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ABSTRACT

The ECB as Lender of Last Resort for Sovereigns in the Euro Area*

The paper establishes that sovereigns, like banks, need a lender of last resort (LoLR). In the euro area the ECB, with its estimated €3.4 trillion non-inflationary loss absorption capacity, is the only credible sovereign LoLR. The ECB/Eurosystem has been acting as sovereign LoLR through its SMP purchases of periphery sovereign debt in the secondary markets. It has also contributed, through the deeply subsidised bank funding it provided through the 3-year LTROs, half of a mechanism to purchase periphery sovereign debt in the primary issue markets. The other half has been financial repression requiring banks in Italy and Spain to purchase more of their own government's debt than they would voluntarily and at below-market yields. We expect that, once Spain and Italy are under troika programmes, the Eurosystem will also lend to these sovereigns indirectly, through loans by the national central banks to the IMF which on-lends them to these sovereigns. We recommend that, to increase its effectiveness as LoLR, the ESM be given a banking license. To reduce the illegitimate and unaccountable abuse of the ECB/Eurosystem as a quasi-fiscal actor, we propose that all its credit risk-related losses be jointly and severally guaranteed/indemnified by the 17 euro area member states.

JEL Classification: E02, E31, E42, E43, E44, E63, G21, G28 and H12

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1. Introduction

This paper argues that the European Central Bank (ECB) has been acting as lender of last resort (LoLR) for the sovereigns of the Eurosystem since it first started its outright purchases of euro area (EA) periphery sovereign debt under the Securities Markets Programme (SMP) in May 2010 (see de Grauwe (2011b), Wyplosz (2011, 2012) and Buiters and Rahbari (2012a)). The scale of its interventions as LoLR for sovereigns has grown steadily since then and its range of instruments has expanded. We interpret the longer-term refinancing operations (LTROs) of December 2011 and February 2012 as being as much about acting, indirectly, as LoLR for the Spanish and Italian sovereigns by facilitating the purchase of their debt by domestic banks in the primary issue markets, as about dealing with a liquidity crunch for EA banks. A future third LoLR instrument will be indirect lending by the Eurosystem to periphery sovereigns. This will be achieved through national Central Banks lending to the International Monetary Fund (IMF) and the IMF lending to the Spanish and Italian sovereigns, once these sovereigns have come under suitable troika (IMF, European Commission and ECB) programmes. If and when the European Stability Mechanism (ESM) gets a banking licence (becomes an eligible counterparty of the Eurosystem for the purpose of repos or other forms of collateralized borrowing), the ECB will have a fourth mechanism through which it can act as LoLR for sovereigns.

The ECB denies acting as LoLR for sovereigns, presumably because this would open it up to the criticism that it is in violation of Article 123 of the Treaty on the Functioning of the European Union (TFEU, henceforth 'the Treaty'). This forbids (direct) funding of the euro area sovereigns by the ECB and the national Central Banks of the euro area. The ECB rationalizes its SMP purchases as being motivated by the desire to maintain or restore orderly sovereign debt markets, which are necessary for the proper functioning of the monetary transmission mechanism – through interest rates. It characterizes its LTROs as addressing banking sector liquidity problems.

We disagree that this is the complete story of what the ECB intended to do through either its SMP purchases or through its LTROs, or of what these interventions actually achieved. We establish in this paper that sovereigns, like banks, need a LoLR. We argue that the ECB is the only credible and effective LoLR from within the euro area. This paper argues that the European Central Bank (ECB) has been acting as lender of last resort (LoLR) for the sovereigns of the Eurosystem since it first started its outright purchases of euro area (EA) periphery sovereign debt under the Securities Markets Programme (SMP) in May 2010 (see de Grauwe (2011b), Wyplosz (2011, 2012) and Buiters and Rahbari (2012a)). The scale of its interventions as LoLR for sovereigns has grown steadily since then and its range of instruments has expanded. We interpret the longer-term refinancing operations (LTROs) of December 2011 and February 2012 as being as much about acting, indirectly, as LoLR for the Spanish and Italian sovereigns by facilitating the purchase of their debt by domestic banks in the primary issue markets, as about dealing with a liquidity crunch for EA banks. A future third LoLR instrument will be indirect lending by the Eurosystem to periphery sovereigns. This will be achieved through national Central Banks lending to the International Monetary Fund (IMF) and the IMF lending to the Spanish and Italian sovereigns, once these sovereigns have come under suitable troika (IMF, European Commission and ECB) programmes. If and when the European Stability Mechanism (ESM) gets a banking licence (becomes an eligible counterparty of the Eurosystem for the purpose of repos or other forms of collateralized borrowing), the ECB will have a fourth mechanism through which it can act as LoLR for sovereigns.

Because of institutional and policy failures in the euro area, the ECB has been forced to take on material sovereign credit risk on top of the growing counterparty risk and credit risk it is assuming through its repos and other collateralized lending operations with the euro area banking sector and through its outright purchases of private securities. We argue that, in a rationally designed Economic and Monetary Union (EMU), joint and several guarantees by the EA member states could, should and would have been used to protect the ECB and the national Central Banks (NCBs) from taking on avoidable sovereign credit risk and indeed any credit risk higher than that implied by a joint and several guarantee from all EA member states. With disorderly markets, however, and with financial panics leading to a potentially self-fulfilling fear-of-default-driven withdrawal of private funding from the markets, even joint and several guarantees by the 17 EA sovereigns may not be sufficient to restore market liquidity and funding liquidity. Among the EA policy actors, only the ECB can provide unconditional euro liquidity in any amount and without notice.

It is possible that a global LoLR like the IMF could have been an adequate source of ultimate liquidity for troubled EA sovereigns. However, there was no consensus among the global political leadership on the extent to which the IMF should play this role. The US and Canada, for instance, refused to make any financial contribution to the fund raising efforts of the IMF since the middle of 2011, that were aimed at providing additional financial

resources – beyond the \$380 bn of loanable funds remaining at the disposal of the IMF at the time of the IMF-World Bank Spring Meetings in April 2012. The \$430bn finally pledged to the IMF fell well short of the \$600bn Managing Director Lagarde had requested. It is also quite inadequate for the IMF, alone or jointly with the euro area fiscally backed facilities (the European Financial Stability Facility (EFSF) and/or the ESM), to act as a credible LoLR for the euro area. The ECB will still be needed to provide the true sovereign LoLR firepower; it is the only credible liquidity back-stop.

We show that, as a result of the failure of the European and wider global political authorities to provide adequate liquidity support and solvency support (including the resources required to permit the orderly restructuring of the debt of insolvent euro area sovereigns and banks) the ECB has in fact acted not only as LoLR for sovereigns and banks (and continues to do so on a steadily expanding scale), but has gone well beyond that: it has provided financial support to manifestly insolvent banks and sovereigns to prevent disorderly defaults of sovereigns and of systemically important banks and to create a window for orderly sovereign debt restructuring and for orderly bank debt restructuring and bank recapitalization instead.

Finally we argue that the ECB should exit from the quasi-fiscal role that has been forced upon it by the inability of the euro area political leadership to create legitimate fiscally backed institutions for dealing with sovereign illiquidity, sovereign insolvency and bank insolvency. Changes are required in the Treaty to allow the ECB/Eurosystem to provide liquidity directly to sovereigns in the primary sovereign debt markets and through direct lending to the sovereigns. To ensure that liquidity support by the ECB to sovereigns and banks does not turn into quasi-fiscal transfers from the ECB to these sovereigns and banks should they turn out to be insolvent as well as illiquid, all sovereign debt exposure of the ECB – whether through outright purchases of euro area sovereign debt, through loans to sovereigns or through lending secured against financial instrument issued or guaranteed by euro area sovereigns – should be backed with the full joint and several guarantees of all the EA member states. To prevent this from turning into a one-way road to Weimar-style inflation, all ECB lender-of-last-resort interventions, like all other decisions affecting the size and composition of the balance sheet and off-balance sheet assets and liabilities of the ECB/Eurosystem, should be at the sole discretion of the ECB, and sufficiently strong incentives must be provided for sovereigns to adhere to fiscal discipline.

Finally, as a further safeguard against opening the floodgates to excessive credit expansion, the substantive accountability of the ECB should be materially enhanced. For example, the remuneration of the members of the Governing Council could be tied to the medium-term performance of inflation relative to the (more clearly defined than currently) numerical inflation target. Even if members of the Governing Council are motivated in part (or even exclusively) by non-pecuniary considerations, having pay related to performance will provide another natural focal point for accountability through media scrutiny and the associated risk of embarrassment. Additional transparency requirements should be introduced for disclosing the details of operational decisions, including the size and composition of the ECB's and NCBs' balance sheets, the terms on which financial transactions are conducted and the identities of the counterparties. The European Parliament should be able to dismiss the Executive Board (collectively), for incompetence.

2. Why sovereigns need a lender of last resort

A lender of last resort provides funding liquidity to solvent but illiquid counterparties. In the classical Bagehot approach, this liquidity is provided against good collateral and at a penalty rate (Bagehot (1873)). The Bagehot approach is, however, too restrictive in our view and we shall use the term lender of last resort (LoLR) in the sense of a lender to illiquid but most likely solvent counterparties on whatever terms. We recognise that illiquidity is almost always the product of fear of insolvency and that in practice it may be very difficult to determine whether an illiquid entity is indeed most likely solvent provided the illiquidity is remedied by providing the illiquid counterparty with liquidity on terms that are appropriate for a solvent borrower.

It has long been recognised that, because of liquidity and maturity mismatch among their assets and liabilities, banks need a lender of last resort (see Friedman and Schwartz (1961) and Goodhart and Illing (2002)). It is less well appreciated, that sovereigns are in a similar position to banks. Like banks, a sovereign that does not have full control over its Central Bank is prone to liquidity and maturity mismatch between its assets and liabilities, broadly defined, even when these liabilities are domestic-currency-denominated. The sovereign is at risk of the equivalent of a bank run or bank funding strike – a sovereign debt roll-over strike, sovereign funding strike or 'sudden stop'. Of course, control of the Treasury over the Central Bank – fiscal dominance – only solves the sudden-stop problem for domestic-currency denominated funding. It does not help when the sovereign faces a

foreign currency funding gap (for related aspects, see Eichengreen et al (2005)). The main assets of the sovereign are intangible, implicit and illiquid ones – notably the net present discounted value of future taxes. Clearly, the net present discounted value of future public spending is an intangible, implicit and highly illiquid liability.

