the gamble and wait for markets to exert pressure on the other Eurozone governments. This is, after all, what happened in 2010.

If rapid market sanctions cannot be fully relied upon to eliminate the moral hazard, we need to turn to an institutional approac , and The failure of the Stability and Growth Pact means that a new approach is required. Decentralising rules and enforcement to the national level is required, as long as member countries remain sovereign in fiscal matters. In addition, incentives to free ride on other countries must be firmly eliminated. This may seem a tall order of requirement but, fortunately, the required legal instruments already exist.

Decentralization is part of the Treaty on Stability, Coordination and Governance (TSCG),[28] adopted in 2012. This new treaty was intended to buttress the Stability and Growth Pact by adding the decentralised approach. It requires that Eurozone member countries adapt their national rules and enforcement mechanisms to achieve fiscal discipline. The combination of a rule and of strong legal enforcement is the way to go (Wyplosz,22005). The treaty promotes a good rule , the"'debt brake". This rule requires that the structural – i.e., cyclically adjusted – budget be quasi-balanced. This way, temporary deficits are allowed in bad times, but they must be matched by surpluses in good times. The treaty also suggests writing the rule in national constitutions so that it is legally binding and difficult to revoke. Constitutional debt brake arrangements were adopted in Switzerland in 2001 and in Germany in 2009, where it will apply in 2016.

Unfortunately, the TSCG is vague in many respects. Both the debt brake arrangement and the constitutional requirements are "if possible" obligations. In many countries, its translation into national legislation has led to much softer rules, often under the cover of excessive complexity, and few countries have made it a constitutional requirement. Fiscal discipline has not yet been effectively rednationalised.

One possibility is to make debt restructuring conditional on the adoption of the complete debt brake solution and its inscription in the national constitution. This would make fiscal indiscipline illegal.[29] Even so, governments may be able to"'flexibly interpre ' their constitutions. Therefore, they must be Proviged with the right incentives to achieve fiscal discipline

Henning and Kessler (2012) convincingly argue that the key to state-level fiscal discipline in the US is an informal rule adopted by Congress when it voted in the 1840s to deny yet more bailouts to some bankrupt states. Equipped with this incentive, all buy one US state then adopted various forms a balanced budged rule. For nearly two centuries, fiscal discipline has prevailed at the state level. Wyplosz (2013) shows that the US rule works better than that adopted for the German lender (before the debt brake), which is the inspiration for the Stability and Growth Pact.

This means that fiscal discipline in the Eurozone would be greatly enhanced by a no-bailout rule. Of course, such a rule is already part of the European Treaty as Art. 125. All it needs is to be applied. Regrettably, this rule has been ignored since 2010, the first time when it was meant to be binding. Policymakers who disregarded the no-bailout rule are not in a position to restore its integrity. The PADRE plan offers a chance to do so. This should

28 It is sometimes referred to as the Fiscal Compact.

29 A stronger requirement would be to additionally request that the rule be submitted to a referendum, where possible, as a way of making it harder for governments to exploit any loophole that they may discover.

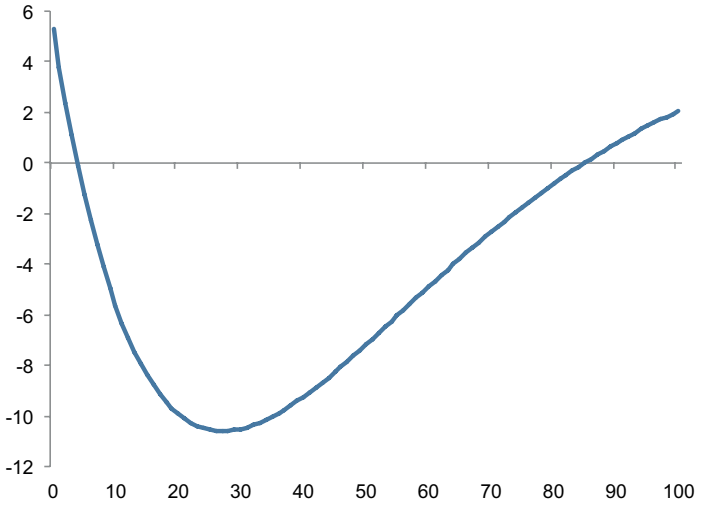
be one condition set by the ECB for accepting the task. The covenant could include one clause that would mandate the ECB to sell its bonds if the rule is broken again.

