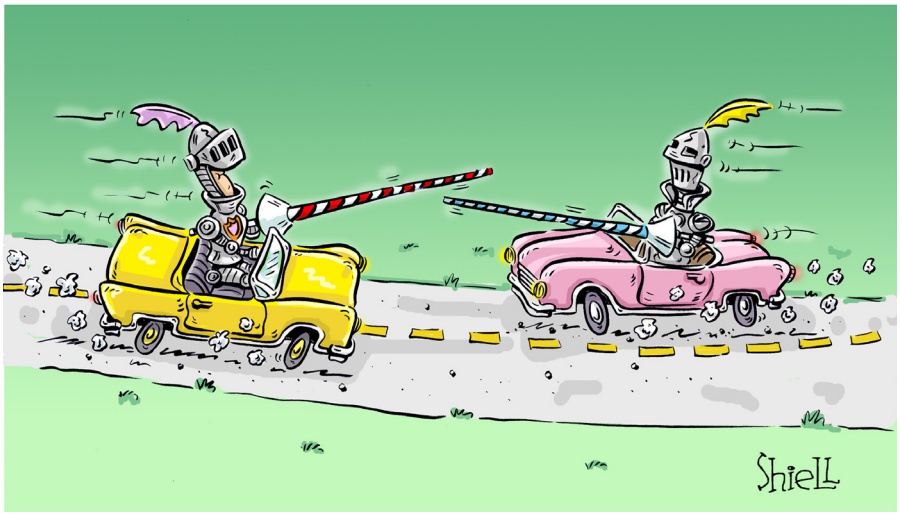
Economics

21 July 2010 | 28 pages

Global Economics View

Games of 'Chicken' Between Monetary and Fiscal Authority: Who Will Control the Deep Pockets of the Central Bank?

- Central banks that provide global reserve currencies have deep pockets.
- Even with inflation at 2 percent, the NPV of the ECB's currency monopoly is at least €2.0 trillion, and of the Fed at $2.9 trillion.
- Not surprisingly, national Treasuries would like to get their hands on some of that money.
- The central bank's responsibility for financial stability can be used by fiscal authorities keen to avoid transparent on-budget and on-balance sheet fiscal measures, to force the central bank into a range of quasi-fiscal actions including:
  - Strengthening the balance sheet of banks through quasi-fiscal subsidies;
  - Providing liquidity support to high-credit risk sovereigns on subsidised terms.
- The financial transactions and other measures through which central banks perform their quasi-fiscal roles are generally opaque and non-transparent, which could undermine accountability for the use of what is ultimately tax payers' money.



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Games of 'Chicken' Between Monetary and Fiscal Authority: Who Will Control the Deep Pockets of the Central Bank?

1. Introduction

The game of Chicken has been used to analyse the interaction of central bank and Treasury

The game of Chicken, also known as the Hawk-Dove or Snowdrift game, is a popular one in economics and political science. It gets its name from a classic macho confrontation situation, in which two testosterone-mad contestants drive their cars towards each other on a collision course: one must swerve, or both may die in the crash, but if one driver swerves and the other does not, the one who swerved will be the "chicken" or coward.[1] The Chicken game belongs to the class of 2-person non-cooperative games where each player prefers not to yield to the other but the outcome where neither player yields is the worst possible one for both players.

Central bank wants price stability and financial stability

The game of Chicken has been applied to the potential conflict between an independent monetary authority and the fiscal authority by Sargent (1986), who attributes the idea to Neil Wallace. The monetary authority pursues price stability but is also concerned about financial stability. The fiscal authority too attaches some value to price stability and financial stability, but does not want to correct an unsustainable primary (non-interest) fiscal deficit through spending cuts or tax increases and much prefers to have the monetary authority monetise the government deficit and public debt.

Fiscal authority wants central bank financing of unsustainable government deficits

As long as neither the monetary authority nor the fiscal authority gives in, the deficit is financed by public debt issuance. With the public-debt to GDP ratio rising without bound, an eventual catastrophe occurs: the sovereign defaults and banks holding large amounts of sovereign debt may collapse, triggering a financial crisis and a deep slump. Following default, the fiscal authority loses access to the government debt markets, at least for a while. The resulting need to instantaneously balance the government's primary budget means sharp public spending cuts and tax increases. This would be the 'collision 'outcome.

