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ABSTRACT

The Role of Central Banks in Financial Stability: How has it changed?*

The roles of central banks in the advanced economies have expanded and multiplied since the beginning of the crisis. The conventional monetary policy roles - setting interest rates in the pursuit of macroeconomic stability and acting as lender of last resort and market maker of last resort to provide funding liquidity and market liquidity to illiquid but insolvent counterparties - have both been transformed. With official policy rates near or at the effective lower bound, the size of the central bank's balance sheet and the composition of its assets and liabilities have become the new, 'poor man's', monetary policy instruments. The LLR and MMLR roles have expanded to include solvency support for SIFIs and, in the euro area, the provision of liquidity support and solvency support for sovereigns also.

Concentrating too many financial stability responsibilities, including macro-prudential and micro-prudential regulation, in the central bank risks undermining the independence of the central bank where it is likely to be useful -- the conventional monetary policy roles.

The non-inflationary loss-absorption capacity (NILAC) of the leading central banks is vast. For the ECB/Eurosystem we estimate it at no less than EUR3.2 trillion, for the Fed at over $7 trillion. This is tax payers' money that is not under the effective control of the fiscal authorities. The central banks have used their balance sheets and their NILACs to engage in quasi-fiscal actions that have been essential to prevent even greater financial turmoil and possible disaster, but that also have important distributional impacts between sectors, financial institutions, individuals and nations. The ECB was forced into this illegitimate role by the fiscal vacuum at the heart of the euro area; the Fed by the fiscal paralysis of the US Federal government institutions.

JEL Classification: E41, E52, E58, E63, G01 and H63
Keywords: accountability, central banks, financial stability and non-inflationary loss absorption capacity

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(I) The Rediscovery of Financial Stability by the Central Banking Community of the Advanced Economies

A long time ago, in a galaxy far, far away, most academic monetary economists working on advanced economies and quite a few central bankers believed that the sum total of central banking was captured by an operationally independent central bank setting short term interest rates to pursue a one- or two-dimensional macroeconomic stability objective. The macroeconomic stability objective is often just price stability, typically defined as the pursuit of some target rate of inflation for some broadly defined index of goods and services. Some countries have dual objectives, involving both price stability and some real activity objective, like employment, unemployment or output. The Fed has a triple macroeconomic stability mandate, involving maximum employment, stable prices and moderate long-term interest rates. An exchange rate objective sometimes substitutes for or complements the price stability objective.

When the north-Atlantic financial crisis erupted in August 2007, the economics profession in the advanced economies and some central bankers rediscovered financial stability. Those working in and on emerging markets and developing countries of course never fell victim to the 'central bank independence and (flexible) inflation targeting' blind spot. The lesson has been sharp: there can be little doubt that, for any central bank faced with a potential conflict between price stability (or macroeconomic stability) on the one hand and systemic financial stability on the other, financial stability, the primary of financial stability has been rediscovered with a vengeance. Systemic financial stability trumps price stability or macroeconomic stability every time - anywhere. This has been true even for the European Central Bank (ECB). I expect that, by the time the European sovereign and banking crises are over, the financial stability role of the ECB will have been enhanced to a scale not seen elsewhere since the crisis started in 2011. If it is not, there will at most be a rump euro area (EA), consisting essentially of a 'greater Deutschmark zone', when the dust of history settles on the EA crises.

(II) Financial stability: what is it?

I view policies to promote financial stability as having four dimensions

The first is the prevention and/or mitigation of asset and credit booms, bubbles and busts. There is a long-standing debate, often referred to as lean vs. clean, between the BIS, led by William While (2006a,b) and most of the rest of the economics profession, led by Alan Greenspan (2008) and by Ben Bernanke and Mark Gertler (Bernanke and Gertler (1999, 2001), Bernanke (2002, 2005)). The BIS favours using interest rates to lean against the wind in asset and credit markets, raising rates when booms or bubbles threaten, even when the general price level and the level of economic activity are on target. The Greenspan-Bernanke school favours letting credit and asset booms and bubbles run their course and using monetary policy aggressively after a bubble bursts to minimize the damage caused by these financial upheavals.

The second dimension of financial stability policy is the prevention and/or mitigation of funding liquidity crises for systemically important financial institutions (SIFIs) and for the sovereign. This is

the lender of last resort (LLR) role of central banks. A lender of last resort provides liquidity to solvent but illiquid counterparties. In the classic Bagehot approach, this liquidity is provided against good collateral and at a penalty rate (Bagehot (1873)). The Bagehot approach is, however, too restrictive and I shall use the term lender of last resort role just in the sense of lending to solvent but illiquid counterparties. I recognise, of course, that illiquidity is almost always the product of fear of insolvency.

The central bank as LLR is an essential financial stability prop not only for the private sector but also for the sovereign. Like banks, sovereigns suffer from maturity and liquidity mismatch among their assets and liabilities. Sovereigns with non-trivial financial deficits and a sizeable stock of sovereign debt with a range of maturities outstanding have regular funding needs. The main assets of the sovereign are highly illiquid: the net present discounted value (NPV) of future taxes and the NPV of future cuts in public spending. 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, it could be tripped into a fundamentally unwarranted payments default should the market instead adopt the 'self-fulfilling fear equilibrium belief' that the government is not solvent. A lender of last resort capable of issuing unquestionably liquid instrument (base money) in any amount is necessary to trump the 'fear equilibrium' or 'sovereign debt run equilibrium' that always threatens the sovereign, just as the LLR is necessary to prevent solvent but illiquid banks from succumbing to a bank run. The truth of this proposition has been underlined several times since the start of 2010 in the case of the euro area with its multiple sovereigns. It is equally true, however, in the case of the US, where a single sovereign faces the central bank.

The third dimension of financial stability is the prevention and/or mitigation of market liquidity crises involving markets for systemically important financial instruments. This is the market maker of last resort (MMLR) role of central banks, first elaborated in Buiter (2008).

Fourth is the prevention and/or mitigation of solvency crises for systemically important financial institutions. This includes recapitalisation of SIFIs through a variety of mechanisms – by raising capital in the markets, by selling assets, by running down maturing loan books or through other forms of deleveraging, through the tax payers or one of their agents (which may result in majority public ownership or full nationalisation), by the mandatory conversion of unsecured creditors, including senior unsecured creditors into shareholders and, ultimately, by the mandatory conversion of secured creditors into shareholders.

Solvency gaps can only be filled through an unrequited transfer of resources. This means that either the fiscal authority will have to be involved or that the central bank will act in a quasi-fiscal manner. The fiscal and quasi-fiscal roles of the central bank are a key focus of this essay.

The prevention or mitigation of market illiquidity and funding illiquidity crises is not just intended to address problems caused by and for private actors. Even in the modern, post-World War II era, recurrent sovereign debt crises in emerging markets have reminded us of the potential fragility of sovereign finances. The insolvency crises faced by the Greek, Portuguese and Irish sovereigns, the liquidity crises rocking Italy, Spain and, lurking behind them, Belgium, France and Austria, the growing spreads over Bunds now encountered even for the Netherlands and Finland and, finally, the failed German sovereign debt auction of 23rd November 2011 and the fact that the CDS spread on 5-year German sovereign debt has in recent months exceeded 100 basis points, all suggest that

financial stability is a sovereign concern throughout the euro area. I would argue that, although the US Federal government continues to be the beneficiary of a global safe haven demand for its debt, the protective buffer against the bond market vigilantes provided by the global reserve currency status of the US dollar, by the size of the US economy, the independence of its courts and the depth, breadth and liquidity of its financial markets, the size of this buffer against normal market discipline is finite, not open-ended. More than that, I suspect that the US federal government buffer against the bond market vigilantes is in the process of being eroded by a steady sequence of unsustainable federal deficits and by a growing suspicion, in the US and in the global capital markets, that the US federal fiscal institutions and policy making processes may not be up to the job of achieving federal fiscal sustainability.

(III) Prevention

Prevention requires foresight. The record of the leading central banks in this regard has been woeful during the decade leading up to the financial crisis that erupted in August 2007.

Both the current and the previous Chair of the Federal Reserve Board were cheerleaders for deregulation and financial innovation, including subprime mortgage securitisation – that deadly concoction of social engineering and financial engineering (see Greenspan (2004, 2005a,b) and Bernanke (2006, 2007a,b)).

In April 2005, Greenspan asserted: *"Innovation has brought about a multitude of new products, such as subprime loans and niche credit programs for immigrants. Such developments are representative of the market responses that have driven the financial services industry throughout the history of our country. With these advances in technology, lenders have taken advantage of credit-scoring models and other techniques for efficiently extending credit to a broader spectrum of consumers … The mortgage-backed security helped create a national and even an international market for mortgages, and market support for a wider variety of home mortgage loan products became commonplace. This led to securitization of a variety of other consumer loan products, such as auto and credit card loans."* (Greenspan (2005a)).[1]

As late as November 1, 2006, Bernanke stated: *"The growth of subprime mortgage lending is one indication of the extent to which access to credit has increased for all households, including those with lower incomes. In 1994, fewer than 5 percent of mortgage originations were in the subprime market, but by 2005 about 20 percent of new mortgage loans were subprime.*[1] *Indeed, the expansion of subprime lending has contributed importantly to the substantial increase in the overall use of mortgage credit. From 1995 to 2004, the share of households with mortgage debt increased 17 percent, and in the lowest income quintile, the share of households with mortgage debt rose 53 percent.*[2]"(Bernanke 2006). In fairness, he went on to warn: "Although the emergence of risk-based pricing has increased access to credit for all households, it has also raised some concerns and questions, which are magnified in the case of lower-income borrowers. For example, although

[1] In the same speech, Greenspan (2005a) also states: "*Improved access to credit for consumers, and especially these more-recent developments, has had significant benefits. Unquestionably, innovation and deregulation have vastly expanded credit availability to virtually all income classes. Access to credit has enabled families to purchase homes, deal with emergencies, and obtain goods and services. Home ownership is at a record high, and the number of home mortgage loans to low- and moderate-income and minority families has risen rapidly over the past five years."*

subprime lending has grown substantially, are prime credit products sufficiently available and do lenders effectively compete in all communities, including historically underserved communities? " (Bernanke (2006)).[2]

On June 5 2007, Bernanke stated that: *"The troubles in the subprime sector seem unlikely to seriously spill over to the broader economy or the financial sector"* (Bernanke (2007a)). As late as August 2007, Bernanke was singing the only slightly qualified praises of mortgage securitisation. [3]

Early in the crisis, especially during the weeks between the first seizure of the wholesale funding markets in August 2007 and the bank run on Northern Rock that followed that bank's request for emergency funding from the Bank of England in September 2008, those in charge of the UK central bank did not recognise that, in order to be tough with banks, you need a special resolution regime (SRR) or orderly resolution regime for banks with prompt corrective action, bridge bank creation capacity and all that, and a well-functioning deposit insurance regime. The UK had none of these.