6.4 Treatment of the new balance sheet items

A characteristic of the PADRE plan is that, while the present value of seigniorage is likely to exceed the cost of restructuring, seigniorage grows slowly over time while the costs hit from the start. As a result, the Eurosystem suffers large losses over a long period of time. Even though it remains solvent,[30] its equity is bound be wiped out several times over. This requires a careful treatment of its balance sheet.

In order to understand the magnitude of the issue, we return to the base case presented in Section 4.3. The annual flow of losses permanently affecting the Eurosystem are estimated to be €161 billion. The stream of annual seigniorage income is depicted in Figure 4. It starts at €31 billion and steadily increases as the result of nominal GDP growth; our simulation shows that it takes 54 years to pass the €161 billion threshold. How can the Eurosystem cope in the meantime? Buiter and Rahbari (2012) conservatively estimate that the system's absorbing capacity – computed as the sum of the capital of the ECB and the NCBs, their reserves and provisions for asset revaluation – is at least of $500 billion, or about 5% of GDP. It is painfully insufficient to absorb the cumulating losses, as shown in Figure 7. In per cent of GDP, the Eurosystem's absorbing capacity declines and quickly becomes negative to reach a staggering minimum of –11% in year 33. It only becomes positive in year 85. Yet, the Eurosystem remains solvent (in the traditional sense) as long as the present value of the losses, which will accumulate and be recorded on the Eurosystem's balance sheet, is compensated by the present value of seigniorage, which is not recorded on the balance sheet. How can this off-balance-sheet asset be brought onto the Eurosystem balance sheet?

Figure 7 Absorption capacity of Eurosystem in the base case (% of GDP)



Source: Authors' calculations

Given that the current ECB paid-in capital and revaluation accounts are relatively modest (a few dozen billions together), in order for the ECB to avoid reporting a negative equity, the participating states might be asked to write off some of their central banks' claims on the ECB (e.g., the allocation of euro banknotes within the Eurosystem, which represented some €100 billion in 2012). This would reduce the shareholders fund of the national central banks and, as a result, it would share the cost of the plan and its burden with the beneficiary states. In mitigating the impact on the ECB balance sheet, it should also make it more politically acceptable.

Another route would be to capitalise (using conservative discount and growth rates) seigniorage income on the ECB balance sheet on the grounds that this is a predictable flow of income and hence an asset. This would

30 As already noted, solvency is not an economic issue for central banks. Here we need that the present value of seigniorage income exceeds the present value of the induced costs.

prevent the negative equity syndrome but, admittedly, it would be quite unconventional accounting for a central bank and subject to approval by the ECB Board and its auditors.

6.5 The size of the ECB

The proposed mechanism would massively increase the size of the ECB's balance sheet, currently af €90 billion, as well that of the Eurosystem, currently at €2,383 billion in the base case. Would that be a problem?

The asset side would increase by the size of the perpetuities created in exchange for the bonds acquired in the first step of the procedure. The liability side would increase as the EBC issues an equal amount of its own notes to sterilise the bond purchases. Of course, these liabilities will involve an interest service, while the corresponding assets would not be yielding any income. This is the source of the indefinite stream losses that must be matched by the off-balance sheet income from seigniorage. Beyond that, the large increase of the balance sheet is of no consequence. In particular, it is not a source of any increase in the money base and therefore it cannot have any inflationary impact.

Would a default by one country, of several countries, create any difficulty? The answer is negative. The reason is that zero-interest perpetuities have no intrinsic value. In its book, the ECB could simply replace the defaulted perpetuities with a line listing them as non-performing loans. Alternatively, in order to deter defaults, the covenant could specify that interest-yielding senior bonds automatically replace the perpetuities of a defaulting country. This would allow the ECB to sue the country and reclaim whatever can be recovered, including payments for the European Commission.