The sovereign clearly needs a source of unconditional liquidity: There are strict technical and political limits on the ability of the authorities to securitise future tax receipts and thus turn their net present discounted value (NPV) into a liquid asset that can be used to meet immediate liquidity needs. A fortiori, when a sovereign has trouble rolling over maturing debt or funding new deficits, it is hard, if only because of credibility and commitment problems, to turn a political commitment today to cut future public spending (whose NPV represents a reduction in an illiquid sovereign liability) into the capacity to increase the issuance of liquid liabilities (new debt). There are, regrettably, no markets for the net present discounted value of primary (non-interest) government budget surpluses.

Among the revenue sources of the Treasury are the payments made to the Treasury by the Central Bank – the Treasury's share of the Central Bank's seigniorage profits (the profits derived by the Central Bank from its monopoly of the issuance of legal tender). The NPV of these future 'taxes' paid by the Central Bank to the Treasury is, however, also an intangible and illiquid asset of the Treasury. A related intangible asset of the Central Bank is the NPV of its future seigniorage. How much seigniorage can be extracted in the future by the Central Bank, if this Central Bank is committed to a price stability target or a low inflation target, is a key question the answer to which determines whether or to what extent the Central Bank can act as lender of last resort to the sovereign without compromising its price stability mandate. How the net present value of this future seigniorage can be mobilized today to deal with sovereign liquidity problems is another key issue.

To motivate and focus the discussion we will start from the basic accounting identities of the general government sector (central, state and local government plus the social security funds but excluding the Central Bank) and of the Central Bank. We shall refer in what follows to the general government as the Treasury. We will use these budget identities and the relevant no-Ponzi finance boundary conditions to generate the intertemporal budget constraints of the Treasury and the Central Bank. Finally we will recast the intertemporal budget constraints as 'comprehensive balance sheets' and contrast them with the conventional balance sheets of tangible real assets and financial assets and liabilities. With these building blocks we then tackle the LoLR issues that can plague the sovereign.

3. A stylized set of accounts for the Treasury and the Central Bank

The Central Bank has as liabilities the monetary base $M \geq 0$ and non-monetary liabilities (term deposits or Central Bank bills and bonds) N . The monetary base consists of coin and currency, with a zero nominal interest rate, and overnight deposits held with the Central Bank by commercial banks and other eligible counterparties – commercial bank reserves with the Central Bank, both required reserves and excess reserves. The interest rate on these reserves is set by the Central Bank. The average nominal interest rate on the monetary base is denoted i^M . For simplicity, all non-monetary debt instruments issued by both the Central Bank and the Treasury are assumed to be one-period maturity, domestic-currency-denominated safe nominal bonds with a nominal interest rate i .

As assets, the Central Bank holds the stock of gold and international foreign exchange reserves, R^f in foreign currency, earning a risk-free one-period nominal interest rate in terms of foreign currency i^f , and the stock of domestic credit, which consists of Central Bank holdings of nominal, interest-bearing Treasury bills, B^{cb} , earning a risk-free domestic-currency nominal interest rate i , and Central Bank claims on the private sector, L , with domestic-currency nominal interest rate i^L . The stock of Treasury debt (all assumed to be denominated in domestic currency) held by the public outside the Central Bank is denoted B^p . It pays the risk-free nominal interest rate i ; T^p is the nominal value of the tax payments by the domestic private sector to the Treasury; it is a choice variable of the Treasury and can be positive or negative; T^{cb} is the nominal value of payments made by the Central Bank to the Treasury; it is a choice variable of the Treasury and can be positive or negative.

H is the nominal value of the transfer payments made by the Central Bank to the private sector (a 'helicopter drop of money' if the counterpart of an increase in H is an increase in the monetary base). We can have helicopter money in this set-up if we assume H to be a choice variable of the Central Bank. In most countries the

Central Bank is not a fiscal principal and can neither tax nor make explicit transfer payments. If the Central Bank does not have the power to tax, then $H \geq 0$, but we can still have transfers by the Central Bank to the private sector, that is, helicopter money. We leave H in the Central Bank's budget constraint for two didactic purposes. First, even though in the real world only the Treasury can make explicit transfer payments to the private sector, that is, $H \equiv 0$ and the Central Bank cannot engage in helicopter money, the Treasury and the Central Bank together can engage in a joint policy action equivalent to helicopter money. This would be a tax cut or increase in transfer payments by the Treasury (a reduction in T^p) with a matching increase in 'taxes' paid by the Central Bank to the Treasury (an increase in T^{cb} that keeps $T^p + T^{cb}$ constant, which the central bank finances with an increase in the monetary base. The second reason for introducing helicopter money is because it highlights the feature that, even when we set $H \equiv 0$ and thus rule out any explicit (quasi-fiscal) tax-transfer actions by the Central Bank, the Central Bank can (and in practice often does) engage in a variety of implicit quasi-fiscal actions by lending to private (and sometimes public) counterparties at rates different from the appropriate risk-adjusted opportunity cost rate of return. The Central Bank frequently subsidizes and occasionally taxes its private counterparties, and it tends to do so in ways that are less than transparent.

Total taxes net of transfer payments received by the consolidated Treasury and Central Bank are $\tilde{T} = T^p - H$; e is the value of the spot nominal exchange rate (the domestic currency price of foreign exchange); $C \geq 0$ is the nominal value of Treasury spending on current goods and services and $C^{cb} \geq 0$ the nominal value of Central Bank spending on current goods and services. Total current spending by the consolidated Treasury and Central Bank is $\tilde{C} \equiv C + C^{cb}$. The Central Bank is not assumed to hold real assets, but the general government/Treasury can. The stock of real assets held by the Treasury is denoted K , the money price of a unit of this real asset is P^K , each unit of physical capital earns a rental rate ρ in nominal terms and depreciates at a constant proportional rate δ . The time subscripts on asset stocks refer to the end of the period in question, or the beginning of the subsequent period. For simplicity we assume that only the Central Bank holds foreign assets (the official gold and foreign exchange reserves) and that neither the Treasury nor the Central Bank issue foreign currency-denominated liabilities.

Equation (1) is the single-period budget constraint of the Treasury and equation (2) that of the Central Bank.

$$B_t^p + B_t^{cb} - P_t^K K_t \equiv C_t - T_t^p - T_t^{cb} + (1+i_t)(B_{t-1}^p + B_{t-1}^{cb}) - (\rho_t + P_t^K(1-\delta))K_{t-1} \quad (1)$$

$$M_t + N_t - B_t^{cb} - L_t - e_t R_t^f \equiv \quad (2)$$

$$C_t^{cb} + T_t^{cb} + H_t + (1+i_t^M)M_{t-1} + (1+i_t)(N_{t-1} - B_{t-1}^{cb}) - (1+i_t^L)L_{t-1} - (1+i_t^f)e_t R_{t-1}^f$$

Before we can proceed with the substantive economic analysis, one more bit of notation is required: I_{t_1, t_0} is the nominal stochastic discount factor between periods t_1 and t_0 , defined recursively by

$$I_{t_1, t_0} = \prod_{k=t_0+1}^{t_1} I_{k, k-1} \quad \text{for } t_1 > t_0 \\ = 1 \quad \text{for } t_1 = t_0$$

The interpretation of I_{t_1, t_0} is the price in terms of period t_0 money of one unit of money in period $t_1 \geq t_0$. There will in general be many possible states in period t_1 , and period t_1 money has a period t_0 (forward) price for each state. Let E_t be the mathematical expectation operator conditional on information available at the beginning of period t . Provided earlier dated information sets do not contain more information than later dated information sets, these stochastic discount factors satisfy the recursion property

$$E_{t_0} \left(I_{t_1, t_0} E_{t_1} I_{t_2, t_1} \right) = E_{t_0} I_{t_2, t_0} \quad \text{for } t_2 \geq t_1 \geq t_0$$

Finally, the risk-free nominal interest rate in period t , i_t , that is the money price in period t of one unit of money in every state of the world in period $t+1$ is defined by

$$\frac{1}{1+i_t} = E_t I_{t+1, t} \quad (3)$$

The solvency constraint of the Treasury is the familiar non-Ponzi finance condition that the present discounted value (NPV) of the terminal stock of net financial liabilities minus tangible assets be non-positive:

$$\lim_{F \rightarrow \infty} E_t I_{F,t-1} (B_F^p + B_F^{cb} - P_F^K K_F) \leq 0 \quad (4)$$

The solvency constraint of the Central Bank is that the present discounted value of its terminal stock of net *non-monetary* financial liabilities be non-positive:

$$\lim_{F \rightarrow \infty} E_t I_{F,t-1} (N_F - B_F^{cb} - L_F - e_F R_F^f) \leq 0 \quad (5)$$

The reason monetary liabilities are not included in the solvency constraint of the Central Bank is that currency is irredeemable: the holder cannot demand, at any time, its exchange from the issuer for anything else. We extend this irredeemability property to the other component of the monetary base, commercial bank reserves with the Central Bank.

These solvency constraints and the single-period budget constraints of the Treasury and Central Bank imply the following intertemporal budget constraints for the Treasury and the Central Bank:

$$P_{t-1}^K K_{t-1} - (B_{t-1}^p + B_{t-1}^{cb}) \geq E_t \sum_{j=t}^{\infty} I_{j,t-1} (C_j - (T_j^p + T_j^{cb}) + S_j) \quad (6)^2$$

$$B_{t-1}^{cb} + L_{t-1} + e_{t-1} R_{t-1}^f - N_{t-1} \geq E_t \sum_{j=t}^{\infty} I_{j,t-1} (C_j^{cb} + T_j^{cb} + H_j + S_j^{cb} - (M_j - (1+i_j^M)M_{j-1})) \quad (7)$$

where

$$S_j = \left(1 + i_j - \left(\frac{\rho_j}{P_{j-1}^K} + (1-\delta) \frac{P_j^K}{P_{j-1}^K} \right) \right) P_{j-1}^K K_{j-1} \quad (8)$$

and

$$S_j^{cb} = (i_j - i_j^L) L_{j-1} + \left(1 + i_j - (1+i_j^f) \frac{e_j}{e_{j-1}} \right) e_{j-1} R_{j-1}^f \quad (9)$$

are the (implicit) losses (profits if negative) incurred by the Treasury on its real assets (in equation (8)) and the implicit quasi-fiscal losses (profits if negative) incurred by the Central Bank by getting a return on its loans to the private sector and on its foreign exchange reserves below the opportunity cost – the safe rate of interest. Total implicit losses of the consolidated Treasury and Central Bank on its portfolio are denoted $\tilde{S} \equiv S + S^{cb}$.