The ECB even today does not know enough about the creditworthiness of its thousands of eligible counterparties to allow it to make informed decisions about their creditworthiness. Some national regulators and supervisors continue to deny the ECB the relevant information, sometimes because of national laws that prohibit passing on such information.

The Fed and the ECB understood, from the first, their lender-of-last resort responsibilities vis-à-vis banks and, in the case of the Fed, vis-à-vis non-bank SIFIs like AIG. The Band of England did not. The ECB understood its market maker of last resort responsibilities well before the Fed and the Bank of England. This is ironic, as intermediation through financial markets is a much larger share of total intermediation in the UK and the US than in the euro area, where intermediation through banks remains the dominant form of intermediation.

The ECB, even today, denies that there is such a thing as the lender-of-last-resort role of the central bank vis-à-vis the sovereigns of the euro area.[4] Its outright purchases of sovereign debt in the secondary markets under the Securities Markets Programme (SMP) are rationalised as part of the

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[2] Bernanke's speech continues: *"How well are lower-income borrowers matched with credit products and loan terms that fit their circumstances? Are borrowers aware of the terms and conditions of their loans, and more generally, are consumers sufficiently well informed to be wary of potentially misleading marketing tactics and to shop effectively among lenders? Some evidence, including recent Federal Reserve research on consumers holding adjustable-rate mortgages, suggests that awareness could be improved, particularly among borrowers with lower incomes and education levels.*[3] *This research suggests the need for greater financial literacy and increased access to financial counselling…."* (Bernanke (2006)).

[3] "*In some ways, the new mortgage markets came to look more like a textbook financial market, with fewer institutional "frictions" to impede trading and pricing of event-contingent securities. Securitisation and the development of deep and liquid derivatives markets eased the spreading and trading of risk. New types of mortgage products were created. Recent developments notwithstanding, mortgages became more liquid instruments, for both lenders and borrowers."* (Bernanke (2007b)).

[4] In response to a question about whether, to keep the euro area in one piece, the ECB would consider becoming the lender of last resort to governments, the new ECB President, Mario Draghi, at his first press conference and Q&A session following the November 3, 2011 meeting of the Governing Council of the ECB answered: *"…what makes you think that the ECB becoming the lender of last resort for governments is what is needed to keep the euro area together? No, I do not think that this is really within the remit of the ECB. The remit of the ECB is maintaining price stability over the medium term."* Source: http://www.ecb.int/press/pressconf/2011/html/is111103.en.html

job of central bank as MMLR. The argument is that, for the interest rate channel of the monetary transmission mechanism to work properly, key financial markets, including the sovereign debt markets, have to function in an orderly, transparent manner. Disorderly, illiquid sovereign debt markets impair the proper functioning of the monetary transmission mechanism and this constitutes a valid ground for central bank intervention in these markets, including through outright purchases of sovereign debt.[5]

Why did our central banks, regulators and supervisors fail to recognise the imbalances as they were building up? Regulatory capture is an important part of the answer. Defective economic analysis, produced by defective economic training for much of the generation of central bankers in charge since the beginning of this century accounts for much of the rest (see Buiter (2009a)).

Regulatory capture can be direct or cognitive. Whatever the incidence of *direct* capture (inducing regulators and supervisors to act in the interest of the industry they supervise or regulation rather than in the public interest they are committed to serve, by offering financial or positional rewards or by creating the expectation that such rewards may be forthcoming in the future), cognitive capture is the rule rather than the exception. In this crisis blind faith in the self-regulating properties of financial markets played a major role, with Alan Greenspan as the prophet of socially beneficial self-regulation and Ben Bernanke and many others providing the scholarly underpinnings. It was the triumph of market fundamentalist religion over science.

This suggests the desirability of having multiple, overlapping regulatory and supervisory bodies, properly staffed and funded, with regular turnover of the top personnel and a significant role for 'outsiders' and independent members in key decision making committees. These multiple regulators and supervisors should co-operate but also to some degree be in competition with each other. Only in this way can we minimize the risk of regulatory capture and groupthink. Instead we are at risk, in the UK, in the US and in the euro area, of concentrating far too much regulatory power in a single institution, the central bank.

Prevention requires early warning systems; indicators of financial stress and strain must be developed, updated and monitored constantly. At the most general level, financial stability is always the result of excessive leverage and excessive mismatch of duration, liquidity, currency denomination and other relevant characteristics. Despite the enduring role of leverage and mismatch, their manifestations in any particular place and time are forever changing. The combination of rapid financial innovation, and lack of transparency promote repeated failures of

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[5] See e.g. the comment of Draghi, at the same press conference and Q&A session following the November 3, 2011 meeting of the Governing Council of the ECB: *"The Securities Markets Programme (SMP) always has had, and was meant to have – as it has been stated since the very beginning – three characteristics. First of all, it is temporary. Second, it is limited in its amount and, third, it is justified on the basis of restoring the functioning of monetary policy transmission channels. So we should keep this in mind because this in a sense answers all the questions that one might have. The relationship with conditionality should be viewed from this perspective. We want our monetary policy to function. And I think that is where the main justification for the SMP lies."* Source: http://www.ecb.int/press/pressconf/2011/html/is111103.en.html

supervisors and regulators to understand the risks embedded in the financial systems whose stability they are responsible for.

(IV) Regulate risky behaviour, not institutions

Regulators and supervisors must monitor risky behaviour, risky products, practices and instruments, no matter where they occur. If a certain kind of behaviour passes the 'duck test' for posing excessive financial instability risk, it must be addressed, regardless of whether the entity or entities engaged in that behaviour call themselves banks, non-bank financial institutions or non-financial enterprises. The range of institutional victims and culprits in the financial crisis is long and very heterogeneous. Northern Rock in the UK was a home-loan bank funded 75 percent in the money markets, 25 percent through deposits. Bear Stearns and Lehman did not take deposits at all and were pure investment banks. AIG was an insurance company – one that operated a rogue investment bank in its UK subsidiary. Fannie and Freddie were government-sponsored entities. IKB Deutsche Industriebank was a German industrial bank. WestLB and the other German Landesbanken were publicly owned regional banks. Commerzbank was a German universal bank. The Greek government is a sovereign.

I therefore like the feature of the new (post Dodd-Frank) US financial regulatory regime that makes it possible to attach SIFI designation to non-bank financial intermediaries also. Under the new regime, the Financial Stability Oversight Council (FSOC) is empowered to identify "systemically important" nonbank financial companies, to put such companies under regulation by the Federal Reserve, and to recommend higher prudential standards for the Federal Reserve to impose on these companies.

The key features shared by all these institutions, and by many others that failed or had to be rescued by the state were, as noted in Section III: excessive leverage, excessive mismatch and lack of transparency.

Leverage is a measure of the degree to which someone is exposed to the risk of an asset or instrument (price risk, default risk, counterparty risk etc.) without owning the instrument. Debt – borrowed money – is one of the oldest and still very common ways to increase leverage for an owner or equity investor. The risk can be on balance sheet or off-balance sheet, it can be explicit or embedded in derivatives, including options, futures, margin and other financial instruments.

Mismatch of maturities, liquidity, currency denomination etc. is the second key characteristic of risk. Some degree of mismatch is clearly unavoidable, if any worthwhile investment project is to be undertaken. Maturity transformation by banks and other financial institutions is a key activity with considerable economic and social value. So is liquidity transformation, as when illiquid and non-tradable loans are securitised and made marketable and liquid. However, any privately profitable and potentially socially useful activity will, if taken to its logical extreme, result in dysfunctional behaviour. Examples include using overnight funding to finance long-term assets traded in markets that could suddenly turn illiquid, or securitisation without the retention of a significant first-loss tranche by the originator of the securitised loans. This does not mean, of course, that the socially optimal scale of any activity that can be taken to excess is zero.

Lack of transparency. When entire asset classes and layers of financial intermediaries fail to appear on or disappear off the radar screen of the regulatory and supervisory authorities, the risk of systemic financial instability can rise sharply. Much financial innovation and financial engineering is

motivated primarily by regulatory or tax arbitrage, and by the desire to be invisible or incomprehensible to regulators or supervisors.

Solutions to or at least mitigation of at least some of these financial instability problems are, in principle, not too difficult technically. They are, however, likely to run into strong political resistance. Obvious dos and don'ts are the following.

(1) Require banks and other SIFIs to hold much more capital, in the economic sense of unconditionally loss-absorbing own resources.

Modigliani – Miller teaches us that capital structure does not matter. Incomplete markets, which create the possibility of bankruptcy, and the fact that bankruptcy is costly, put the first nail into the Modigliani-Miller coffin: costly bankruptcy tells us we need more capital. The fact that all contract enforcement is imperfect and costly creates a further host of complications which I have no time to address here.

Modigliani-Miller relies crucially on the assumption that households can undo, through home-made increases or reductions in leverage, any change in leverage introduced by companies whose debt or equity they own. This home-made leverage mechanism breaks down because only corporations have limited liability. Households don't. Distortionary taxes are another reason for Modigliani-Miller to fail. In particular, the fact that many countries have corporate tax systems in which interest on corporate debt is deductible from the corporate tax base but dividends and retained earnings are not, creates a bias towards excessive corporate debt issuance. Asymmetric information and limited liability creates agency problems with corporate managers, who may have an incentive to create excessive leverage if executive earnings are related to profits or share prices. This problem is even more acute if the equity stake of management itself is leveraged by being in the form of stock options.

(2) End interest-deductibility for corporate debt.
(3) Relate executive pay to the value of the firm (equity plus debt) rather than just to equity. Don't pay top bank officials in share options.
(4) Rethink limited liability for some financial institutions.

An example of this class of proposals is Kotlikoff's proposal for 'limited purpose banking' . Kotlikoff (2010) recommends unlimited liability for all leveraged financial institutions. Limited liability would apply only to pure pass-through mutual funds. Although interesting, this proposal has (at least) two weaknesses. First, how does one differentiate a financial institution from a non-financial enterprise? Every non-financial enterprise has a financial balance sheet. The treasury department of a commodities trader can easily turn into a derivatives trading platform and from there into an investment bank. That's how Enron started off. GE started off as a manufacturer. Second, there is the 'too big to fail' problem or the 'too politically connected to fail' problem which does not go away when there is unlimited liability. An unlimited liability highly leveraged entity could grow too big or could become too interconnected with other financial entities to be allowed to fail. Limited liability does not solve the too big to fail problem.

(5) Don't confuse liquidity and funding with capital and, specifically, don't turn liquidity into a private good.

Liquidity is not a substance but a property of financial instruments. It is subject to network-externalities, and is fundamentally a matter of beliefs and trust. With confidence, optimism and trust, any security will be liquid. Without these, nothing is liquid. Therefore, for both funding liquidity and market liquidity, the provider of the ultimate, unquestioned source of (domestic currency) liquidity is a necessary participant in any socially efficient arrangement. The central bank must always be ready to act as the ultimate source of funding liquidity (as lender of last resort) and as the ultimate provider of market liquidity (as maker maker of last resort (see Buiter (2008)). It is unwise and inefficient to force private financial institutions to hold emergency or stress level stocks of liquid assets during normal times. The Liquidity Coverage Ratio and the Net Stable Funding Ratio of the new Basel III arrangements risk forcing unnecessary levels of liquidity on banks and other financial institutions. This would be especially damaging if, as I suspect, domestic sovereign debt will be declared a suitable source of liquidity for all seasons in most countries. This will permit regulators and sovereigns to conspire to use financial repression to stuff large amounts of unwanted public debt into the portfolios of captive, regulated entities at below fair yields, in the name of prudence, liquidity management and financial stability.