7 Conclusions

If adopted, the PADRE plan would bring the sovereign debt crisis to an immediate end. It would give governments the space that they require to support a much-needed recovery, using fiscal policy as the last remaining macroeconomic instrument in national hands. If backed by a proper arrangement guaranteeing fiscal discipline, the debt restructuring would be hailed by the financial markets and usher an era of renewed prosperity. It would definitely save the euro.

It is worth emphasising that the proposed mechanism is not a present to indebted governments. Nor is it an organised default. It is literally a restructuring of their debts, smoothing the repayment into annual installments spread far into the future. Over the years, economic growth would mitigate, and eventually eliminate, the burden, thus not seriously harming future generations. For instance, in the base case with 2% inflation and GDP growth of 1.5%, after 20 years the ratio of the perpetuities to GDP would be half its initial level; after 50 years, it would be 18%.

Of course, any debt restructuring may produce perverse incentives. Governments typically serve their debts only because they fear the consequences of not doing so. The painless mechanism that we propose could provide encouragement to accumulate public debts again and again. The conditions that we put forward are designed to rule out any such gamble. They include a tightly designed covenant and the requirement that fiscal discipline be upheld by adequate constitutional provisions. The covenant is meant to expose undisciplined governments to rapid market sanctions.

Perhaps the strongest opposition to any debt restructuring is political. One powerful motivation is the principle that debts must be repaid. Another is the fear that taxpayers in fiscally disciplined countries will be asked to pay for taxpayers in fiscally undisciplined countries. Our proposed mechanism is designed first and foremost to meet these political concerns. In fact, it does more. By conditioning participation in the arrangement, it offers a tool to nudge fiscally undisciplined countries toward discipline.

Finally, there is no denying that the accounting costs are fabulously high. Even though these costs are merely the visible sign of within-country redistribution over time, with no transfer across country, they may be intimidating. The only answer is that some form of debt restructuring is unavoidable. The longer the wait, the larger the amounts.

Appendices

Appendix 1: Adjusted shares of ECB capital

Austria	Belgium	Cyprus	Estonia	Finland	France
2.77%	3.46%	0.19%	0.25%	1.78%	20.24%
Germany	Greece	Ireland	Italy	Latvia	Luxembourg
26.86%	2.79%	1.59%	17.84%	0.39%	0.25%
Malta	Netherlands	Portugal	Slovakia	Slovenia	Spain
0.09%	5.68%	2.53%	0.99%	0.47%	11.82%

Source: ECB and authors' calculations.

Appendix 2: The arithmetic of seigniorage income

Let C_t be amount of currency in circulation at the end of year t. Seigniorage income during that year is $S_t = C_t - C_{t-1}$. The present value as off the beginning of year t of this revenue flow is:

$$R_t = \sum_{j=0}^{\infty} \frac{S_{t+j}}{(1+i)^j}$$

Assuming that the currency stock rises at rate μ each year, we have:

$C_{t+j} = (1 + \mu)^{j+1} C_0$, where $C_0 = C_{t-1}$, i.e. the initial stock of currency. Then:

$$R_t = \frac{1+i}{i-\mu}\mu C_0$$

The rate of growth μ of the currency stock depends on the demand for currency. Following Buiter and Rabhari (2012), we assume $C_t = kY_t^{\alpha}P_t$, where P_t is the price level and Y_t is real GDP. Given the inflation rate π and the real growth rate γ, this implies:

$1 + \mu = (1 + \pi)(1 + \gamma)^{\alpha}$

Knowing C_0, γ, i and π, we can compute R_t.

Since flow seigniorage income is $S_t = C_t - C_{t-1}$, with $C_{t+j} = (1 + \mu)^{j+1} C_0$ we have in any year t:

$S_t = [(1 + \pi)(1 + \gamma)^{\alpha} - 1](1+)^t C_0$.