We also define the following notation: For any stream of nominal payments X_j , $j = 1, 2, \dots$ the net present

discounted value at the beginning of period t is defined as $V_{t-1}(X) \equiv E_t \sum_{j=t}^{\infty} I_{j,t-1} X_j$. We omit the time

subscript of the net present discounted value operator when this can cause no confusion.

Two useful measures of the current revenue obtained by the Central Bank from its issuance of base money are:

$$\begin{aligned} \omega_t^1 &\equiv M_t - (1+i_t^M)M_{t-1} \\ &= \Delta M_t \quad \text{if } i_t^M = 0 \end{aligned} \quad (10)$$

and

$$\omega_t^2 \equiv (i_t - i_t^M)M_{t-1} \quad (11)$$

The first measure, ω^1 measures the command over real resources achieved in period t by the issuance of base money. When the nominal interest rate on base money is zero (as it is for its currency component), ω^1 is just the change in the monetary base (see also Buiter (2007)). The second measures the interest saved in a period by

² Note that $E_t E_{t-1} I_{t,t-1} = E_{t-1} I_{t,t-1} = \frac{1}{1+i_t}$.

having borrowed through the issuance of base money liabilities rather than through the issuance of non-monetary debt. It can be shown by brute force that the two measures are related as follows:

$$E_t \sum_{j=t}^{\infty} I_{j,t-1} (M_j - (1+i_j^M)M_{j-1}) \equiv E_t \sum_{j=t}^{\infty} I_{j+1,t-1} (i_{j+1} - i_{j+1}^M) M_j - \left(\frac{1+i_t^M}{1+i_t} \right) M_{t-1} + \lim_{N \rightarrow \infty} E_t I_{N,t-1} M_N \quad (12)$$

It follows that, if we assume that the NPV of the terminal base money stock is zero in the long run, that

$$V_{t-1}(\omega^1) = V_{t-1}(\omega^2) - \left(\frac{1+i_t^M}{1+i_t} \right) M_{t-1} \quad (13)$$

We can therefore rewrite equation (7) as:

$$B_{t-1}^{cb} + L_{t-1} + e_{t-1} R_{t-1}^f - M_{t-1} - N_{t-1} \geq E_t \sum_{j=t}^{\infty} I_{j,t-1} (C_j^{cb} + T_j^{cb} + H_j + S_j^{cb} - (i_j - i_j^M) M_{j-1}) \quad (14)$$

The single-period budget constraint of the consolidated general government/Treasury and Central Bank is

$$M_t + N_t + B_t^p - L_t - e_t R_t^f - P_t^K K_t \equiv \tilde{C}_t - \tilde{T}_t + (1+i_t^M)M_{t-1} + (1+i_t)(N_{t-1} + B_{t-1}^p) - (1+i_t^L)L_{t-1} - (1+i_t^f)e_t R_{t-1}^f - (\rho_t + P_t^K(1-\delta))K_{t-1} \quad (15)$$

The intertemporal budget constraint of the consolidated general government/Treasury and Central Bank is

$$P_{t-1}^K K_{t-1} + L_{t-1} + e_{t-1} R_{t-1}^f - N_{t-1} - B_{t-1}^p \geq E_t \sum_{j=t}^{\infty} I_{j,t-1} (\tilde{C}_j - \tilde{T}_j + \tilde{S}_j - (M_j - (1+i_j^M)M_{j-1})) \quad (16)$$

or equivalently

$$P_{t-1}^K K_{t-1} + L_{t-1} + e_{t-1} R_{t-1}^f - M_{t-1} - N_{t-1} - B_{t-1}^p \geq E_t \sum_{j=t}^{\infty} I_{j,t-1} (\tilde{C}_j - \tilde{T}_j + \tilde{S}_j - (i_j - i_j^M) M_{j-1}) \quad (17)$$

Finally, using the less cluttered net present discounted value operator notation, we can rewrite the intertemporal budget constraints:

I) For the Treasury:

$$P_{t-1}^K K_{t-1} + V_{t-1}(T^p) + V_{t-1}(T^{cb}) \geq B_{t-1}^p + B_{t-1}^{cb} + V_{t-1}(C) + V_{t-1}(S) \quad (18)$$

II) for the Central Bank:

either

$$B_{t-1}^{cb} + L_{t-1} + e_{t-1} R_{t-1}^f + V_{t-1}(\omega^1) \geq N_{t-1} + V_{t-1}(C^{cb}) + V_{t-1}(T^{cb}) + V_{t-1}(H) + V_{t-1}(S^{cb}) \quad (19)$$

or, equivalently,

$$B_{t-1}^{cb} + L_{t-1} + e_{t-1} R_{t-1}^f + V_{t-1}(\omega^2) \geq M_{t-1} + N_{t-1} + V_{t-1}(C^{cb}) + V_{t-1}(T^{cb}) + V_{t-1}(H) + V_{t-1}(S^{cb}) \quad (20)$$

III) for the consolidated Treasury and Central bank

either

$$P_{t-1}^K K_{t-1} + L_{t-1} + e_{t-1} R_{t-1}^f + V_{t-1}(\tilde{T}) + V_{t-1}(\omega^1) \geq N_{t-1} + B_{t-1}^p + V_{t-1}(\tilde{C}) + V_{t-1}(\tilde{S}) \quad (21)$$

or, equivalently,

$$P_{t-1}^K K_{t-1} + L_{t-1} + e_{t-1} R_{t-1}^f + V_{t-1}(\tilde{T}) + V_{t-1}(\omega^2) \geq M_{t-1} + N_{t-1} + B_{t-1}^p + V_{t-1}(\tilde{C}) + V_{t-1}(\tilde{S}) \quad (22)$$

Figures 1, 2, 3 and 4 help to illustrate why sovereigns too require a LOLR. Figure 1 presents a stylised general government (Treasury) conventional balance sheet and Figure 2 the stylized Central Bank conventional balance sheet. On the asset side of Figure 1, we find marketable (and often relatively liquid) assets, including in principle (but omitted here for simplicity) general government holdings of gold, foreign exchange and other foreign investments, equity in partially or wholly publicly owned firms, and real assets, including land, structures, and real estate, but also natural resource rights, from subsoil minerals, oil and gas to band spectrum. All this equity and real assets is captured by $P_{t-1}^K K_{t-1}$. On the liability side, there is marketable and non-marketable public debt, $B_{t-1}^p + B_{t-1}^{cb}$. Conventional general government/Treasury net worth, W_{t-1} , is the difference between the value of the tangible assets plus the financial assets and the financial liabilities.

Figure 1: Stylised general government (Treasury) conventional balance sheet

Assets		Liabilities	
$P_{t-1}^K K_{t-1}$	Value (at actual sale or purchase prices) of land, real estate, structures, mineral assets and other real assets, equity in public enterprises and other financial assets	Marketable and non-marketable general government debt	$B_{t-1}^p + B_{t-1}^{cb}$
		General government financial net worth	W_{t-1}

Figure 2 has the financial assets of the Central Bank, $B_{t-1}^{cb} + L_{t-1} + e_{t-1} R_{t-1}^f$, the financial liabilities of the Central Bank (monetary and non-monetary) and the financial net worth of the Central Bank W_{t-1}^{cb} .

Figure 2: Stylised Central Bank conventional balance sheet (financial assets and liabilities)

Assets		Liabilities	
$e_{t-1} R_{t-1}^f$	Gold and foreign exchange holdings and other investments	Base money	M_{t-1}
B_{t-1}^{cb}	Treasury debt	Non-monetary liabilities	N_{t-1}
L	Private sector debt and loans to the private sector	Central Bank financial net worth	W_{t-1}^{cb}

Figure 3 presents the general government or Treasury comprehensive balance sheet, which also features the intangible assets and liabilities that are omitted from the published financial or conventional balance sheets (see also Buiter (2010)). The comprehensive balance sheet of the general government is its intertemporal budget constraint (equation (18)), with the familiar no-Ponzi finance terminal condition imposed: the net present discounted value of the terminal conventional net worth of the general government must be non-negative. Figures 4 and 5 present two equivalent versions of the Central Bank's comprehensive balance sheet, corresponding, respectively to equations (19) and (20), the two equivalent representations of the intertemporal budget constraint of the Central Bank.

The most important intangible asset in Figure 3 is the present value of taxes, levies and social security contributions, $V_{t-1}(T^p)$. We also single out for future reference one particular stream of general government revenues: the share of Central Bank profits paid to the general government, generally to the central government Treasury, $V_{t-1}(T^{cb})$. The present value of transfers, entitlement spending and exhaustive general government primary current expenditure, $V_{t-1}(C)$, appears on the liability side. We could have entered $V_{t-1}(S)$, the present value of the subsidies paid by the general government on its real assets as a liability on the right-hand side of Figure 3. Instead we subtract it from the market value of the real assets (the price at which these assets can be bought from or sold to the private sector) to get the fair value of the assets were they to remain in the public sector: $P_{t-1}^K K_{t-1} - V_{t-1}(S)$.