(6) Create a special resolution regime for banks and other SIFIs that can restructure about-to-fail SIFIs at the speed of light, say by applying good bank – bad bank model at speed of light.

Prompt corrective action and bridge bank constructions should be readily available. All unsecured creditors, subordinated, junior and senior, of banks must know that they are at risk of hair cuts or of mandatory conversion of their debt into equity. All unsecured debt is cocos, either ex-ante, or ex-post. Living wills operate at a different frequency from crisis management, but are an integral part of it. Where possible, the SRR and Living Wills should be introduced at an international level. Ideally, there would be a global SRR regime for Global SIFIs (GSIFIs). Europe can at least make a start with a European Resolution Authority for EU cross-border SIFIs.

(7) Introduce Islamic finance for all.

There is too much debt in the public sector, the banking sector and the household sector. Rather than running this down painfully by asset sales and by running financial surpluses, the excessive debt should be either written down or converted into equity. Once the stock problem has been solved, new debt issuance should be subject to much tighter limits than before, for financial institutions, households and sovereigns. Although non-financial corporates were not part of the excessive debt problem this time, limits on indebtedness should also be designed for them.

For households, the main debt problem concerns excessive mortgage debt characterised by negative equity. The existing household mortgage debt that is in negative equity could, at the request of the household, be converted into an Islamic-style mortgage, with the negative equity transferred explicitly to the mortgage lender. The mortgage payment would be changed into a fixed rent component and an equity purchase component, which the household could speed up, slow down or even reverse (selling equity back to the bank), subject to certain verifiable conditions being satisfied. All new residential mortgages would have the features of an Islamic mortgage.

For banks and other financial institutions, excessive leverage can, for near-insolvent entities, be reduced by converting unsecured subordinated, junior and senior debt into equity. Even for

systemically important institutions, the principle should be adhered to, that the last unsecured creditor is fully written down or converted into equity before a cent of public money goes in.

For public debt, equitise the public debt outstanding, if necessary by a 'voluntary' restructuring into securities like real GDP growth warrants or floating rate debt where the nominal interest rate is some constant plus the growth rate of nominal GDP. With declining real GDP and/or deflation, this would allow the sovereign to amortise its debt when the public finances are at their most vulnerable, rather than being faced with a fixed interest burden. Robert Shiller (2003) has proposed a range of useful risk-sharing liabilities for the sovereign.

(V) Regulation and resolution need to be global in scope

Central banks coordinated well in cutting rates and making currency swap lines available. The Fed was generous in allowing US subsidiaries of foreign banks access to many of its special facilities. But this was improvised, messy and mostly unaccountable to the ultimate beneficial owners of the central bank - tax payers and other citizens - until the Fed was forced, by lawsuits or by Congressional action, to reveal the information. We need global agreements on host country and home country responsibilities for branches and subsidiaries of SIFIs.

As pointed out in the previous Section, in addition to internationally harmonised and preferably uniform and uniformly enforced regulation and supervision, we need cross-border resolution regimes for all GSIFIs. A case can be made that there should be further restrictions on cross -border financial activities by GSIFIs, whether through subsidiaries or branches, unless there is a proper cross-border resolution regime and a cross-border living wills.

Of course, resolution of cross-border GSIFIs may require an international fiscal burden sharing regime if adequate capital resources cannot be found elsewhere. A cross-border TARP - or tax-payer funded SIFI recapitalisation fund or regime – is hard to visualise, except possibly for the European Union, which is likely to achieve banking sector union (with its necessary minimum fiscal backup necessary for bank recapitalisation) long before it achieves significant wider and deeper fiscal union in other dimensions.

(VI) Macroprudential instruments

Leaning against the wind in asset markets and credit markets

Here Bernanke et. al. are right (Bernanke and Gertler (1999, 2001)). Short-term interest rates, even if you have the world's greatest communication policy to leverage the announcement effects of future short-term interest rates, are not very powerful instruments for influencing asset valuations and credit growth. You need macroprudential instruments. We need these even more to mitigate the pro-cyclical consequences of many aspects of the current and likely future regulatory regimes, including Basel 2, 2.5 and 3.

Among the many macroprudential countercyclical instruments that have been proposed are countercyclical capital requirements for banks (either through countercyclical capital surcharges or through countercyclical risk weights), Spanish-style dynamic provisioning, countercyclical loan-to-value ratios and debt-to-income ratios in residential mortgage markets, countercyclical margin

requirements in equity markets, countercyclical variations in margins or haircuts in repo markets or a countercyclical land tax. Very little is known about the operating characteristics of these instruments, as most of them have never been implemented.

An important issue concerns the control of these new macroprudential instruments. Some of them are quasi-fiscal or explicitly fiscal in nature. It would be politically difficult to entrust them to an operationally independent central bank. At the same time, it would be necessary to coordinate the usual instruments of monetary policy with the setting of the macroprudential instruments, and a separate macroprudential regulator might make this difficult logistically and politically.

(VII) The fiscal role of the central bank

There is an unavoidable fiscal dimension to a central bank's activities. Central banking is an immensely profitable monopoly, especially in a fiat economy. The net present value of its future seigniorage, even if it faithfully executes, say, an inflation target mandate of 2 percent per annum, can be vast. Extremely conservative estimates made by us for the ECB/Eurosystem of the NPV of future non-inflationary currency issuance range from around €2 trillion to multiples of that amount. For the Fed, it is easy to come up with conservative estimates of the NPV of future seigniorage in excess of $ 7 trillion. That NPV gets distributed to the proximate beneficial owners, the Treasury, after deducting the cost of running the central bank. Through the Treasury, the seigniorage revenues of the central bank end up with the ultimate beneficial owners of the central bank: the citizens and residents of the country, as tax payers and beneficiaries of public spending.

In addition to the generation of seigniorage revenue, central banks manage significant and often complex portfolios. By taking on credit risk, often at less than ex-ante fair rates of remuneration, central banks during this crisis have risked distributing the NPV of its future seigniorage to the parties that succeeded in offloading the credit risk on it, instead of to Treasury. In a well-functioning political-economic system, with proper accountability for all agents of the state, the taking on of credit risk by the central bank should occur subject to agreement from the tax payers, or their Trustee, the Treasury or the Parliament or Congress to which both the central bank and the Treasury are ultimately accountable. There has been no prior approval by the appropriate Parliament/Congress of the taking on of material credit risk by the central bank either in the case of the ECB or for the Fed. Nor has there been, thus far, proper ex-post accountability by these two central banks for the way in which this risk was taken on and managed. Under the Dodd-Frank Act, both the ex-ante authorisation of risky portfolio management decisions and other quasi-fiscal actions, and the ex-post accountability of the Fed will be enhanced. No such enhancement in governance for and accountability of the ECB is in the works.

(A) A little seigniorage arithmetic

As noted, the traditional contribution of the central bank to the sovereign's funding needs are seigniorage, the stream of profits earned by the central bank through its ability to issue base money. In a modern fiat money economy, base money, *M*, is the sum of the stock of currency, *C*, and commercial bank reserves held with the central bank, *R*, the sum of required reserves, R^r and excess reserves, R^e. It pays an interest rate that is typically below the risk-free market rate of interest. Currency typically pays a zero interest rate, $i^c = 0$. The interest rate on required reserves,

i^r, and on excess reserves, i^e is set by the central bank. In addition, currency is irredeemable – the holder of a given amount of currency has no other claim on the issuer than for the same amount of currency. For all practical purposes, the stock of bank reserves can also be viewed as irredeemable – at most the holder can insist on redemption in the form of currency.

So

$$M = C + R \tag{1}$$

$$R = R^r + R^e \tag{2}$$

I will define seigniorage in period *t*, S_t, as the flow of period *t* profits derived from base money issuance. Let M_t be the stock of base money at the end of period t, with similar notation for all other asset stocks; Δ is the backward difference operator.

$$\begin{aligned} S_t &= M_t - (1+i_t^c)C_{t-1} - (1+i_t^r)R_{t-1}^r - (1+i_t^e)R_{t-1}^e \\ &= \Delta M_t - i_t^c C_{t-1} - i_t^r R_{t-1}^r - i_t^e R_{t-1}^e \end{aligned} \tag{3}$$

We can rewrite **(3)** more compactly in terms of the (weighted) average interest rate on the monetary base, i^m, as follows

$$S_t = \Delta M_t - i_t^m M_{t-1} \tag{4}$$

where

$$i_t^m = i_t^c \left(\frac{C_{t-1}}{M_{t-1}} \right) + i_t^r \left(\frac{R_{t-1}^r}{M_{t-1}} \right) + i_t^e \left(\frac{R_{t-1}^e}{M_{t-1}} \right) \tag{5}$$

Let *Y* denote real GDP and *P* the GDP deflator. The proportional growth rate of real GDP in period *t* is denoted $\gamma_t = \frac{Y_t - Y_{t-1}}{Y_{t-1}}$ and the rate of inflation of the GDP deflator is denoted $\pi_t = \frac{P_t - P_{t-1}}{P_{t-1}}$.

Seigniorage as a share of GDP, $s_t = \frac{S_t}{P_t Y_t}$, is therefore given by:

$$s_t = \frac{\Delta M_t}{P_t Y_t} - \frac{i_t^M}{(1+\gamma_t)(1+\pi_t)} m_{t-1} \tag{6}$$

where $m_t = \frac{M_t}{P_t Y_t}$ is the monetary base as a share of GDP, the reciprocal of the income velocity of circulation of base money.

The net present discounted value of current and future seigniorage at the beginning of period *t,* denoted $NPV_t(S)$, is defined as

$$NPV_t(S) = E_t \sum_{j=t}^{\infty} I_{j,t} \left(M_j - (1+i_j^m) M_{j-1} \right) \quad \textbf{(7)}$$

where E_t is the expectation operator conditional on information at time *t* and $I_{j,t-1}$ is the (stochastic) nominal discount factor between periods *j* and *t,* defined by

$$\begin{aligned} I_{j,t} &= \prod_{k=t+1}^{j} I_{k,k-1} \text{ for } j > t \\ &= 1 \qquad\qquad \text{for } j = t \end{aligned} \quad \textbf{(8)}$$

The one-period risk-free nominal interest rate in period *t*, i_t, is defined by

$$\frac{1}{1+i_t} = E_t I_{t+1,t} \quad \textbf{(9)}$$

An empirical implementation of equation **(7)** is a heroic task, which we tackle by making the heroic simplification of stationarity. Specifically, we assume that the proportional growth rate of the monetary base is a constant μ and that the short nominal interest rate is a constant i. I also restrict the consideration of the monetary base to the currency component, omitting required and excess reserves issuance as a source of seigniorage. This means that we set $M = C$ and $i_j^m = 0$ in equation **(7)**. I therefore err on the size of underestimating the size of the NPV of future seigniorage.