References

Archer, D. and P. Moser-Boehm (2013), "Central Bank Finances", BIS Papers No 71, Bank for International Settlements.

Begg, D., P. de Grauwe, F. Giavazzi, H. Uhlig and C. Wyplosz (1998), "The ECB: Safe at Any Speed?", *Monitoring the ECB* 1, CEPR, London.

Borensztein, E. and U. Panizza (2009), "The Costs of Sovereign Default", IMF Staff Papers 56(4), pp. 683-741.

Buiter, W. (1984), "A Guide to Public Sector Debts and Deficits", *Economic Policy* 1, pp. 13-79.

Buiter, W. and E. Rahbari (2012), "Looking into the Deep Pockets of the ECB", *Global Economic View*, Citibank.

Burda, M. and C. Wyplosz (2012), *Macroeconomics, A European Text*, 6th edition, Oxford University Press.

Brunnermeier, M., L. Garicano, P. Lane, S. Van Nieuwerburgh, M.

Pagano, R. Reis, T. Santos and D. Vayanos (2011), "European Safe Bonds: ESBIEs", The Euro-nomics Group, www.euro-nomics.com

Borensztein, E. and U. Panizza (2009), "The Costs of Sovereign Default", IMF Staff Papers 56(4), pp. 683-741.

Cecchetti, S., M. Modanty and F. Zampolli (2011), "The Real Effects of Debt", Working Papers No 352, Bank for International Settlements, Basel.

Cukierman, A. (2006), "Central Bank Finances and Independence – How Much Capital Should a CB Have?", Tel Aviv University.

De Grauwe, P. (2012), "The Governance of a Fragile Eurozone", *Australian Economic Review* 45(3), pp. 255-268.

Fatás, A. and M. Ilian (2012), "Fiscal Policy as a Stabilization Tool", *The B.E. Journal of Macroeconomics* 12(3), pp. 1-68.

Frait, J. (2005), "Exchange Rate Appreciation and Negative Central Bank Capital: Is There a Problem?", Czech National Bank.

Galì , J. and R. Perotti (2003), "Fiscal Policy and Monetary Integration in Europe", *Economic Policy* 18(37), pp. 533-572, October.

Hartwig Lojsch, D., M. Rodríguez-Vives and M. Slavík (2011), "The Size and Composition of Government Debt in The Euro Area", *Occasional Paper Series* No. 132, European Central Bank.

Henning, C. R. and M. Kessler (2012), "Fiscal Federalism: US History for Architects of Europe's Fiscal Union", Working Paper 12-2, Perterson Institute for International Economics, Washington D.C.

Kumar, M. S. and J. Woo (2010), "Public Debt and Growth", IMF Working Papers, No. 10/174, International Monetary Fund.

Mitchell, B. (2011), *British Historical Statistics*, Cambridge University Press.

Panizza, U. and A. F. Presbitero (2012), "Public Debt and Economic Growth: Is There a Causal Effect?", MoFiR working paper No. 65.

Pâris, P. and C. Wyplosz (2013), "To End the Eurozone Crisis, Bury the Debt Forever", VoxEU, 6 August.

Reinhart, C. M. and K. S. Rogoff (2010), "Growth in a Time of Debt", *American Economic Review: Papers and Proceedings*, 100(2), pp. 573-578.

Reinhart, C. M. and M. Belen Sbrancia (2011), "The Liquidation of Government Debt", NBER Working Paper No. 16893.

Reinhart, C. M., V. R. Reinhart and K. S. Rogoff (2012), "Public Debt Overhangs: Advanced-Economy Episodes Since 1800", *Journal of Economic Perspectives* 26(3), pp. 69-86.

Tomz, M. and M. L. J. Wright (2012), "Empirical Research on Sovereign Debt and Default", Working Paper Series WP-2012-06, Federal Reserve Bank of Chicago.

Wyplosz, C. (2005), "Fiscal Policy: Institutions Versus Rules", *National Institute Economic Review* 191, pp. 70-84.

Wyplosz, C. (2013), "Europe's Quest for Fiscal Discipline", *European Economy Economic Papers* 498.