Figure 3: Stylised general government comprehensive balance sheet

Assets		Liabilities	
$P_{t-1}^K K_{t-1} - V_{t-1}(S)$	Fair value of land, real estate, structures, mineral assets and other real assets, equity in public enterprises and other financial assets	Marketable and non-marketable general government debt	$B_{t-1}^p + B_{t-1}^{cb}$
$V_{t-1}(T^p)$	Net present value of taxes, levies and social security contributions	NPV of general government primary current expenditure	$V_{t-1}(C)$
$V_{t-1}(T^{cb})$	$V_{t-1}(S^{cb})$ Net present value of payments made by the Central Bank to the Treasury		
		Comprehensive general government net worth	\hat{W}_{t-1}

Figure 4: Stylised Central Bank comprehensive balance sheet

Assets		Liabilities	
$e_{t-1} R_{t-1}^f$	Gold and foreign exchange holdings and other investments	Non-monetary liabilities	N_{t-1}
B_{t-1}^{cb}	Treasury debt	Net present value of current primary expenditure by Central Bank	$V_{t-1}(C^{cb})$
L_{t-1}	Private sector debt and loans to the private sector	Net present value of payments made by the Central Bank to the Treasury	$V_{t-1}(T^{cb})$
$V_{t-1}(\omega^1)$	Net present value of future base money issuance by the Central Bank	Net present value of transfer payments by the Central Bank to the private sector (helicopter money drops)	$V_{t-1}(H)$
		Net present value of implicit subsidies paid by the Central Bank	$V_{t-1}(S^{cb})$
		Central Bank comprehensive net worth	\hat{W}_{t-1}^{cb}

Figure 5: Alternative but equivalent stylised Central Bank comprehensive balance sheet

Assets		Liabilities	
$e_{t-1}R_{t-1}^f$	Gold and foreign exchange holdings and other investments	Base money	M_{t-1}
B_{t-1}^{cb}	Treasury debt	Non-monetary liabilities	N_{t-1}
L_{t-1}	Private sector debt and loans to the private sector	Net present value of current primary expenditure by Central Bank	$V_{t-1}(C^{cb})$
$V_{t-1}(\omega^2)$	Net present value of interest saved by the Central Bank through its issuance of base money	Net present value of payments made by the Central Bank to the Treasury	$V_{t-1}(T^{cb})$
		Net present value of transfer payments by the Central Bank to the private sector (helicopter money drops)	$V_{t-1}(H)$
		Net present value of implicit subsidies paid by the Central Bank on the financial assets it holds.	$V_{t-1}(S^{cb})$
		Central Bank comprehensive net worth	\hat{W}_{t-1}^{cb}

The comprehensive balance sheet of the Central Bank also includes an intangible asset and several intangible liabilities not included in its conventional financial balance sheet. Consider for instance Figure 5 and contrast it with Figure 2. The additional asset of the Central Bank is the net present value of future interest saved by having borrowed through the issuance of base money rather than through the issuance of non-monetary debt instruments, $V_{t-1}(\omega^2)$. The additional liabilities of the Central Bank are (1) the net present value of the payments made by the Central Bank to the Treasury, $V_{t-1}(T^{cb})$, which we encountered as an asset of the Treasury in Figure 3, (2) the net present value of the helicopter money drops made by the Central Bank, $V_{t-1}(H)$ (zero in most real-world economies) and (3) the net present value of the implicit, quasi-fiscal subsidies made by the Central Bank on its financial assets, $V_{t-1}(S^{cb})$.

Even when Central Banks cannot engage in 'helicopter money' drops, that is, even if $V_{t-1}(H) \equiv 0$, it can provide implicit subsidies/transfers to private counterparties through subsidized lending rates, through the term

$V_{t-1}(S^{cb})$ in Figure 5. Take the two 3-year Longer-term Refinancing Operations of the ECB in December 2011 and February 2012. These loans were made at an interest rate linked to the official policy rate, the refi rate. This stands currently at 1.00 percent but is expected by us to come down to 0.50 percent by the end of the year and to remain at that level over the life of the LTRO. Over the 3 years of the LTRO, the bank's cost of borrowing could therefore be as little as 60 basis points. In addition, collateral requirements for the loans were weakened dramatically. There can be little doubt that these LTROs involved a significant subsidy from the ECB to the borrowing banks, in our view at least 3.00 percent per year. With just over 1 trillion worth of LTROs undertaken, the annual subsidy would be €30bn; over three years the NPV of the subsidy would be around €85.6bn, using a four percent discount rate for the NPV calculations.

As noted earlier, the main asset of the sovereign is highly illiquid: the NPV of future taxes, levies and social security contributions, denoted $V_{t-1}(T^p)$. It may be possible to securitise some future tax flows and thus turn the NPV of such taxes into tradable instruments, but this has only been attempted on a limited scale and the resulting financial instruments have not been widely traded in liquid markets. Among the revenue streams of the Central Bank are the bulk of the distributed profits of the Central Bank, $V_{t-1}(T^{cb})$. Typically, the national Treasury is the beneficial owner (and in some cases, as in the UK, the legal owner) of the Central Bank, and the non-retained part of Central Bank profits are paid out as a form of dividends to the national Treasury. The equity in the Central Bank, even in those cases where the Central Bank is formally a joint stock company, is usually not traded, however, so the Treasury, even where it holds most or all of the Central Bank's equity, cannot realize the NPV of future Central Bank profits by selling the equity. The actual stream of payments made by the Central Bank to the Treasury in any give period need bear little relationship to economic profits earned in that period. The value of T^{cb} in one or more periods and even of $V_{t-1}(T^{cb})$ could be negative if the Treasury makes transfers to the Central Bank, say to recapitalize it.

Another key future stream of resources for the sovereign comes from *foregone* public spending, that is, a reduction in $V_{t-1}(C)$. The NPV of primary (non-interest) general government current spending is a key intangible liability. If it were possible to turn commitments to future cuts in public spending – a reduction in an illiquid liability – into a matching capacity to issue new liquid liabilities, one would have achieved a financial engineering miracle: the de-facto securitization of future public spending cuts. This may be possible when optimism, confidence and trust in the government are high. But when pessimism rules, confidence has vanished and trust is weak, the government may be unable to translate promises of future public spending cuts or of future tax increases into a present ability to fund itself in the markets. Even during normal times the bulk of the intangible assets of the sovereign is illiquid and of long-maturity, and even a determined attempt to reduce the intangible liabilities of the government need not translate into any significant increase in its ability to borrow today.

In addition to holding significant amounts of illiquid intangible assets and liabilities, many sovereigns have non-trivial financial deficits and/or a sizeable stock of sovereign debt, part of which matures and requires re-financing each period. Most governments therefore have regular, recurrent funding needs. Like banks, sovereigns therefore suffer from maturity and liquidity mismatch among their assets and liabilities. So even if the sovereign is solvent – provided it can get funded at yields that reflect the market's belief that the sovereign *is* solvent – this sovereign could be tripped into a fundamentally unwarranted payments default should the market instead adopt the 'self-fulfilling fear equilibrium belief' that the government is (most likely) not solvent. A lender of last resort capable of issuing an unquestionably liquid instrument (for instance base money) in any amount, may well be necessary to trump the 'fear equilibrium' or 'sovereign debt run equilibrium' that always threatens the sovereign, just as the lender of last resort is necessary to prevent solvent but illiquid banks from succumbing to a bank run (see also Kopf (2011)). The truth of this proposition has been underlined several times since 2010 in the case of the euro area (EA) where a single central bank faces 17 sovereigns. It is equally true, however, in the case of the US, where a single sovereign faces the Central Bank (see also de Grauwe (2011a) and Gros and Mayer (2010)).

The economic logic of the intertemporal budget constraints implies that the Treasury is solvent if and only if its comprehensive net worth is non-negative, $\hat{W}_{t-1} \geq 0$. Likewise, the Central Bank is solvent if and only if its comprehensive net worth is non-negative, $\hat{W}_{t-1}^{cb} \geq 0$. These solvency conditions are, of course, quite consistent with the conventionally defined financial net worth of the Treasury, W , and/or the conventionally defined financial net worth of the Central Bank, W^{cb} , being negative. This can be seen by noting that:

$$\hat{W} \equiv W + V(T^p) + V(T^{cb}) - V(S) - V(C) \quad (23)$$

and that

$$\hat{W}^{cb} \equiv W^{cb} + V(\omega^2) - V(C^{cb}) - V(T^{cb}) - V(H) - V(S^{cb}) \quad (24)$$

In the case of the Central Bank, for instance, even if its conventional financial net worth (regulatory net worth or regulatory capital) were negative, comprehensive net worth could be positive if the net present value of future interest saved because of the Central Bank's monopoly of the issuance of domestic base money, exceeds the net present value of its future running costs, $V(C^{cb})$, its future payments to the Treasury, $V(T^{cb})$, its future helicopter money drops, $V(H)$ and its future quasi fiscal subsidies on its lending and other assets, $V(S^{cb})$.

Finally, Figure 6 presents the conventional balance sheet of the consolidated general government (Treasury) and Central Bank, and Figures 7 and 8 present two equivalent representations of the comprehensive budget constraint of the consolidated general government (Treasury) and Central Bank, corresponding to equation (21), respectively equation (22).

Figure 6: Conventional balance sheet of consolidated Treasury and Central Bank

Assets		Liabilities	
$P_{t-1}^K K_{t-1}$	Market value of land, real estate, structures, mineral assets and other real assets, equity in public enterprises and other financial assets	Base money	M_{t-1}
		Non-monetary liabilities of the Central Bank	N_{t-1}
		Marketable and non-marketable Treasury debt held by public	B_{t-1}^p
		Consolidated Treasury and Central Bank conventional or financial net worth	$\tilde{W}_{t-1} = W_{t-1} + W_{t-1}^{cb}$

Figure 7: Comprehensive balance sheet of consolidated Treasury and Central Bank.

Assets		Liabilities	
$P_{t-1}^K K_{t-1} - V_{t-1}(S)$	Fair value of land, real estate, structures, mineral assets and other real assets, equity in public enterprises and other financial assets	Non-monetary liabilities of the Central Bank	N_{t-1}
$V_{t-1}(T^p)$	Net present value of taxes, levies and social security contributions	Marketable and non-marketable general government debt	B_{t-1}^p
$V_{t-1}(\omega^1)$	Net present value of future base money issuance	NPV of consolidated Treasury and Central Bank primary current expenditure	$V_{t-1}(\tilde{C})$
		Net present value of transfer payments by the Central Bank to the private sector (helicopter)	$V_{t-1}(H)$

		money drops)	
		Net present value of implicit subsidies paid by the Central Bank on the financial assets it holds.	$V_{t-1}(S^{cb})$
		Comprehensive consolidated Treasury and Central Bank net worth	\widehat{W}_{t-1}

Figure 8: Alternative but equivalent comprehensive balance sheet of consolidated Treasury and Central Bank.

Assets		Liabilities	
$P_{t-1}^K K_{t-1} - V_{t-1}(S)$	Fair value of land, real estate, structures, mineral assets and other real assets, equity in public enterprises and other financial assets	Base money	M_{t-1}
$V_{t-1}(T^p)$	Net present value of taxes, levies and social security contributions	Non-monetary liabilities of the Central Bank	N_{t-1}
$V_{t-1}(\omega^2)$	Net present value of future base money issuance	Marketable and non-marketable general government debt	B_{t-1}^p
		NPV of consolidated Treasury and Central Bank primary current expenditure	$V_{t-1}(\tilde{C})$
		Net present value of transfer payments by the Central Bank to the private sector (helicopter money drops)	$V_{t-1}(H)$
		Net present value of implicit subsidies paid by the Central Bank on the financial assets it holds.	$V_{t-1}(S^{cb})$
		Comprehensive consolidated Treasury and Central Bank net worth	\widehat{W}_{t-1}

Note that the comprehensive net worth of the consolidated Treasury and Central Bank, \widehat{W}_{t-1} , can be positive even when either the financial net worth of the Treasury or the financial net worth of the Central Bank, or both, are negative. This follows from

$$\begin{aligned}
\widehat{W} &\equiv \tilde{W} + V(T^p) + V(\omega^2) - V(\tilde{C}) - V(H) - V(\tilde{S}) \\
&= W + W^{cb} + V(T^p) + V(\omega^2) - V(\tilde{C}) - V(H) - V(\tilde{S})
\end{aligned}
\tag{25}$$

The comprehensive balance sheet of the consolidated Treasury and Central Bank adds the intangible assets and the intangible liabilities of both the Treasury and the Central Bank to the conventional or financial balance sheet of the consolidated Treasury and Central Bank.