It follows that, in this stationary environment, the NPV of current and future currency issuance is given by:

$$NPV_t(S) = \left(\frac{1+i}{i-\mu} \right) \mu C_0 \quad \textbf{(10)}$$

Where C_0 is the initial value of the stock of currency.

A standard Cagan-style demand function for currency take the form

$$\begin{aligned} &\frac{C}{P} = kY^{\alpha} e^{-\beta(i-i^c)} \\ &k, \alpha, \beta > 0 \end{aligned} \quad \textbf{(11)}$$

where P is the general price level and Y some scale variable like real GDP. With i^c, the interest rate on currency zero (because of historical accident and the lack of imagination of our central bankers), it follows that, at a constant nominal interest rate, the growth rate of the stock of currency, μ, the rate of inflation, π and the growth rate of real GDP, γ are related as follows:

$$1 + \mu = (1+\pi)(1+\gamma)^{\alpha} \quad \textbf{(12)}$$

The NPV of current and future currency issuance can therefore be written as

$$NPV(S) = \left(\frac{1+i}{1+i-(1+\pi)(1+\gamma)^{\alpha}} \right) \left((1+\pi)(1+\gamma)^{\alpha} - 1 \right) C_0 \qquad \textbf{(13)}$$

The Global Economics team at Citi have recently produced estimates of long-run currency demand functions for the euro, the US dollar, the Pound Sterling and the Japanese Yen, based on equation **(11)**, allowing for non-stationarity, common trends and structural breaks in the relevant series.

The estimation yields a very robust estimate for the output elasticity of currency demand for the euro (and for the three other currencies) of around 0.8, implying that every one percent increase in real output calls forth a 0.8% increase in real money balances held. The interest rate semi-elasticity of currency demand is somewhat less precisely estimated. The average coefficient value estimated is around 3 for the euro area (but considerably higher for the US and for Japan), implying that a 1% increase in a short-term nominal market interest rate (our opportunity cost measure) implies a 3% decrease in currency balances.[6] To arrive at estimates of the present discounted value of seigniorage, we need to combine our estimated coefficients with assumptions about future real growth rates for the euro area and discount rates for the stream of seigniorage revenue. Reasonable conservative estimates for the former would be around 1%pa, on average for the euro area, while a 4% nominal discount rate may be appropriate for the latter.

Figure 1 presents the estimates for the value of Eurosystem seigniorage based on these benchmark assumptions as well as a number of alternative assumptions for growth rates and interest rates. As the table indicates, the resulting value would be just over €2trn at a 1% average real growth rate and with a discount rate of 4%. Raising the average growth rate of real GDP to 1.5% almost doubles the estimate of the value of seigniorage. Note that the relevant growth rate here is the average growth rate in the future, with the horizon being very long (infinite, actually).

Figure 1

Present Discounted Value of future seigniorage in the euro area (α= 0.8; β=2.9)

EUR (bn)	Interest/ Discount Rate (i)				
Real Growth Rate (γ)	3.5%	4.0%	4.5%	5.0%	5.5%
0.5%	€1,886	€1,273	€956	€763	€632
1.0%	€3,717	€2,065	€1,421	€1,078	€865
1.5%	€13,090	€3,817	€2,216	€1,553	€1,189
2.0%	Infinite	€10,966	€3,888	€2,345	1,670

Note: α represents the long run income elasticity of the money demand function, and β the corresponding interest rate semi-elasticity.

Source: Citi Investment Research and Analysis

Above, we noted that the output elasticity of currency demand is estimated extremely precisely and robustly, including across different samples, different statistical methodologies, and different countries. There is therefore little need to dwell on the impact of different assumptions about this elasticity. The interest rate semi-elasticity is less precisely estimated. However, the quantitative impact of different values for this elasticity are rather limited, reducing the estimated value of seigniorage in our benchmark case (for a real growth rate of 1% and a nominal interest rate of 4%) by 3% if the elasticity is 4 rather than 3 and raising it by 3% if the elasticity is 2.

[6] Full details of the data used, the estimation methodology and the result will be made available in a forthcoming publication.

The corresponding estimates and calculation for US dollar, Sterling and Yen currency demand are given in Figures 2, 3 and 4, respectively.

Figure 2

Present Discounted Value of future seigniorage in the United States (α= 0.8; β=7.2)

USD (bn)	Interest/ Discount Rate (i)				
Real Growth Rate (g)	3.5%	4.0%	4.5%	5.0%	5.5%
0.5%	$1,727	$1,150	$849	$664	$540
1.0%	$3,186	$1,795	$1,226	$918	$724
1.5%	$8,669	$3,096	$1,839	$1,285	$974
2.0%	Infinite	$7,077	$3,005	$1,864	$1,329

Note: α represents the long run income elasticity of the money demand function, and β the corresponding interest rate semi-elasticity

Source: Citi Investment Research and Analysis

Figure 3

Present Discounted Value of future seigniorage in the United Kingdom (α= 0.8; β=1.7)

GBP (bn)	Interest/ Discount Rate (i)				
Real Growth Rate (g)	3.5%	4.0%	4.5%	5.0%	5.5%
0.5%	£98	£67	£51	£41	£34
1.0%	£182	£105	£74	£56	£46
1.5%	£514	£183	£111	£79	£62
2.0%	Infinite	£432	£183	£116	£85

Note: α represents the long run income elasticity of the money demand function, and β the corresponding interest rate semi-elasticity

Source: Citi Investment Research and Analysis

Figure 4

Present Discounted Value of future seigniorage in Japan (α= 0.7; β=12.1)

Yen (trn)	Interest/ Discount Rate (i)				
Real Growth Rate (γ)	3.5%	4.0%	4.5%	5.0%	5.5%
0.5%	¥136	¥90	¥65	¥50	¥40
1.0%	¥225	¥131	¥89	¥66	¥51
1.5%	¥457	¥203	¥125	¥88	¥66
2.0%	¥2,438	¥360	¥185	¥120	¥86

Note: α represents the long run income elasticity of the money demand function, and β the corresponding interest rate semi-elasticity

Source: Citi Investment Research and Analysis

By any standards, these estimates of the NPV of non-inflationary seigniorage are large numbers. For the euro area, at 2 percent inflation, 1 percent real GDP growth and a 4 percent nominal interest rate, it comes to more than €2 trillion (see Figure 1). For the US, with 2 percent inflation, real GDP growth at 2 percent and a 4 percent nominal discount rate, the NPV of future non-inflationary seigniorage is more than $7 trillion.

These numbers underestimate the non-inflationary loss-absorbing capacity or *NILAC* of the central bank for a number of reasons. First, it ignores required reserves or assumes they are paid the market opportunity cost and therefore don't represent a source of profit to the central bank. Even if this were correct currently, it is at the discretion of the central bank, which sets both the reserve requirement and the rate of remuneration on required reserves. The required reserve ratio for the euro area was recently (on December 8, 2011) lowered to 1 percent of eligible deposits from 2 percent.

Second, it ignores excess reserves or assumes they too are paid their market opportunity cost. Again, their remuneration rate, as well as the remuneration rate on all the central bank's non-monetary liabilities are instruments of the central bank, although the availability of private and other sovereign substitutes limits the ability of the central bank to extract rents from these liabilities.

Third, it ignores the conventional loss-absorption capacity of central banks. In the case of the Eurosystem – about €81 bn of capital plus reserves plus probably around €320 bn of gold and foreign exchange revaluation gains.

Finally, as shown in Buiter (2007b), the intangible asset that has to be added to the conventional balance sheet of the central bank to obtain its non-inflationary loss absorption capacity due to the monopoly of currency issuance is not just the NPV of future currency issuance but the sum of the NPV of future currency issuance and the initial stock of base money, about €875bn for the euro area. This means that the non-inflationary loss-absorption capacity of the Eurosystem with $\gamma = 1\%$, $\pi = 2\%$ and $i = 4\%$: is at least €3.2 trillion – enough to get excited about. These resources are, of course, tax payers' resources and should be accounted for properly.

(VIII) How different is the fiscal role of the central bank in the US from that in the euro area?

(A) The ability and willingness to use the anticipated and unanticipated inflation taxes

As regards the *ability,* that is, the technical or instrumental capacity of the central bank to fund government budget deficits or inflate away the real net present value of servicing the outstanding stock of public debt, there is no significant difference between the Fed and the ECB/Eurosystem. The ECB can, from a purely technical, instrumental perspective, use seigniorage or the anticipated inflation tax to fund the deficits of any, some or all of the 17 sovereigns that are part of the euro area, just as the Fed can for the US Federal government (and indeed for any of the 50 state governments and any of the countless local government entities). The ECB cannot purchase sovereign debt in the primary issue markets or lend to sovereigns directly, but it can purchase any amount of sovereign debt in the secondary markets – although it has thus far restricted its outright purchases of sovereign debt (mainly periphery sovereign debt through the Securities Market Programme (€211bn outstanding on December 30, 2011) to levels much below that of the other leading central banks.

The ECB also has the same technical capacity as the Fed (or the Bank of England) to use unanticipated inflation to reduce the real NPV of servicing the euro-denominated sovereign (and private) debt in the euro area. The US certainly holds an advantage over the UK as regards its ability to impose a capital levy on government bond holders through unanticipated inflation. The average

maturity of the outstanding stock of US Treasury debt is only around 5 years, while in the UK it is just over 13 years.[7] The euro area average maturity is around 6.3 years. This means that the inflation surprise would have to be larger in the US if it is to achieve the same absolute or percentage reduction in the real cost of sovereign debt service on the outstanding debt. Both in the euro area and in the US, the share of index-linked or foreign-currency-denominated sovereign debt in total sovereign debt is small. Of the $15.5 trillion Federal debt outstanding at the end of fiscal year 2011, of which $9.9 trillion was held by the public, only 3.5 percent (5.6 percent) was index-linked.[8] Less than one percent of euro area sovereign debt is denominated in non-Euro currencies.

In comparing the Fed and the ECB, the real issues are, first, the *legal or constitutional ability* of these two central banks to use seigniorage or the unanticipated inflation tax improve the solvency of their sovereigns, and, second, their *political ability* or *willingness* to act as lender of last resort for their sovereigns, and/or to impose an unanticipated capital levy on the holders of their sovereign's debt.

It is clear that, as far as the EU Treaty is concerned, there are only minor, insignificant legal constraints on the ability of the ECB/Eurosystem to act as lender of last resort for the 17 sovereigns of the euro area. The primary objective of the ECB is price stability. However, the ECB/Eurosystem is also mandated to support financial stability.[9] If excessive sovereign debt and/or excessive sovereign deficits threaten financial stability, acting as lender of last resort for one or more of the sovereigns and/or inflating away the burden of the sovereign debt may be the lesser evil, if deflation and financial collapse are the alternative.

As noted, the Treaty also forbids the ECB from lending directly to any sovereign or from purchasing its debt in the primary issuance markets. However, there is no Treaty impediment to outright purchases of sovereign debt in the secondary markets. Since the Securities Market Programme was activated in May 2010, the Eurosystem has purchased outright around €211 bn of euro area sovereign debt. Every euro area member state's central bank held sovereign debt outright on its balance sheet even before the EMU was created. And of course, the individual member states' central banks prior to 1999, as well as the Eurosystem since 1999, have accepted hundreds of billions of euro worth of euro area sovereign debt as collateral in repos and other collateralised transactions with eligible counterparties. As the counterparties in these transactions included (and include) banks that were either insolvent (kept alive by regulatory forbearance and by the willingness of the ECB/Eurosystem to fund insolvent banks that offered as collateral securities issued by or guaranteed by insolvent sovereigns) or at risk of insolvency should the sovereigns whose debt they offered as collateral turn out to be insolvent, these collateralised loans were at times economically equivalent to outright purchases of sovereign debt.

The ECB rejects a role as lender of last resort to sovereigns. It has, however, already gone far beyond that role. A lender of last resort lends to entities that are illiquid but most likely solvent. As noted earlier, in the pure Bagehot (1873) model of the lender of last resort, the LLR lends only against good collateral and at a penalty rate. Instead, in its first interventions in support of illiquid sovereigns, the ECB purchased debt issued by sovereigns (Greece, Ireland and Portugal) that were

[7] For euro area, the source is Eurostat, for the US and the UK, the source is the IMF.
[8] Source: US Treasury.
[9] See Article 127.5 FTEU.

not just illiquid but almost certainly insolvent as well. Funding into insolvency means going well beyond a lender of last resort role vis-à-vis sovereigns.

Such restrictions as the Treaty imposes on the balance sheet of the central bank apply only to the asset side of the balance sheet – the ban on direct lending to the sovereigns by the ECB and the NCBs and the prohibition of sovereign debt purchases in the primary markets by the ECB and the NCBs. There are no Treaty restrictions on the liability side of the central bank. Specifically, there is no restriction on 'monetary financing' by the Eurosystem of euro area sovereign debt nor is there a requirement that purchases of sovereign debt in the secondary markets by the Eurosystem be sterilised. There is a lot of popular mythmaking to the contrary, and there are non-specific references to the 'spirit of the Treaty', but the truth of the matter is that there was no agreement on these issues among the authors of the Treaty and that this lack of agreement is reflected accurately in the open-ended and ultimately permissive approach of the Treaty to sovereign debt purchases by the central bank and to the monetisation of sovereign debt. It is a classic EU fudge that does not rule out any course of action.

The notion that the US sovereign is not at risk of default because it can always force the Fed to monetise its debt and deficits is politically naive and technically incorrect. It is true that the Fed is 'a creature of Congress'. The Fed is governed by the Federal Reserve Act which can be repealed or amended by the Congress. But for the members of the Board of Governors and of the FOMC to vote by majority in favour of a deliberately inflationary resolution of the US sovereign debt problem, an 'inflationist' majority would have to be found among the 7 Board members and the 5 voting Regional Fed Governors. The Congress would therefore have to be able to pack the Board with inflationist members. The current members certainly would not oblige. In addition, amendments to the Federal Reserve Act and to the Full Employment and Balanced Growth Act (better known as the Humphrey–Hawkins Full Employment Act) would likely be required, as both include stable prices or stable purchasing power of money among the objectives of the Fed.

Such packing of the Board of Governors and the FOMC with inflationists and/or the passing of inflationist amendments to the Federal Reserve Act and the Full Employment and Balanced Growth Act are possible but politically highly unlikely. The legal changes would require either an inflationist majority in both Houses of Congress and an inflationist President or an inflationist super-majority in the Congress capable of overcoming a Presidential veto. The personnel changes on the Board would require that the President nominate and the Senate confirm inflationist appointments[10]

So, while it is true that the Fed is 'a creature of Congress', and that the institution is constrained by, and indeed at times appears to live in fear of, anticipated Congressional reactions to its actions, the political conditions that would have to be satisfied for the US sovereign to be able to compel or induce the Fed to monetise its debt and deficits are unlikely to be satisfied any time soon. It is difficult to envisage circumstances under which either both the Congress and the Executive/White House would be dominated by parties that consider sovereign default to be more harmful than monetisation and inflation, or under which there is a supermajority in the Congress that holds the

[10] The seven members of the Board of Governors are appointed by the President and confirmed by the Senate for a14-year term.

view that sovereign default is worse than inflation and that can override a Presidential veto of Congressional legislation to instruct the Fed to monetise the Federal debt and deficit.

In fact, the most vocal elements in Congress on issues of monetisation, QE and debauching the currency are as rabidly anti-monetisation of sovereign debt and deficits as any those of any parliament in the euro area. One candidate for the Republication nomination for the US Presidency, Governor Rick Perry of Texas, has come very close to accusing the Chairman Ben Bernanke of treason because of Bernanke's support for QE.[11] Another candidate for the Republican nomination, Congressman Ron Paul, wants to abolish the Fed (which he considers to be an immoral institution) and replace it with a Gold Standard. Rather than being inflationist, the US body politic appears to have a surprisingly large quota of anti-inflation nutters. I therefore conjecture that the likelihood of an attempt at an inflationary resolution of the US Federal fiscal problems is not significantly greater than an inflationary resolution of the sovereign debt problems of the euro area member states.

(B) Technical/economic obstacles to an inflationary solution of the US and euro area sovereign debt problems: the seigniorage Laffer curve

Unanticipated inflation can be used to reduce or even wipe out the real net present value of servicing the outstanding public debt, as long as this debt is not price index-linked or exchange rate-indexed. The rates of inflation may be high, but it can be done.

However, even if the entire stock of sovereign debt were wiped out, there would remain sizeable non-interest sovereign deficits or primary deficits in the US. For the US, the IMF estimate of the general government structural or cyclically corrected deficit as a share of GDP in 2010 is 5.1 percent. The corresponding euro area figure for 2010 is 1.6 percent.

Although it is complicated to do a real-time analysis of the maximum amount of seigniorage revenue that can be extracted once inflation is fully anticipated, it is rather easy to provide a steady-state or long-run benchmark. The currency demand function in equation **(11)** can be written as $c = kY^{\alpha-1}e^{-\beta i}$ where $c = C/(PY)$ is the ratio of currency to GDP – the reciprocal of the income velocity of circulation of currency. There can be a steady state or balanced growth path only if currency demand is proportional to GDP, that is, $\alpha = 1$. For the US, the point estimate for α is 0.8 and is statistically insignificantly different from 1 at conventional significance levels. Assuming α to be too high biases the results towards overestimating the amount of seigniorage that can be extracted.

With $\alpha = 1$, the long-run base money demand function becomes

$$c = ke^{-\beta i} \qquad \textbf{(14)}$$

In the long run, if $\alpha = 1$, the growth rate of the nominal stock of base money, equals the growth rate of the nominal GDP (see equation **(12)**). Also, when the actual and anticipated rates of inflation

[11] *"If this guy prints more money between now and the election, I dunno what y'all would do to him in Iowa but we would treat him pretty ugly down in Texas. Printing more money to play politics at this particular time in history is almost treasonous in my opinion."* Governor Rick Perry on Monday, August 15 2011, Burns & Haberman in Politico.com http://www.politico.com/news/stories/0811/61448.html .

are the same, the nominal interest rate, the real interest, *r*, and the inflation rate are related as follows: $1+i=(1+r)(1+\pi)$. It follows that seigniorage as a share of GDP can be written as:

$$s=\left((1+\pi)(1+\gamma)-1\right)ke^{-((1+r)(1+\pi)-1)} \quad \textbf{(15)}$$

Assume that the long-run growth rate of GDP and the long-run real interest rate are independent of the fully anticipated rate of inflation. It follows that the inflation rate that maximises long-run seigniorage as a share of GDP. $\hat{\pi}$ is given by

$$\hat{\pi}=\left(\frac{1}{\beta}-\gamma\right)\left(\frac{1}{1+\gamma}\right) \quad \textbf{(16)}$$

The maximum long-run share of seigniorage in GDP. $\hat{s}$ is therefore given by

$$\hat{s}=\frac{1}{\beta}ke^{-\left[\frac{r-\gamma}{1+\gamma}+\frac{1}{\beta}\left(\frac{1+r}{1+\gamma}\right)\right]} \quad \textbf{(17)}$$

The long-run real interest rate for the US is probably not all that different from the long-run growth rate of real GDP. Assuming $r=\gamma$, we have

$$\hat{s}=\frac{1}{\beta}ke^{-\frac{1}{\beta}} \quad \textbf{(18)}$$

The US estimates for β, (minus) the semi-elasticity of real base money demand with respect to the financial opportunity cost of holding base money (some nominal interest rate minus the own return on base money – zero for currency) tend to be high – the point estimate reported earlier was $\beta=7.2$, although it is statistically poorly determined. I will further flatter the conclusion in favour of a high-revenue yielding inflation tax also considering the case where the interest semi-elasticity is as low as -2.0.

Note that *k* is the long-run ratio of the monetary base to GDP when the nominal interest rate is zero. The opportunity cost of base money, or at least the opportunity cost of holding currency has been just about zero in the US since the beginning of 2009. As of November 2, 2011, there was just over $1.0 trillion worth of Federal Reserve notes outstanding; $ 1.5 trillion worth of commercial bank overnight deposits (reserves) were also held with the Federal Reserve System. US nominal GDP for 2011 is likely to be around €15.0 trillion. This gives us an estimate of *k* based on currency alone of 0.067, that is, the long-run stock of US currency at a zero nominal interest rate is 6.7 percent of GDP. If we were to consider instead an estimate of *k* for the entire stock of base money our estimate of *k* would be 0.167 or 16.7 percent of GDP.

When $\beta=7.2$, maximum long-run seigniorage as a share of GDP considering only currency issuance is therefore only 0.8 percent of GDP. Considering both currency issuance and commercial bank reserves held with the Fed, and assuming (1) that base money demand tracks currency demand and (2) that the Fed pays a zero interest rate on both required and excess reserves, the estimate of maximum long-run seigniorage as a share of GPD is just 2.0 percent of GDP. The cyclically adjusted

primary deficit of the US general government for 2010 is, as we noted earlier, estimated to be 5.1 percent of GDP. Seigniorage cannot fill that gap. Assuming a 2.5 percent per annum real GDP growth rate in the long run, this insufficient maximal seigniorage would be extracted at an inflation rate of 11.1 percent per annum.