Of particular importance for our purposes are the difference between the conventional and comprehensive balance sheets of the Treasury alone (Figures 1 and 3 respectively) and their consolidated counterparts, given in Figures 6 and 8 respectively. Contrast Figures 3 and 8. The additional NPV of the resources the Central Bank brings to the consolidated Treasury and Central Bank balance sheet is the NPV of current and future seigniorage, where seigniorage is defined as interest saved by borrowing through the issuance of base money rather than through the issuance of non-monetary debt instruments. Base money consists of coin and currency, which bear a zero nominal interest rate, and overnight deposits or demand deposits held by commercial banks and other eligible counterparties with the Central Bank, also referred to as commercial bank reserves with the Central Bank. These reserves carry a Central-Bank-determined remuneration rate. But the contribution of the Central Bank to the asset side of Figure 8 is not the only significant contribution it makes to the public finances. On the liability side of Figure 8 (and indeed of Figure 6) appears the stock of base money. Since the Central Bank has the ability to issue this unquestionably liquid liability at will, the consolidated general government should never face a potential *domestic currency* illiquidity problem, unlike the conventional general government, whose financial liabilities held by the public, B^P can become illiquid.

4. Other potential lenders of last resort for Euro area sovereigns

In principle, the domestic Central Bank is not the only possible lender of last resort for sovereigns. Sovereigns could also rely on some form of self-insurance, e.g. by amassing a large stock of liquid financial assets, or an external institution, such as the International Monetary Fund, could play the role of lender of last resort. Both of these alternative sources of emergency liquidity are likely to be useful (and are in fact used) in the euro area, but are simply not large enough to replace the Central Bank as the primary lender of last resort for domestic currency liquidity for euro area sovereigns and banks. The insufficient size of the facilities available to these other potential lenders of last resort is not dictated by the laws of nature or of economics – it is a consequence of unwillingness/political inability of the political leadership in the euro area and in the wider global community to create facilities of sufficient size.

As noted above, a truly credible LOLR needs to be able to issue unquestionably liquid instruments in any amount and on demand, that is, without delay. At a minimum, a credible LOLR should be able to cover the plausible liquidity needs of the agents that are potentially vulnerable to a funding strike by private investors. In the euro area, one way to make the latter requirement operational is to estimate the total financing requirements of euro area sovereigns over, say, the next two or three years. These are presented in Figure 9. As Figure 9 shows, the gross financing requirements of the euro area periphery (Greece, Cyprus, Ireland, Italy, Portugal and Spain), estimated as maturing general government bonds and bills plus estimates for the general government deficit, and for the EA 'soft core' (Austria, Belgium, France, Netherlands) exceed EUR1trn in 2012 alone. For the euro area as a whole, gross financing requirements for the general governments are closer to EUR1.5trn for 2012 alone. If we assume that the lender of last resort should be able to cover at least two years' worth of funding for all EA sovereigns, its minimum funding capacity better not fall short of EUR3trn.

Figure 9. Selected EA countries – Gross financing requirements 2012-2014 (bn EUR)

Country/Group	2012	2013	2014	2012 - 2014 Q2
Austria	26.7	24.9	31.5	56.7
Belgium	81.0	43.4	31.3	117.5
Cyprus	4.1	2.5	0.9	6.0
Finland	18.9	7.9	7.7	21.7
Greece	44.9	25.1	23.7	76.5
Ireland	21.7	19.5	20.7	50.2
Italy	388.6	211.1	162.5	567.1
Spain	201.3	156.0	95.2	386.4
Portugal	29.7	19.2	18.0	53.3
France	429.2	225.9	158.3	634.5
Germany	281.9	224.9	178.9	519.4
Netherlands	91.4	56.6	46.0	157.0
GR+IR+PO	100.5	66.3	63.3	186.0
CY+GR+IR+PO+SP+IT	726.3	451.7	328.6	1180.6
Total	1619.4	1016.9	774.6	2646.4

Note: Redemptions are bond and bill redemptions due in the respective years. Government agency debt is not included. Budget deficit forecasts are IMF forecasts for Austria, Finland, Cyprus, Netherlands and CIRA forecasts for all others.

Source: Bloomberg, IMF and Citi Investment Research and Analysis

In the euro area, self-insurance could be carried out at the national level or by some or all euro area countries joining together to create a common liquidity facility (through an EA/EU-wide facility or based on an intergovernmental agreement). The European Financial Stability Facility (EFSF) and the European Stability Mechanism (ESM), as well as their smaller relative, the European Financial Stabilisation Mechanism (EFSM), belong to the latter category. The EFSF was created in June 2010 to provide nominally up to EUR440bn in loans (even though its lending capacity compatible with a desired AAA-rating was much smaller at around EUR255bn at most) to EA countries in need. Subsequently, its size has been raised to provide an effective lending ceiling of EUR440bn and its mandate widened to include not only loans to sovereigns, but interventions in primary and secondary EA sovereign markets, precautionary facilities, support for EA banks (even though this would still need to be routed through the sovereign) and credit enhancements for sovereign bonds. In June 2011, the notional size of the EFSF was increased to EUR780bn so as to increase its effective size to EUR440bn.³ The EFSF is backed by guarantees from EA member states and funds itself in the market. Until October 2011, it was only able (by statute) to issue debt to meet its near-term lending commitments. Since October 2011, the EFSF can do a limited amount of pre-funding, but now as before there are no plans to pre-fund a significant portion of the EFSF's lending capacity. The member state guarantees, furthermore, are not joint-and-several, but pro-rata, with each contributing country's share based on its equity share in the ECB. The successor facility of the EFSF, the ESM, is supposed to become operational on July 1, 2012. It has the same mandate as the EFSF, but unlike the EFSF, it is supposed to be permanent, and it is partly backed by paid-in capital. It is also expected to have senior creditor status vis-à-vis all creditors other than the IMF, and includes a sovereign debt restructuring mechanism, partly contractual or market-based (through mandatory collective action clauses (CACs) for euro area sovereign debt issues from 2013) and partly statutory.

After the March 31, 2012 decision to allow the ESM to run side-by-side with the EFSF, the maximum liquidity that the EFSF/ESM can provide is EUR700bn (including the almost EUR200bn that have already been committed to the Irish, Portuguese and Greek programmes with EFSF participation). This is a substantial amount, but still falls far short of the plausible liquidity needs pointed out above. What is more, the EUR700bn are largely a theoretical funding capacity – as noted, the EFSF/ESM are only pre-funded to a very limited degree and do not have the ability to issue unquestionably liquid instruments at short notice without the support of the Central Bank – the ECB. The limit on the size of the EFSF/ESM was a political decision of the euro area political authorities (the heads of state and heads of government and their ministers of finance). Another political decision, even though it was likely also driven by legal concerns, was not to make the link between the EA rescue facilities and the ECB official, e.g. by providing the EFSF/ESM with a banking license that would have made it an eligible counterparty of the Eurosystem Central Banks for repos and other collateralized loans. But without access to ECB liquidity, even a much larger nominal funding ceiling for the EFSF/ESM is unlikely to enable these facilities, severally or

³ The nominal or notional size of the EFSF is larger than its effective size or its lending capacity because the EA heads of state and heads of government (HoSHoGs) wanted the facility to be rated triple A, which was much higher than the average sovereign rating in the euro area, and because countries that are themselves on a Troika programme are not asked to contribute to the EFSF lending to other EA member states.

running in tandem, to play the role of a truly credible lender of last resort for euro area sovereigns. Truly self-insuring during a crisis is not an option.

Liquid gold and hard-currency foreign exchange reserves, including IMF quotas, are in principle part of the stock of available foreign assets. However, part of the EA stock of gold and foreign exchange reserves is held by the ECB and much of the rest by the national Central Banks (NCBs). Unlike Japan, the UK and the US, where the Treasury is the owner of the gold and foreign exchange reserves, with the Central Banks only acting as agents for their national Treasuries in the foreign exchange markets, the ownership and control of the EA gold and foreign exchange reserves is rather opaque. The Bundesbank in 2011 effectively vetoed German government plans for using the German IMF quotas to supplement the resources of the EFSF, and the German contribution to the IMF's fund-raising campaign for the EA, supposed to be around €50bn, also appears to require the consent of the Bundesbank.

Figure 10. EFSF – Financial Capacity (billions EUR)

Effective size:	440.0
Irish (€17.7bn) and Portuguese (€26bn) programmes:	-43.7
EFSF contribution to 1 st Greek program	-27.0
2 nd Greek program	-109.1
Theoretical Maximum Remaining Capacity:	259.2

Source: EFSF and CIRA

Figure 11. EFSM – Financial Capacity (billions EUR)

Effective size:	60.0
Irish (€22.5bn) and Portuguese (€26bn) programmes:	-48.5
Maximum Remaining Capacity:	11.5

Source: European Commission and CIRA

A second alternative to the ECB as LoLR for EA sovereigns would be for an external institution, probably the IMF, to play the role of a lender of last resort. This LoLR support could take the form of sufficiently large credit lines or overdraft facilities that provide guaranteed and unconditional access to credit under all circumstances, or they could take the form of sufficiently large discretionary lending arrangements, potentially on terms and conditions (henceforth conditionality) regarding fiscal-financial austerity and structural reform.