If we assume instead (and counterfactually) that $\beta = 2.0$, maximum long-run seigniorage as a share of GDP considering only currency issuance is just over 2.0 percent of GDP. Considering both currency issuance and commercial bank reserves held with the Fed (and making the same assumptions about reserve demand and remuneration as before) the estimate of maximum long-run seigniorage as a share of GPD is 5.1 percent of GDP. Because the cyclically adjusted primary deficit of the US general government for 2010 is estimated to be 5.1 percent of GDP, seigniorage can just fill that gap if the broad seigniorage definition is used. Assuming a 2.5 percent per annum real GDP growth rate in the long run, this seigniorage would be extracted at an inflation rate of 46.3 percent per annum.

No doubt, at near 50 percent inflation, either the Fed would have to compensate excess reserves, or excess reserves would vanish rapidly, reducing the maximum amount of seigniorage that could be extracted to something much closer to the 2 percent of GDP that we estimate as the inflation tax yield from currency issuance alone. Noting that these calculations are based on estimates of the income elasticity of base money demand and of the interest semi-elasticity of base money demand that are deliberately slanted to exaggerate the likely revenues yielded by the anticipated inflation tax, it is clear that the US sovereign could not fund anything like its existing cyclically corrected primary deficit through money issuance alone. Any attempt to do so would lead to accelerating inflation and, ultimately, hyperinflation.

For the euro area, 2011 GDP is likely to come out at around €9.8 trillion (IMF estimate). On October 11, euro currency outstanding was around €863 bn and bank reserves held with the Eurosystem €775 bn. The currency-based estimate of *k* for the euro area is therefore around 8.8 percent of GDP and the base money estimate is 16.7 percent of GDP. Assume that for the euro area the real interest rate is 2.0 percent and the growth rate of real GDP 1.0 percent. With $\beta = 2.9$ (the estimate used in Figure 1) the maximum long-run currency-based estimated of seigniorage as a share of GDP for the euro area is therefore 2.1 percent, higher than the 0.8 percent obtained for the US with $\beta = 7.2$. The base money-based estimate for the euro area is 4.0 percent of GDP, also higher than its US counterpart when $\beta = 7.2$. If we redo the calculations for the euro area with $\beta = 2.0$, the currency-based estimate is 2.6 percent of GDP. The broad base money-based estimate is close to that for the US, at 5.0 percent of GDP. If the IMF's estimate of the cyclically corrected primary general government balance for the euro area in 2010 of 1.6 percent is correct, seigniorage alone could fill the primary gap in the euro area. Assuming a trend growth rate of real GDP of 1.0 percent per annum, and a real interest rate of 2.0 percent it would do so at an annual inflation rate of around 22 percent based on the currency only calculation, or just under 10 percent based on the broad base money definition.

(IX) Quasi-fiscal activities of the central bank

In addition to the overtly and unavoidable fiscal activities of the central bank associated with the distribution of seigniorage revenues, central banks are involved in a wide range of transactions and

other activities that are ex-ante or ex-post equivalent from an economic perspective to subsidies or taxes, even if they are not formally or legally labelled as such and even though they generally are not subject to the same parliamentary/congressional scrutiny and oversight as explicit taxes, transfers and subsidies. These quasi-fiscal activities of the central bank can involve private, public, domestic or foreign entities.

Among the quasi-fiscal instruments used by central banks during the financial crisis are the following:

- The level of required reserves for eligible deposits.
- The remuneration of both required and excess reserves.
- The terms and conditions on which central banks purchased illiquid assets from private, public, domestic and foreign counterparties
- The terms and conditions on which central banks have accepted illiquid and other hard-to-value collateral from eligible counterparties, including the valuation of the collateral and the haircuts imposed on these valuations.

Central banks have taken on significant credit risk during the crisis. If this was not priced properly ex-ante, that is, if the risk-adjusted expected return to the assumption of private and public sector credit risk by the central bank did not at least cover the appropriate opportunity cost of funds to the central bank, such actions involve an ex-ante quasi-fiscal subsidy. Even if the central bank took on credit risk on the correct terms ex-ante, the ex-post realisation of risk could still result in ex-post quasi-fiscal transfers or taxes. It is a key question whether even taking on properly priced credit risk is a legitimate task of the central bank. I believe it is not. Unfortunately, when the political arena within which a central bank operates is crooked and badly distorted, such quasi-fiscal activities by the central bank may constitute the lesser evil.

The Bank of England followed a clear policy under which purchases or acceptance as collateral of anything but high-grade financial instruments could only be done with a full guarantee or indemnity from the UK Treasury. As long as the UK Treasury is most likely solvent, that is indeed the proper division of labour.

Both the Fed and the ECB have taken on massive credit risk during the crisis. The Fed has taken on only private credit risk (as long as the US sovereign is most likely solvent); the ECB has taken on both private credit risk and the credit risk of potentially insolvent sovereigns from the euro area periphery. The Fed parked much of its risky private exposures in off-balance-sheet SPVs like Maiden Lane and Maiden Lane 2. The TALF could potentially have exposed the Fed to up to a$1 trillion of risky private assets with a US Treasury indemnity of at most $100bn. The ECB/Eurosystem now holds €211bn worth of risky EA periphery sovereign debt outright on its balance sheet. By lending to (near-) insolvent banks that offer as collateral instruments issued by or guaranteed by (near-) insolvent sovereigns, the ECB/Eurosystem is exposed to many hundreds of billions of euro worth of convoluted private and public credit risk. The ELAs (Emergency Liquidity Assistance facilities) are notionally an exposure of national central banks (guaranteed by the national sovereign), not of the

Eurosystem or the ECB, but if the national sovereign involved is itself insolvent, ELA exposure becomes ECB/Eurosystem exposure nevertheless.

Secrecy is one of the traditional hallmarks of central banking. In this crisis, the opaqueness of central banks' actions has set new records. Some of it may be necessary, at least temporarily so as to ensure that market-sensitive and other confidential information does not become public prematurely or in a distorting or unfair manner. Most of it appears to be motivated by the all-too-human desire to maximise power and minimise accountability and the risk of being asked difficult or embarrassing questions about the form and substance of central bank interventions during the crisis. Central banks, most notably the ECB and the Fed, have been stonewalling all attempts to produce greater openness, transparency and accountability. In the case of the Fed, it was only the threat of lawsuits[12], the continuing threat of legislative initiatives like Representative Ron Paul's 'Audit the Fed' proposals and the heavy hand of the Dodd-Frank Bill that have forced the US monetary authorities to begin to come clean on their interventions on behalf of domestic and foreign financial institutions since late 2007.

The ECB thus far has refused to disclose, even after the passing of an appropriate time interval, exactly what securities it has bought outright under the SMP programme and at what prices. It has also refused to make public either the valuation methods it uses to price illiquid financial instruments it is offered as collateral, or the actual valuations assigned to the illiquid instruments it has accepted as collateral. The haircuts applied to these valuations are supposed to be in the public domain, but many market observers believe that the actual haircuts imposed on Greek banks offering Greek sovereign debt as collateral at the Greek central bank are higher than the posted official haircuts.

The identities of the counterparties in the Eurosystem's and ELAs' transactions is also not revealed, even after the passing of a suitable period of time. This complete lack of openness, transparency and accountability for the ECB's and NCBs' use of public resources – ultimately resources belonging to the tax payers and other citizens of the euro area - is extraordinary. With a Eurosystem balance sheet of around €2.1 trillion and a non-inflationary loss absorption capacity (NILAC) of at least €3.2 trillion, one would have hoped that the European Parliament, to which the ECB is formally accountable (mainly through the quarterly hearings with its Committee on Monetary and Economic Affairs (ECON)), would have insisted on a full accounting for the quasi-fiscal activities of the ECB/Eurosystem. Thus far, however, the ECON has been something of a toothless paper tiger.

(X) Instruments of the modern central bank

[12] When the Fed refused to identify the recipients of almost $2 trillion of emergency loans or the nature and provenance of the troubled assets it had accepted as collateral, Bloomberg News requested details of the Fed lending under the U.S. Freedom of Information Act and filed a federal lawsuit Nov. 7 2008 seeking to force disclosure. The Bloomberg lawsuit was Bloomberg LP v. Board of Governors of the Federal Reserve System, 08-CV-9595, U.S. District Court, Southern District of New York (Manhattan). On August 25, 2009, the Court ruled in favour of Bloomberg News.

The financial crisis has provided a timely reminder that the policy instruments of the central bank extend beyond the setting of some short-term nominal interest rate. Even before the crisis struck, it was common knowledge that the announcement effects of monetary policy decisions were likely to be more significant drivers of economic activity that the monthly setting of some overnight rate. Providing projections of future policy interest rate paths or publishing contingent rules for setting future interest rates is now part of the 'acquis central bancaire'.

The size and composition of both sides of the balance sheet of the central bank (and the proliferation of off-balance sheet assets and liabilities like swaps and many other contingent claims and derivatives) have greatly expanded the central bank's instrumentarium. The Fed and the Bank of England conduct (or have conducted) many of their rescue operations through off-balance sheet special purpose vehicles (SPVs) like the Maiden Lane SPVs of the Fed mentioned before, or the Special Liquidity Scheme (now closed for new business) and Asset Purchase Facility of the Bank of England.

Quantitative easing (or Large Scale Asset Purchases), credit easing (aka qualitative easing), enhanced credit support and operation twist have entered the central bank dictionary since the official policy rate has reached levels so low that it could not be cut further, either because of the availability of a zero nominal interest rate store of value (currency) or because of the extreme psychological discomfort this would cause for central bankers unable to contemplate (indirectly) imposing negative nominal interest rates on commercial bank depositors.

All the unconventional measures mentioned in the previous paragraph are 'poor man's monetary policy'. QE at the zero lower bound (ZLB) or the effective lower bound (ELB), when the assets the central bank purchases are traded in orderly markets, has very little effect on anything. The Fed's and Bank of England's assertion that there is evidence of significant impacts (at least in asset markets) (see D'Amico and King (2010), Joyce, Stevens and Tong (2010), Hamilton and Wu (2011) and Swanson (2011)) is quite unconvincing, and has recently be refuted quite convincingly in a BIS study (Meaning and Zhu (2011)). Inevitably all these studies rely on high-frequency event studies, which are inherently incapable of demonstrating the presence or absence of *lasting* effects, even if the identification if the impact effect were to be convincing.

Nothing happens when the economy is at the ELB on the liability side when the central bank engages in QE. Excess reserves held by commercial banks just sit there idly. QE, credit easing or enhanced credit support have significant effects, at the ELB, if you intervene, on the asset side, in disorderly markets. Examples are purchases of securitised mortgages during the subprime mortgage-backed securities crisis or purchases of securities issued by most likely solvent but most certainly illiquid sovereigns like Spain and Italy during 2011 and 2012. In the future, central bank purchases (or acceptance as collateral) of securitised commercial loans, including SME loans, the Wilshire stock index, REITs etc. could play a similar role.

This brings me to the inevitable conclusion that it is time to get serious about abolishing the zero lower bound or effective lower bound on risk-free short nominal interest rates. It is only the hidebound conservatism of our central bankers that prevents them from undertaking the minor institutional and practical innovations that would make it as easy, operationally, to set the central bank's official policy rate at minus 5 percent as at plus five percent.

I have written extensively on this subject (see Buiter and Panigirtzoglou (2001), Buiter (2003, 2005, 2007a, 2008, 2009b, 2010a), Hall (1997), Goodfriend (2000), Fukao (2005), Eisler (1932), Gesell (1916), Gaitskell (1969)). The socially most efficient way of getting rid of the ELB would be by doing away with currency completely. An alternative due to Gesell (1916) would tax currency holdings. A third approach, due to Eisler (1932), decouples the numéraire or unit of account role of money from its medium of exchange or means of payment role. The central bank would introduce a potentially variable exchange rate between bank reserves with the central bank (the dollar) and a new currency (the rollad). There would be no physical dollar currency issued by the state. By setting the rollad at a forward discount relative to the dollar, the central bank can implement an arbitrarily large negative interest rate for the dollar.

(XI) The institutional division of labour for financial stability: who does what?

Different countries organise the management of financial stability in different ways and there is a wide range of proposals for alternative arrangements. When it comes to deciding which institution does what, two key points have to be kept in mind.

First, the Treasury (the sovereign) has to be the central player on the financial stability team whenever tax payers' money is put at risk. Second, don't fall into the common trap of thinking that centralisation is the solution to every coordination problem – avoid the 'central planning fallacy'.

The Bank of England is a prime example of this central planning fallacy. Under the new regime proposed by the UK government, the Bank of England would have control over interest rates through the MPC, which has a majority of internal or Executive Bank of England members; it would have control of macroprudential oversight through the Financial Policy Committee (FPC), which would also have a majority of executive Bank of England members; it would have control over microprudential oversight, through the Prudential Regulation Authority (PRA); it would run the Resolution Authority. Every aspect of financial regulation and supervision, except market conduct, aka the protection of widows and orphans, will be under the control of the Bank of England. The Governor of the Bank of England chairs the MPC, the FPC, and the PRA. He will also be in charge of the UK Resolution Authority. To top it off, he is also a Vice-Chair of the European Systemic Risk Board – the EU proto-macroprudential body. This adds up to an impossibly heavy work load. Even if it were feasible, it would not be desirable to concentrate so much power in one person.

I have no firm views on the relative merits of the twin peaks model (prudential and conduct of business), the three pillars model (banking, insurance and securities) or the integrated model, in which all supervision is concentrated in one organisation. I would just want to note that 'markets', that is, maintaining orderly, liquid and well-functioning markets, is also a macro-prudential issue, not just a conduct or widows and orphans issue, although of course some conduct issues arise in markets as well as in institutions.

The setting of the official policy rate (the Federal Funds target rate in the US, the Refi rate in the euro area and Bank Rate in the UK) could be delegated to an operationally independent body, the Monetary Policy Committee or MPC, say, outside the central bank. Presumably the MPC would set the usual trio of rates, a central rate, a (lower) deposit facility rate and a (higher) loan facility rate. Conventionally, this rate-setting function is performed by a body that is part of the central bank,

often with a majority of its members drawn from among the central bank's executives. It is not clear why this is the best location for the MPC.

The exchange rate *regime* (fixed, floating, multiple exchange rates) is a political decision that has to be made by the Treasury. Exchange rate management within a regime (e.g. foreign exchange market interventions in sport or forward markets) should be the responsibility of the monetary authority – the central bank or, if the MPC is outside the central bank, the MPC and the central bank jointly. The stock of official gold and foreign exchange reserves should be transferred to the central bank as legal owner, not just as manager. The common practice of having the Treasury in charge of/responsible for exchange rate management, even within a given exchange rate regime – as is the case, for instance in the US and Japan - is as incomprehensible as it is unhelpful to effective monetary and exchange rate management. Anyone who has tried to explain this arrangement in a world with a floating exchange rate and perfect international capital mobility to a class full of undergraduates will know what I am talking about.

The lender of last resort and market maker of last resort roles – the provision of funding liquidity and market liquidity – can only be the responsibility of the central bank. The size and composition of the balance sheet of the central bank, including its collateral policy, are matters for the central bank, constrained of course by the interest rates set by the MPC, and subject to the constraint that if the central bank takes on credit risk greater than that of its sovereign, it should only be able to do so with a full guarantee or indemnity of the sovereign, and therefore only subject to the consent of the sovereign.

Macro-prudential policy (countercyclical capital requirements, loan-to-value ratios, margin requirements, even a countercyclical land tax or property tax) should be conducted by a macro-prudential regulator which need not be the central bank. If it is the central bank, the central bank should not be in charge of micro-prudential regulation, to avoid obvious conflicts of interest. If the central bank is not in charge, the macro-prudential regulator has to work closely with the central bank and the MPC, and with the Treasury whenever tax payers' money is at risk.

Micro-prudential policy should really not be led by the central bank, even if the central bank is not the lead-macro-prudential agency. The central bank's unavoidable LLR and MMLR roles are too likely to create conflicts of interest should the central bank also act as lead- micro-prudential regulator. Although the central bank should not be in the lead, it should work closely with the micro-prudential regulator.

There is no reason for the central bank to be the bank or SIFI resolution authority. In the US, this task is performed by the FDIC. It will always require the approval of the Treasury for any decision that puts public money at risk.

More generally, solvency support for systemically important financial institutions needs to be decided by a body that includes representatives from the resolution authority, the macro-prudential authority, the micro-prudential authority, the LLR and MMLR, and the Treasury. The Treasury should have veto power in any decision to put public resources at risk in support of the solvency of individual private institutions.

The US, through FSOC (the Financial Stability Oversight Committee) brings all agencies involved in systemic financial stability together under the chairmanship of the Secretary of the Treasury. That seems a rather sensible arrangement. In the UK's new proposed arrangement, the central bank is all-powerful, although the Treasury, through its monopoly of the power to tax, will no doubt play an important, but not explicitly spelled out role. In the euro area, there is no EA-wide fiscal authority, only an EA-wide quasi-fiscal authority, the ECB/Eurosystem. This is reflected in the composition of the European Systemic Risk Board, which draws a majority of its voting members, including its Chair, from the ECB's Governing Council, and has no voting member that represents any Treasury, national or supranational.

(XII) Competence and independence

The providers of macro-prudential and micro-prudential oversight will require a whole new set of skills. If central banks are going to play a significant role in these areas, they will need these skills. So far, central banks are dominated by monetary economists and macroeconomists, with a bit of finance (the asset-pricing variety, not corporate finance) thrown in. Where they have a regulatory or supervisory function, the ranks of the supervisors are made up of accountants and lawyers – box tickers. These skills and professions all have their uses, but need to be complemented by finance experts, including corporate finance experts, experts on micro market functioning, and on dysfunctional markets, experts on game theory and mechanism design, including auctions, and on industrial organisation.

More independent experts will have to be brought in and for shorter terms. Groupthink, cognitive capture and direct capture are ever-present threats. An 8 year, non-renewable term should be the maximum anyone can serve in any capacity as a regulator, supervisor or member of the MPC.

(XIII) Legitimacy, accountability, transparency

Central banks have great powers, derived from their monopoly over the creation unquestioned domestic-currency liquidity. From this they derive their roles as lender of last resort and market maker of last resort. As Figures 1 to 4 demonstrate, they command vast resources – tax payers' or citizens' money. With growing macro-prudential and micro-prudential powers, the influence of central banks will only grow further.

The people in charge of central banks are political appointees, unelected and without any real 'input legitimacy', except for the small amount conferred by their nomination and confirmation processes. It is therefore important that an institution led by unelected technocrats be properly accountable, formally and substantively.

Formal accountability is a key aspect of the mechanism through which the Agent (or Trustee) is held responsible for his actions. It involves the Agent/Trustee giving, *ex-post*, a statistical or judicial explanation for events, actions and outcomes. Such formal accountability requires that those to whom account is given (the Principal) can properly monitor the actions of Agent. The Principal must

have enough information to be able to make an informed judgment as to how well the Agent has performed.

Clear objectives for the Agent and the most complete possible information about the choice set and the actions of the Agent are necessary for formal accountability to be possible. Formal accountability requires openness and transparency, at least *ex-post.* Whether, in the case of the ECB, it is enough to know the objectives of the ECB and to observe the narrowly defined actions of the monetary authority (typically the interest rate decisions), or whether more detailed and comprehensive information about the actions of the ECB (such as individual voting records, if voting takes place) and greater procedural transparency (minutes) are also required, continues to be a subject of disagreement (see e.g. Buiter (1999) and Issing (1999)).

Substantive accountability means that, following such reporting, explanation and justification, *judgment* (or other pleasant or unpleasant consequences for the Agent) may follow.

There is substantive accountability if the reporting, explanation and justification is 'payoff-relevant' for the party doing the reporting, that is, if there can be punishments, sanctions or rewards for those deemed responsible for actions or outcomes. It is clear from its own website, that the ECB has a minimalist, interpretation of formal accountability and considers substantive accountability inconsistent with independence. If one searches the ECB's website for 'Accountability', one can find a reasonable definition of formal accountability ('accountability' to the ECB) under the heading 'Accountability and Transparency':

"Accountability

To help the ECB carry out its mandate to guarantee price stability, it has been granted political independence. But this independence needs to be balanced with accountability. Accountability is the legal and political obligation of the ECB to explain and justify its decisions to the citizens of Europe and their elected representatives. Accountability is enhanced by a high degree of transparency."[13]

A second statement on accountability can be found also.[14] From this statement it is clear that what I call formal accountability is identified with reporting obligations imposed by the Treaty (the Statute of the ESCB and of the ECB) and by appearances before the Committee on Economic and Monetary Affairs (ECON) of the European Parliament to give evidence.

The reporting obligations are minimal and the ECB does not go beyond them in any meaningful way. Quoting again from the ECB's website:

"According to the Statute, the ECB is required to publish quarterly reports on the activities of the Eurosystem as well as a consolidated Weekly Financial Statement. In addition, it has to produce an Annual Report on its activities and on the monetary policy of the previous and the current year. The Annual Report has to be addressed to the European Parliament, the EU Council, the European Commission and the European Council.

To fulfil the requirements of the Statute, the ECB publishes

- *a Monthly Bulletin*
- *a consolidated Weekly Financial Statement*

[13] http://www.ecb.int/mopo/strategy/comm/html/accountability.en.html .
[14] http://www.ecb.int/ecb/orga/accountability/html/index.en.html

- *Annual Reports*

Besides that, the ECB produces a range of other task-related publications."[15]

Note that, as discussed in Section IX, this interpretation of reporting obligations appears to be quite consistent, in the eyes of the ECB, with a refusal to provide any information that would allow outside parties to evaluate the quasi-fiscal activities of the ECB/Eurosystem.

The fact that the ECB does not reveal the individual voting records of the members of its Governing Council, the freely admitted failure to have formal votes for interest rate decisions at all – these decisions apparently emerge 'by consensus'-, and the absence of minutes or other records of the decision-taking meetings continue to be an anomaly standing in the way of judging the competency of the individual members, and of the degree to which they adhere to their commitment to serve the EMU-wide interest rather than their national interests.