Of course, the IMF is already involved in the Irish, Greek and Portuguese troika programmes to the tune of almost EUR100bn, even though it is at the very least debatable that these operations meet the definition of lending to illiquid rather than insolvent institutions – in the case of Greece, the sovereign default of March-April 2012 could, in our view, have been anticipated when the IMF joined the first troika programme for that country in May 2010. The IMF is also likely to be involved in efforts to provide funding to other illiquid EA sovereigns in the future, most likely Spain and Italy, but the scope of its own funding contribution will be limited, for two reasons. First, its membership is deeply divided on the issue of substantially increasing IMF exposure to the euro area. Among the G7, the US, the UK and Canada are skeptical. Many emerging markets perceive the IMF to be unduly lenient with its European debtors, compared to the severe conditions many EM countries had to satisfy to obtain IMF support in the past. Second, the financial resources of the IMF are, in any case, limited. In February 2012, the IMF's forward commitment capacity stood at USD398bn. At the G20 meeting in Washington, DC, IMF MD Lagarde announced on April 20, 2012 that she had obtained commitments to increase the IMF's resources by at least USD430bn.⁴ A substantial share of the resource increase would come from the EA countries themselves which had pledged €150bn expected to be contributed by the NCBs of the euro area. But even if the resource increase comes through as planned and even if most of it were to be available for LoLR funding to EA sovereigns, it would still fall short of the minimum size required for a credible LoLR for EA sovereigns.

IMF resources of various shapes – be it as funding provided through a precautionary program or a full-blown program (Stand-by Agreement) – could be a useful addition to the combined lender of last resort facility for the EA member states, but are likely to play no more than a supporting role in keeping the euro area sovereigns funded.

⁴ See <http://www.imf.org/external/np/sec/pr/2012/pr12144.htm>

Figure 11. IMF – Financial resources, as of end-February 2012

	bn USD	% change from 2010
I. Total resources	841.4	34.7
Members' currencies	408.3	13.8
SDR holdings	15.9	174.1
Gold holdings	4.9	0.0
Other assets	21.5	110.8
Available under NAB activation 1/	314.0	n/a
Other borrowing arrangements	76.9	-68.6
II. Less: Non-usable resources	224.8	44.9
Of which: Credit outstanding	137.7	60.7
III. Equals: Usable resources	616.6	31.4
IV. Less: Undrawn balances under GRA arrangements	176.0	10.1
V. Equals: Uncommitted usable resources	440.6	42.4
VI. Plus: Repurchases one-year forward	19.2	540.0
VII. Less: Repayments of borrowing due one-year forward	1.1	n/a
VIII. Less: Prudential balance 2/	61.7	-43.4
IX. Equals: Forward commitment capacity (FCC)	397.7	95.4

1/ Reflects second activation of the enlarged NAB on October 1, 2011 (SDR 189 billion) and undrawn committed resources from the first enlarged NAB activation. 2/ As of April 1, 2011, amounts available under Fund bilateral borrowing and note purchase agreements of NAB participants needed to cover financing of undrawn balances under pre-NAB approved Fund arrangements based on the current 1:1 bilateral borrowed to quota resources financing ratio and undrawn balances under bilateral agreements of non-NAB participants fully available to finance both pre- and post-NAB commitments.

Source: IMF and Citi Investment Research and Analysis

5. Four instruments through which the ECB can act as lender of last resort for sovereigns

The ECB has thus far intervened as lender of last resort for the Spanish and Italian sovereigns using two instruments – outright purchases of sovereign debt in the secondary markets under the Securities Markets Programme (SMP) and the provision of subsidised funding to euro area banks that are eligible counterparties of the Eurosystem for repo operations. Financial repression by the national authorities in periphery countries where the sovereign continues to have market access (e.g. Spain and Italy) ensures that at least part of this very cheap ECB credit to banks end up being invested by these banks in national sovereign debt in amounts higher than and at yields lower than those that would prevail without official pressure on the banks. We expect it to use a third instrument before long: loans by national central banks to the IMF, which will be on-lent by the IMF to the sovereigns of Spain and Italy at low rates reflecting the IMF's preferred creditor status, as soon as these countries have accepted IMF or troika programmes and the associated conditionality. Unlike the EFSF and the ESM, which can make loans directly to governments and can purchase sovereign debt in both the primary and secondary markets, the ECB can only buy sovereign debt outright in the secondary markets. A fourth instrument, giving the ESM a banking license (making it an eligible counterparty for the ECB for repos and other forms of collateralized borrowing) may follow in due course.

5.1 Direct outright purchases in the secondary markets under the SMP

The first, direct, instrument is the outright purchases of government securities in secondary markets under the Securities Markets Programme. The creation of the SMP was announced on 10 May 2010 and in principle covers the outright purchases of both private and public debt securities.⁵

⁵ "In view of the current exceptional circumstances prevailing in the market, the Governing Council decided: 1. to conduct interventions in the euro area public and private debt securities markets (Securities Markets Programme) to ensure depth and liquidity in those market segments which are dysfunctional. The objective of this programme is to address the malfunctioning of securities markets and restore an appropriate monetary policy transmission mechanism. The scope of the interventions will be determined by the Governing Council. In making this decision we have taken note of the statement of the euro area governments that they "will take all measures needed to meet [their] fiscal targets this year and the years ahead in line with excessive deficit procedures" and of the precise additional commitments taken by some euro area governments to accelerate fiscal consolidation and ensure the sustainability of their public finances. In order to sterilise the impact of the above interventions, specific operations will be conducted to re-absorb the liquidity injected through the Securities Markets Programme. This will ensure that the monetary policy stance will not be affected..."

(http://www.consilium.europa.eu/uedocs/cmsUpload/ECB_press_releases.pdf)

On 13 April 2012, EA periphery sovereign debt worth €214 billion was outstanding under the SMP. The ECB does not publish data on the composition of its purchases, but it is widely assumed that so far the ECB has purchased Greek, Portuguese, Irish, Spanish and Italian government debt securities under the SMP. The flow of new sovereign debt purchases under the SMP has declined markedly recently and has been effectively zero since February 2012.

There is little doubt that the ECB's SMP purchases prevented major financial turmoil that could have resulted in a chain of defaults of likely solvent euro area banks and sovereigns, notably in May 2010 and again in August 2012 and October and November 2011.

But purchases in the secondary markets are an ineffective instrument for ensuring that the new funding needs of a sovereign (the sum of its financial deficit and the maturing debt) are met at a sustainable rate of interest for that sovereign. Unless the purchaser (in this case the ECB) is known to have deep pockets and to be willing and politically able to use all the resources it has at its disposal to cap the yield/set a floor under the price in the secondary markets, there is a risk that the purchaser ends up owning much of the outstanding stock of debt without doing much to save the sovereign from default by purchasing the gross new debt issuance. Since the ECB does not use rhetoric to support and leverage its purchases of sovereign debt in the secondary markets, even if it focuses its interventions around the dates of primary market issuance and auctions, it would likely have to spend much more to achieve the same impact on market yields (and on the sovereign's marginal funding cost) than it would have to spend if it did put its mouth where its money is, or if it focused on primary market purchases.

The reason the SMP is restricted to secondary market purchases is legal. Article 123.1 of the *Consolidated Version of the Treaty on the Functioning of the European Union* reads: "Overdraft facilities or any other type of credit facility with the European Central Bank or with the Central Banks of the Member States (hereinafter referred to as 'national central banks') in favour of Union institutions, bodies, offices or agencies, central governments, regional, local or other public authorities, other bodies governed by public law, or public undertakings of Member States shall be prohibited, as shall the purchase directly from them by the European Central Bank or national central banks of debt instruments." Lending to governments or primary market purchases are thus currently simply not on the menu for the ECB. Secondary market purchases are less effective, but at least they are legal in the sense of not forbidden by the Treaty.

The SMP route to provide LOLR support suffers from a serious shortcoming in our view by being limited to secondary market interventions. It is also subject to another shortcoming, namely that it lacks a mechanism for reinforcing the ability of sovereigns at the receiving end of LOLR support to validate the presumption of solvency. SMP support does not come with explicit fiscal or structural reform conditionality, nor is an explicit debt sustainability analysis a prerequisite for SMP support. In the absence of such a commitment mechanism, the availability of LOLR support has the potential to weaken incentives for fiscal discipline that could, ad extremum, turn an illiquidity problem into an insolvency problem.

Of course, conventional LoLR support to banks is granted to illiquid, but solvent institutions only, but is in principle provided without conditionality. Instead the borrower from the LoLR is supposed to provide good collateral, or rather, collateral that would be good under orderly market conditions. The distinction between illiquidity and insolvency is especially hard to make when the beneficiary/borrower does not offer collateral (as is typically the case for sovereign LoLR operations). Establishing the solvency of the beneficiary is especially hard in the case of sovereigns, for three reasons. First, as noted above, the main assets of governments are intangible – the present value of taxes, levies and social security contributions – and correspondingly hard to value. Second, and more importantly in the case of euro area sovereigns, the incentives of sovereigns to repay can sometimes be very uncertain. In the euro area, sovereign insolvency is in general a 'won't pay', not a 'can't pay' issue. Third, enforcement actions against sovereigns are notoriously difficult, especially when much of the outstanding government debt was issued under domestic law (and is therefore subject to legal transformation initiated by the country's legislative branch of government). Even when the debt was issued under foreign law (most often under New York or English law), the principle of sovereign immunity or simply diplomatic niceties prevent effective cross-border enforcement of rulings against governments. And gun-boat diplomacy as a means of sovereign contract enforcement is not what it used to be.

In the absence of a credible commitment mechanism for sovereigns, it should therefore come as no surprise that the ECB shies away from putting its mouth where its money is, i.e. it does not provide rhetorical support for its SMP LoLR operations.

A third potential shortcoming is that SMP purchases could, instead of carrying an illiquid, but likely solvent sovereign through a period of temporary loss of market access, cause persistent damage the prospects of the sovereign returning to being funded in the private markets. This can happen if the sovereign is, as a result of the SMP purchases, left with an 'overhang' of effectively senior creditors, including not only the ECB, but also potentially the IMF and the EFSF/ESM. In our view, the problem of 'seniority overhang' is a real one in the case of the troika programmes for Greece, Ireland and Portugal, but this is because these were not truly LoLR operations, as the borrowing sovereigns were not likely solvent even when the first SMP operations and troika programmes in their support were put together. For solvent, but illiquid sovereigns, the creation, through SMP purchases or through EFSF/ESM and IMF loans, of a class of senior creditors would be only of secondary concern. For the same reason, the argument that debt owned by official creditors should be pari passu with privately held debt therefore also does not hold much merit in the case of true LoLR operations.

But even if we discount the potential issue of seniority overhang, it is clear that the SMP is not fit for the purpose of providing credible and efficient LoLR support for EA sovereigns.

5.2 Indirect outright purchases of EA periphery sovereign debt in the primary markets through banks

A second, indirect instrument is outright purchases of sovereign debt in the primary issue markets. The ECB and the NCBs are prohibited from doing this by the Treaty.⁶ So they provide half of the required mechanism by making very cheap, heavily subsidised, credit available to banks, currently under the 3-year full-allotment LTROs, the first of which was implemented, to the tune of €489bn on December 22, 2011, and the second of which amounted to EUR529.5bn allotted on February 29.

The terms on which this funding is provided are very attractive. The interest rate is tied to the refi rate, which was 100 bps in April 2012 but could be down to 50 bps around before the end of 2012. Over the 3-year life of the LTRO, the average cost of funding could end up at as little as 60bps. Collateral standards were also relaxed at the same time that the 3-year LTROs were announced: "the Governing Council has decided... to increase collateral availability by (i) reducing the rating threshold for certain asset-backed securities (ABS), and (ii) allowing national Central Banks (NCBs), as a temporary solution, to accept as collateral additional performing credit claims (i.e. bank loans) that satisfy specific eligibility criteria."⁷

The other half of the mechanism is financial repression by the periphery authorities, which forces periphery banks and other regulated entities (such as pension funds and insurance companies) to purchase, often in the primary markets, more of their own sovereign's debt and at lower yields than they would voluntarily in the absence of moral suasion, arm twisting, friendly or not-so-friendly persuasion and other forms of pressure by the authorities. Arm-twisting of banks by the national authorities and national central banks can apply not just to the amount of national sovereign debt purchased by the banks at the sovereign debt auctions in the primary markets and to the terms on which this is bought, but also to the amount of uptake by the banks of the longer-term financing offered by the ECB.

The ECB/Eurosystem acts as the 'nice cop' in the financial repression policy by making available funding at highly subsidised rates, thus permitting banks that are forced to use part of their LTRO borrowing to purchase additional debt issued by their own sovereign to do so while still making an attractive return despite the financial repression. There is no serious downside for the banks that are subject to financial repression. The likely outcome is their sovereign not defaulting on its debt. Thanks to the subsidised LTRO funding, even government debt purchased at higher than fair prices in the primary issue markets offers an acceptable carry trade. In the unlikely event the sovereign defaults, those banks were already so heavily exposed to their own sovereigns (explicitly through holdings of government bonds or lending to the government, implicitly through the ripple effect that a sovereign default has on other bank exposures and on the banks' own funding conditions), that insolvency of the banks would likely have resulted even without the additional sovereign debt purchased as a result of financial repression. And by announcing that there will be no bank stress test in 2012, the European Banking Authority (EBA) has effectively taken away the threat that falling prices of government securities could lead to extra capital requirements in the near term.

⁶ See footnote 5.

⁷ ECB Press Release, 8 December 2011.

Figure 12. Selected EA Countries – MFI holdings of domestic sovereign debt , as of end-February 2012

Country	Bn EUR	% of total stock of outstanding marketable sovereign debt	% of MFI capital and reserves	% MFIs balance sheet size
Greece	42.4	15.5	94.5	8.7
Ireland	14.6	12.1	11.6	2.4
Italy	295.4	17.9	75.3	7.1
Portugal	26.4	20.9	61.5	4.5
Spain	238.2	30.8	62.7	6.5

Note: Holdings of domestic credit institutions only for Ireland.

Sources: National Central Banks and Citi Investment Research and Analysis

This second route has three advantages over the SMP route of providing LoLR support. First, banks can, unlike the ECB, lend to governments and purchase sovereign debt in primary markets, and therefore provide more effective LoLR support than through the ECB's SMP purchases. Second, since it is the banks that purchase the government debt, the problem of effectively senior officially held debt subordinating private creditors would not arise. Third, again, as it would be the banks that would be lending to EA sovereigns or purchasing their debt, not even German law professors may be likely to mount a legal challenge against this version of LoLR support on the basis of Article 123 of the Treaty.⁸

However, in our view the combination of subsidised bank funding and financial repression still has two big shortcomings that make it unattractive as more than a stop-gap LoLR for EA sovereigns. First, just as with SMP purchases, there are no commitment mechanisms binding sovereigns to fiscally responsible actions. Second, the subsidised funding that is provided to EA banks is not explicitly tied to liquidity support for deserving sovereigns. Indeed only a relatively small share of the LTROs has gone to purchases of Spanish and Italian sovereign debt. By suppressing borrowing costs and otherwise loosening borrowing terms and conditions, such actions risk keeping alive fundamentally insolvent *banks* and to encourage imprudent lending by all banks, creating medium-term risks for financial stability and likely making it harder to restore conditions for sustainable growth.

5.3 Indirect lending to EA periphery sovereigns through the IMF

The third instrument – not yet used – for the ECB to act as a LoLR is another indirect one, and is also aimed at getting around the Treaty's prohibition of direct funding by the ECB and the NCBs of the sovereigns. But importantly this third route would also likely improve on the second route in terms of its implications for medium-term financial stability and sovereign incentives for engaging in responsible fiscal budgeting.

This third approach has the NCBs lending to the IMF which then lends, on favourable terms reflecting its preferred creditor status, to EA sovereigns, once these sovereigns are subject to IMF/Troika programmes, including an IMF Standby-By Programme or a substantively similar arrangement of subsidised loans in exchange for fiscal, financial and structural reform conditionality. Just like banks, the IMF *can* lend to EA sovereigns (indeed, like the EFSF and the ESM, the IMF *can only* fund sovereigns). And as long as the NCB lending to the IMF does not occur explicitly to support EA sovereigns, e.g. by creating a separate account for euro area support at the IMF, this route also appears to be consistent with the Treaty, though we regard it as likely to be challenged in either the European Court of Justice or in one of the national constitutional courts.

Financial and structural reform conditionality are likely to be key for an effective LoLR regime based on NCB lending to the IMF and, through the IMF to the fiscally weak sovereigns. Fiscal and structural reform conditionality and a debt sustainability analysis are also standard ingredients for IMF programs. This set-up therefore offers a much improved channel for LoLR support, compared to the first two options. Two concerns remain. First, the political obstacles to using the IMF to provide significantly enhanced support to the euro area will likely remain, potentially impeding the IMF's ability to act fast and on the necessary scale. It is also not clear to what extent the programme conditionality will be effective in providing incentives for sovereigns to be fiscally responsible, and whether the debt sustainability analysis is sufficiently discriminating to ensure that only illiquid sovereigns are offered LoLR support and that insolvent sovereigns are required to restructure their debt so as to ensure future

⁸ However, even this route is not completely free of legal risk. German law professor Bernd Schuenemann has recently sued the Executive Board of the Bundesbank for incurring great risks on behalf of the German taxpayer, while lacking the legitimacy to do so. This lawsuit does not directly refer to LoLR support for EA sovereigns channeled through banks, but is concerned with the total size of the exposure, of which LoLR actions to sovereigns and banks of course account for a substantial part.

sustainability as a precondition for access to programme funding. The example of Greece, where the troika provided funding to the sovereign despite the manifest insolvency of the sovereign does not inspire confidence. Neither do the troika programmes for Ireland and Portugal, where funding was provided to the two sovereigns despite a high likelihood that both were insolvent. We hope and expect that, when Portugal and Ireland apply for a second troika programme (or for an extension of their current programmes), the issue of sovereign debt restructuring as a pre-condition for future funding of the sovereign by the troika will be revisited.

5.4. Giving the ESM a banking license

A fourth instrument is also indirect and has also not yet been used: It is to make the ESM an eligible counterparty of the Eurosystem so that it can access the Eurosystem's liquidity facilities using its claims on EA sovereigns as collateral. The ESM would then on-lend the funds, on favourable terms reflecting the ESM's preferred creditor status, to EA sovereigns. The ESM's funding would always be accompanied by a 'programme', but since the ESM also has the option of offering precautionary access to funding, fiscal and structural reform conditionality imposed as part of the programme can range from non-existent to substantial. Many of the characteristics of this LoLR set-up are similar to the third one. This includes the possibility to engage in primary market interventions and the option to impose fiscal and structural reform conditionality and to make debt sustainability a condition for obtaining funding by the ESM. But it still is subject to the risk that this regime will be ineffective in providing the right fiscal incentives. On the plus side, because the ESM is a European institution – and would, in this configuration, be endowed with a European funding back-stop through its access to the Eurosystem's collateralized lending facilities – this route also helps to create the impression that at long last the euro area is capable of coming up with a sustainable and durable institutional LoLR set-up of its own, rather than engaging in the rather unseemly process of having a rich region ask, through the IMF, for financial support from much poorer emerging markets..

However, there are still political and potential legal hurdles to taking this route. This is first that, because of the need to respect Article 123 of the Treaty, courts have to confirm that they see the ESM as a credit institution rather than a state agency; if this is not possible, Article 123 will have to be amended or scrapped, and Treaty revisions take time even if they are not controversial. Materially altering Article 123 would be highly controversial. A second challenge concerns whether the size and/or the duration of the ESM's potential LoLR exposure violates constitutional requirements for budgetary sovereignty of national parliaments, including but not limited to the German parliament.

6. Remaining issues

6.1. How to sharpen incentives for fiscal discipline

As noted above, true LoLR support is granted to illiquid, but solvent institutions only, against good collateral (or collateral that would be good in normal times) but in principle without further conditions attached to accessing the support. But since the distinction between illiquidity and insolvency for sovereigns is particularly tricky and since ex-post enforcement actions aimed at sovereigns are particularly difficult (a problem aggravated by the inability of most sovereigns to offer adequate collateral for any financial support they receive), additional safeguards to ensure that the presence of a LoLR does not weaken incentives for fiscal discipline seem merited. Among these could be statutory fiscal rules, such as those that are part of the amended Stability and Growth Pact (SGP), and the Fiscal Compact. Regular debt sustainability analyses should be carried out and a positive verdict should be a precondition for obtaining LoLR support. These are mostly meant to reduce the likelihood that EA sovereigns would run into solvency problems. Fiscal and structural reform programme conditionality are also likely to be required for LoLR access. But all of these together are unlikely to be sufficient.

For the regime to be effective in the long term, sovereigns would likely have to be allowed to fail. Sovereigns must be allowed to fail (i.e. to restructure their debt by imposing losses on creditors), and not only the small and not systemically important sovereigns, and not only after months or years of procrastination and bickering. For that, it is possible that a sovereign debt restructuring mechanism (SDRM) may be necessary. The ESM contains the outline of such an SDRM, but only the contractual or market-based component of the SDRM is spelled out clearly, through the requirement that all sovereign debt in the EA issued from January 1, 2013, have collective action clauses (CACs) that permit a qualified majority of the debt holders to accept a debt restructuring offer from the sovereign. The elimination of the unanimity requirement for approving a sovereign debt restructuring proposal reduces the problem of hold-outs and vulture funds delaying restructuring. We believe that a statutory dimension too will have to be given to any effective euro area SDRM.