The Treaty makes the European Parliament the institution to which the ECB is formally accountable. The ECB describes its relations with the European Parliament in a way that suggests that there is a material degree of (formal) accountability through these interactions. [16]

In fact, the ECON and the European Parliament in general are woefully ineffective as regards holding the ECB to account. Past Presidents of the ECB have stonewalled awkward questions, refused to answer them point blank and generally run circles around the MEPs. It is therefore quite appropriate that the ECB tends to refer to the quarterly sessions with the ECON not as 'evidence sessions' 'hearings' or 'testimony' but as 'dialogues'. Dialogues occur between equals, not between Principal (the Parliament) and Agent or Trustee (the ECB). The party that is held to account is not the equal of the party to whom it is accountable.

The Fed and the Bank of England also have oral and written reporting obligations to, respectively, the US Congress and the UK Parliament. In the case of the Fed, there has been a significant increase in formal accountability since it engaged in multi-trillion dollar quasi-fiscal balance sheet operations in the first two years of the crisis. All other operationally independent central banks in representative democracies also have both oral and written reporting obligations that are rather more onerous than those of the ECB. For the Fed and the Bank of England, the oral reporting sessions/hearings/evidence sessions are rather more taxing affairs than for the ECB. There can be little doubt that the ECB has the lowest degree of formal accountability of any central bank in an advanced economy.

As regards substantive accountability, it is not surprising that truly operationally independent central banks have effectively no substantive accountability at all. Independence probably *has* to mean that those in charge of monetary policy cannot be fired except for incapacity or serious misconduct, and that financial remuneration and working conditions likewise cannot be used to reward or punish

[15] http://www.ecb.int/ecb/orga/accountability/html/index.en.html

[16] *"The European Parliament, as the institution which derives its legitimacy directly from the citizens of the EU, plays a key institutional role in holding the ECB to account. Since its establishment, the ECB has maintained a close and fruitful dialogue with the European Parliament. The President of the ECB regularly reports on the ECB´s monetary policy and its other tasks at his hearings before the European Parliament´s Committee on Economic and Monetary Affairs (ECON), which take place quarterly. Moreover, the President appears before the plenary session of the Parliament to present the ECB´s Annual Report, on which Parliament, as a rule, adopts a resolution. Other members of the ECB´s Executive Board also appear before the European Parliament. In addition, informal discussions take place between ECB representatives and members of the European Parliament on the policies of the ECB and other issues where the ECB has specific expertise. Beyond that, the ECB replies to written questions by MEPs, which are published together with the ECB´s answers in the Official Journal of the EU and on the ECB´s website."* http://www.ecb.int/ecb/orga/accountability/html/index.en.html .

them for mere incompetence. It ought to mean also that monetary policy makers cannot be sued in civil courts or be dragged into criminal courts for actions taken in their capacity as monetary policy makers. In the advanced industrial countries we have not (yet) witnessed recourse to the law by those disgruntled with the conduct of monetary policy. The legal immunities and liabilities of central bankers in the performance of their monetary policy making tasks are, however, an uncharted area in the advanced economies, although not in emerging markets and developing countries.

In the case of the ECB, substantive accountability (such as the right to fire ECB Executive Board members and NCB Governors for incompetence or to dock their pay for incompetence or a failure to faithfully implement their mandate) is non-existent. The protections enshrined in the Treaty are backed up by the fact that the European Court of Justice is the only body that can dismiss ECB Executive Board members. De facto the same absence of substantive accountability exists, as regards the risk of being fired, for the members of the Federal Reserve Board of Governors and for the members of the UK's MPC. It is perhaps not quite as clear that an enraged US Congress of House of Commons could not try to dock the pay of the national monetary policy makers.

The Fed and the Bank of England both have limited but material formal accountability and very limited substantive accountability. The ECB has very limited formal accountability and no substantive accountability. I fear that this will undermine the legitimacy and longer-term political viability of the institution, especially now that it has gained these comprehensive financial stability responsibilities and is engaging in such vast quasi-fiscal operations.

The ECB asserts it has all the legitimacy it needs. It has input legitimacy because it is a creature of the European Treaties. It has process legitimacy because it is accountable. After all it regularly publishes the documents it is required to produce by the Treaty; its President and other Executive Board members have periodic dialogues with the Committee on Economic and Monetary Affairs of the European Parliament; its President presents the Annual Report to the whole European Parliament; and its entire Executive Board talk to the media. It has output legitimacy because it does a good job pursuing its price stability mandate, and does so in a verifiable way, with an operational, quantitative inflation measure

This kind of independence, limited formal accountability and absence of substantive accountability may be tolerable if all a central bank does is set interest rates. It is not adequate and will not remain politically tolerable if that central bank acts as lender of last resort, market maker of last resort and quasi-fiscal actor on a huge scale. It would seem unavoidable that, sooner rather than later, the fact that the central bank is an agency of the state and that its resources are tax payers' money become politically relevant. Such central banks should be accountable substantively and formally to a much higher degree than has been the norm thus far, even in the US and the UK. The ECB will not be able to retain its independence if it continues as the least accountable central bank in the world while accumulating steadily greater regulatory powers and playing an ever-expanding quasi-fiscal role.

Subject to the requirement of temporary confidentiality for commercially sensitive and market-sensitive transactions, the public and Parliament or Congress should know every aspect of what the central bank has done.

- What securities it has bought outright, from whom and on what terms.
- What collateral it has accepted, from whom and on what terms
- Which counterparties it has agreed to deal with or turned down.

The crisis of central bank accountability is in large part not of the central banks' making. Instead it reflects a failure of political institutions, processes and leadership. In the EA, the ECB is forced into a lender of last resort role vis-à-vis sovereigns and, even beyond that, into a position of having to fund likely or manifestly insolvent sovereigns, banks and other systemically important financial institutions because the alternative would be a financial catastrophe. The fundamental problem is that the EA and EU political leadership could not agree on the creation of a €3 or €4 trillion EFSF/ESM liquidity facility, and on the matching quid-pro-quo for such liquidity support: orderly restructuring of insolvent sovereigns and banks (with PSI), fiscal austerity and deep structural reform enforced through a (possibly temporary) loss of national sovereign over fiscal policy and wider economic policy for financial beneficiary countries, and the creation of a European banking union, with a common regulator/supervisor, a common resolution agency, a common bank recapitalisation facility and common deposit insurance arrangements.

In a more sensibly arranged future universe, the problem of reconciling central bank independence in the conduct of conventional monetary policy - interest rates and QE – which is probably desirable, with central bank accountability will be resolved by reducing the regulatory and supervisory roles of the central bank and by taking the central bank out of the quasi-fiscal game completely.

Eliminating the quasi-fiscal role of the central bank will require that each central bank will require a full guarantee/indemnity from its sovereign (in the case of the ECB this should be a joint and several guarantee from all 17 EA sovereigns) for any credit risk the central bank takes on that is higher than that of its sovereign (in the case of the ECB for any credit risk it takes on that is higher than that of a joint and several guarantee from all 17 EA sovereigns). This means that the central bank will have an envelope or limit, beyond which it cannot go as regards credit risk exposure, without permission from the Treasury and without a full guarantee from its Treasury. The central bank may have to argue in public for an increase in its credit risk-bearing capacity, but it cannot engage in any unilateral, non-sovereign-guaranteed increase in its credit risk exposure.

The terms and conditions associated with all the central bank's on-balance sheet and off-balance-sheet activities will have to be in the public domain, subject to a suitable time lag to allow for confidentiality concerns and market-sensitivity.

This would put an end to most of the quasi-fiscal activities of the central bank, this opaque form of taxation and subsidisation without representation. While it is highly desirable to put an end asp to this making of budgetary policy by the central bank without the approval of Parliament or Congress, it will have not happen while the current financial crisis continues. I hope that when the next financial crisis comes around, a comprehensive, legal, regulatory and institutional division of labour between the central bank, the Treasury and the regulatory/supervisory authorities will have been put in place in the euro area, the US, the UK and elsewhere to minimize – preferably eliminate – the need for an operationally independent and therefore substantively unaccountable central bank to engage in fundamentally inappropriate and illegitimate quasi-fiscal actions.

The quasi-fiscal activities of the Bank of England have been limited to the acceptance of illiquid collateral from eligible counterparties on terms not revealed to the public. The scale of this (relative to the size of the banking sector or GDP) has probably been much smaller than in the US or the euro area. Both the Fed and the ECB continue to engage in quasi-fiscal activities on a large scale. They did not seek this quasi-fiscal role or want it. They were forced into it by a desire to prevent a

financial disaster with potentially catastrophic consequences for the real economy. In the US, the real culprit is the fiscal gridlock and paralysis at the heart of the US Federal government. In the euro area, the defining problems are the institutional fiscal vacuum at the heart of the euro area and the lack of political leadership in the EU. There is no supranational, federal fiscal authority of any kind in the euro area. In the US, the combination of constitutional checks and balances and political polarisation produces a federal fiscal decision-making process that is so dysfunctional, it resembles the euro area fiscal vacuum.

The quasi-fiscal actions of the ECB and the Fed are contributing to a democratic deficit and accountability crisis. We need to reform this perverse division of labour between unaccountable central banks lacking legitimacy and fiscal authorities that, although accountable and legitimate, lack the capacity to act. Central banks, because of a failure of institutional design, deep political pathologies and lack of foresight and political leadership have been and continue to be forced to perform tasks for which they are not suited and for which they lack the political legitimacy. It is time to restrict them again to the important but limited roles they were designed for.

(XIV) Conclusion

The roles of central banks in the advanced economies have expanded and multiplied since the beginning of the crisis. The conventional monetary policy roles - setting interest rates in the pursuit of macroeconomic stability and acting as lender of last resort (LLR) and market maker of last resort (MMLR) to provide funding liquidity and market liquidity to illiquid but insolvent counterparties - have both been transformed. With official policy rates near or at the effective lower bound, the size of the central bank's balance sheet and the composition of its assets and liabilities have become the new, 'poor man's', monetary policy instruments. The lender of last resort and market maker of last resort roles have expanded to include solvency support for systemically important private financial institutions and, in the euro area, the provision of liquidity support and solvency support for sovereigns also.

Concentrating too many financial stability responsibilities, including macro-prudential and micro-prudential regulation, in the central bank risks undermining the independence of the central bank where it is likely to be useful – setting interest rates and the LLR and MMLR functions.

The non-inflationary loss-absorption capacity (NILAC) of the leading central banks is vast. For the ECB/Eurosystem we estimate it at no less than €3.2 trillion, for the Fed at over $7 trillion. This is tax payers' money that is not under the effective control of the fiscal authorities. The central banks have used their balance sheets and their NILACs to engage in quasi-fiscal actions that have been essential to prevent even greater financial turmoil and possible disaster, but that also have important distributional impacts between sectors, financial institutions, individuals and nations. The ECB was forced into this illegitimate role by the fiscal vacuum at the heart of the euro area; the Fed by the fiscal paralysis of the US Federal government institutions.

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