A key lesson of the ongoing euro area crisis is that it is essential to de-couple national sovereigns from the banks in their jurisdictions. We have witnessed an insolvent sovereign dragging its national banking sector (which apart from its exposure to the sovereign was most likely solvent) into insolvency (Greece). We may well witness an insolvent banking sector deemed too big to fail turn out to be too big to save and dragging its sovereign into insolvency (Ireland). Our conclusion is that, in order to survive, the euro area does not need an ambitious fiscal union, but rather a euro area banking union with a minimal, and capped fiscal component.

The Banking Union has 5 key dimensions: (1) A euro area-wide regulator and supervisor for banks and other systemically important financial institutions (sifis), (2) A euro area-wide resolution and bail-in regime for banks and other sifis, (3) A euro area-wide bank recapitalization facility (Eurotarp), (4) A euro area-wide facility for guaranteeing new unsecured term borrowing by banks, (5) A euro area-wide deposit insurance regime and insurance fund. Features (3), (4) and (5) required limited, capped fiscal facilities, say, €400bn for the Eurotarp, €400bn for the unsecured term borrowing guarantee facility (UTBGF) and a temporary €500bn fiscal deposit insurance fund, which would over time be replaced by a banking-industry-funded facility. The unsecured term borrowing guarantee facility is necessary if, as we fear, there will be significant unsecured bank debt restructuring during the years to come in the euro area. It is likely that not only subordinate unsecured debt holders but senior unsecured bank debt holders too will find themselves transformed into bank shareholders as part of the unavoidable deleveraging, restructuring, recapitalization and consolidation of the euro area banking sector.

The three fiscal 'pots' required for euro area banking union could, even under the existing Treaties, be funded with debt issued under joint and several guarantees by the new Eurotarp, Euro UTBGF and Euro deposit insurance fund, as they can be described as 'projects'. A nice symbolic acknowledgement of euro area banking union would be to require all euro area banks and other sifis to incorporate as Societates Europeae, that is, not under national statutes but under European statute.

It would also be desirable to ensure that the ECB/Eurosystem's role in the LoLR processes for sovereigns and for banks be limited to the provision of liquidity support and not of solvency support. The straightforward way to do this would be to require that any assets held by the ECB and the NCBs (acting as part of the Eurosystem) that are not of the highest credit quality (defined as the rating attached to an instrument jointly and severally guaranteed by all the EA member state governments), be jointly and severally guaranteed by the EA member state governments. This would put an end to the non-transparent and unaccountable quasi-fiscal role of the ECB.

This would mean joint and several guarantees by all EA member states of SMP purchases of sovereign or private debt and of lending by the Eurosystem against collateral issued or guaranteed by lowly rated sovereigns. Borrowing by the ESM from the Eurosystem (should the ESM get banking license) would also be jointly and severally guaranteed by the EA member states. Bank borrowing from the Eurosystem secured against risky private financial instruments would likewise have to be jointly and severally guaranteed by the EA member states. This would turn the asset side of the Eurosystem's balance sheet into what is sometimes called a 'Treasuries only' configuration (ignoring foreign exchange reserves to simplify the argument), where 'Treasuries' is shorthand for the highest credit rating available in the euro area, that is, the credit rating attached to a jointly and severally guaranteed instrument. It would not solve the problem of finding some effective commitment mechanism for the national sovereigns, to ensure fiscal sustainability. Indeed, with the ECB and the NCBs benefiting from a joint and several guarantee from the euro area sovereigns, the Eurosystem itself would be incentivized to engage in imprudent lending to national sovereigns and to banks. Clearly, as regards the national sovereigns, the quid pro quo would have to be reduced fiscal and wider economic sovereignty of beneficiary governments, at least for the duration of the financial support programmes. For banks, a more effective euro area regulator/supervisor and a credible euro area-wide special resolution regime for banks, which are not captured (cognitively or otherwise) by bank executives, shareholders and unsecured bank creditors are essential.

6.2. How much credible LOLR support can the ECB provide?

The ECB/Eurosystem has deep pockets. Of course, if we don't impose an inflation constraint, the domestic-currency pockets of the ECB/Eurosystem are infinitely deep – they print the stuff (euro currency) and create it electronically by crediting overnight deposit accounts with the Eurosystem for eligible banks. We believe the ECB takes its price stability mandate seriously and will not depart from it. We have therefore, conservatively, estimated its non-inflationary loss absorbing capacity (NILAC), and come up with a central estimate of about €3.4trn (see Buiter and Rahbari (2012b)). This is the sum of two components. The first consists of about €80bn of conventional capital and reserves and about €394bn of loss absorbing capacity in the Eurosystem's revaluation

accounts (realisable capital gains on gold reserves and other assets). This corresponds to W^{cb} in terms of the notation of Section 3. The second, larger component is about €2.9trn for the net present discounted value of future non-inflationary seigniorage (narrowly defined as interest saved as a result of zero-interest currency issuance, that is, $V(\omega^2)$ in the notation of Section 3), assuming a 2% inflation rate, a 1% growth rate for real GDP and a nominal discount rate of 4%. This means that the ECB/Eurosystem has the non-inflationary resources to provide the 'Big Bazooka' firewall/ring fence to safeguard the euro area banks, the euro area sovereigns and indeed the euro area as a whole.

6.3. Will the European Treaties need to be changed?

In our view, substantial Treaty change is likely to be unavoidable if the euro area is to come up with a robust LoLR set-up. For this purpose, we propose the following changes:

1. Get rid of Article 123 (politically very difficult, but necessary for a rational solution). This would permit the ECB, at its discretion, to act as lender of last resort to euro area sovereigns through sovereign debt purchases in primary and secondary markets, by lending to the sovereigns directly (with or without collateral) and by engaging in collateralized lending to the banking license-enhanced ESM
2. Restrict the ability of the ECB/Eurosystem to purchase sovereign debt in primary and secondary markets, to purchases that benefit from a full joint and several guarantee from all EA governments
3. Restrict the ability of the ECB/Eurosystem to lend to sovereigns directly, to loans either secured against 'good' collateral or benefiting from a full joint and several guarantee.
4. Stipulate that outright purchases of sovereign debt by the ECB/Eurosystem or loans to sovereigns (financial operations under (2) and (3)) can occur only at the discretion of the ECB. The ECB cannot be instructed or forced to engage in such operations.
5. Any countries benefiting from (2) or (3) should be subject to tough conditionality under ESM or troika programmes that involve a material surrender of national fiscal and wider economic policy sovereignty for the duration of the programme.

Alternatively, the ESM with banking license could do (2) and (3), but would have to be fully joint and severally guaranteed to avoid quasi-fiscal credit risk exposure for the ECB/Eurosystem. In this case (4) and (5) would continue to apply.

7. Conclusion

The search for a suitable policy regime and institutional arrangement to provide lender of last resort support for sovereigns of the euro area continues. Routes that are limited to secondary market interventions (like the SMP operations of the ECB) are a non-starter beyond the immediate present, where legal and/or political impediments prevent the national and supranational decision makers from coming up in a timely manner with a more efficient regime to ensure that fundamentally unwarranted sovereign default is avoided. Relying on subsidized funding for banks (provided by the ECB through the LTROs) and on financial repression (provided by the national authorities in those periphery countries like Italy and Spain, where the sovereign still funds itself in the markets but at increasingly painful and ultimately unsustainable yields) is also inherently undesirable as this route blunts incentives for both banks and sovereigns to exercise financial prudence. We expect that ECB/Eurosystem lending to periphery sovereigns under troika programmes will fill part of the sovereign funding gap for the larger periphery countries like Spain and Italy during the years to come. And we consider it possible (and desirable) that the ESM will be given a banking license in due course.

But the creation of a technically efficient LoLR for sovereigns (capable of mobilizing large amounts of resources at short notice) should not come at the expense of two other equally important objectives. The first is to take the ECB/Eurosystem out of the quasi-fiscal game. It is simply unacceptable in a democracy that unelected technocrats are put in a position where they have to rule on the allocation and distribution of multiple trillions of euros without any legitimizing accountability. Our proposal in Section 6.3 addresses that issue.

The second is to create the right incentives for banks and sovereigns to behave prudently, to avoid a repeat of the fiscal bacchanalia and irresponsible bank lending, investing and funding of the decade before 2008. In a number of countries, financial instability reached critical levels because of the behaviour of households and non-financial corporations (always of course deeply entangled with the banking sector). This requires strengthening both the preventive arm of the euro area fiscal and wider macroeconomic and financial stability regime, and the remedial or corrective arm. The constantly evolving complex network of institutions and procedures through

which prevention and cure are supposed to be administered remains incomprehensible and probably ineffective despite (or perhaps because of) the creation of a new alphabet soup of Treaties, arrangements, procedures and pacts: the reinforced Stability and Growth Pact (SGP), the Excessive Deficit Procedure (EDP), the Excessive Imbalance Procedure (EIP), the Macroeconomic Imbalance Procedure (MIP) and the associated Alert Mechanism Report (AMR), the country-specific medium term budgetary objectives (MTO), the European semester for coordination of economic and fiscal policy planning, the Euro+ Pact, the Fiscal Compact (aka Treaty on Stability, Coordination and Governance), the European Stability Mechanism (ESM) Treaty, the European Financial Stability Facility(EFSF), the European Financial Stabilisation Mechanism (EFSM), the six-pack and the two-pack. These function alongside the European System Risk Board (ESRB), the European Banking Authority (EBA), the European Securities and Markets Authority (ESMA), the European Insurance and Occupational Pensions Authority (EIOPA), the national financial sector supervisors and regulators, the Directorate-General Economic and Financial Affairs and the Directorate-General Internal Market.

With instruments and institutions in such chaos and disarray, it is actually surprising that things are not worse than they are, given the Rube Goldberg Machine that the national political and European leaderships have concocted to pursue fiscal and financial stability. It is therefore not surprising that most of the heavy lifting to prevent disorderly sovereign defaults, disorderly collapses of systemically important financial institutions and the disintegration of the euro area has been done by the European Central Bank, lender of last resort of sovereigns and banks, and the protagonist of quasi-fiscal union in the euro area.

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