The outcome where the monetary authority gives in and monetises public debt and deficits is called Fiscal Dominance. Monetary dominance is the outcome where the fiscal authority gives in and cuts public spending and/or raises taxes to stabilise or reduce the public debt to GDP ratio to prevent a sovereign default.

2. The game of chicken in the Euro Area

We believe that the current strategic interaction between the single monetary authority and the 16 national fiscal authorities in the Euro Area can usefully be viewed through the loupe of the Chicken game, or rather of a variant of this game. The European Central Bank (ECB) is committed to price stability as its primary objective, but has since the outbreak of the financial crisis in August 2007 assumed a financial stability mandate of ever-growing scope and significance. Even if government solvency is not part of the official or proximate objectives of the ECB, the impact of a sovereign default in one or more of the 5 'peripheral' Euro Area countries (Greece, Spain, Portugal, Ireland

[1] They could both swerve in the same direction and still collide. This outcome, with two dead 'chickens', is not considered in the formal models of the game.

and Italy — henceforth the P5) on financial stability in the Euro Area would be so devastating — because of the high concentration of the Euro Area banks to the debt (sovereign and private) of the P5 — that the prevention or mitigation of sovereign default now is a *de-facto* ECB objective.[2]

The sixteen fiscal authorities of the Euro Area are with few exceptions (Luxembourg and Finland and, if we are generous, perhaps also Slovakia and Slovenia) in unsustainable fiscal positions. In 2010, the European Commission expects not a single Euro Area member state to have a general government deficit less than 3.0 percent of GDP — the ceiling under the Stability and Growth Pact as well as one of the two fiscal Maastricht criteria for Euro Area membership.[3] The Euro Area average is expected to be 6.6% as against 6.1% in 2009 and a forecast 6.1% for 2011. As regards the General Government gross debt to GDP ratio, the Euro Area average was 78.7% in 2009 and is forecast to be 84.7% in 2010 and 88.5% in 2011. Only Luxembourg, Finland, Slovakia and Slovenia meet the 60% of GDP debt limit that constitutes the second of the fiscal Maastricht criteria for Euro Area membership.

Note that even countries like Germany and the Netherlands, which view themselves as paragons of fiscal virtue, quite different from the fiscally irresponsible Mediterranean fringe, would not be able today to join the Euro Area because they fail to meet both fiscal criteria.

It therefore constitutes not too much of an abstraction from real-world complexity to view the 16 Euro Area fiscal authorities as a single (albeit rather uncoordinated) Euro Area fiscal authority confronting the ECB in a game of Chicken, except in one respect, which actually makes the game more interesting: there can be a meaningful conflict between the monetary and fiscal authorities even if the fiscal authority knows it cannot succeed in getting the central bank to raise the average future inflation rate so as to increase the net present discounted value of future central bank revenues transferred to the fiscal authority. It suffices that it be possible for the fiscal authority to force the central bank to bring forward in time its contribution to the government budget, even if the NPV of all future contributions of the monetary authority to the government budget cannot be increased.

3. Fiscal Dominance is the Rule, Monetary Dominance the Exception

Fiscal Dominance is the usual outcome, Monetary Dominance the exception

In the real world, the usual outcome in a stand-off between the monetary and fiscal authority is Fiscal Dominance — the victory of the fiscal authorities and the monetisation of public sector deficits and debt. Monetary Dominance, in which the central bank forces the fiscal authority to cut its primary deficit to stabilise the public debt burden, is the exception to the rule. The reason is that regardless of the formal language of the laws ensuring operational independence or even operational *and* target independence of the central bank, when push comes to shove, the fiscal authority has the political clout to force the central bank to do its bidding.

[2] See BIS Consolidated banking statistics, June 2010.

[3] See European Commission (2010).

In many countries there are even formal 'override' clauses in the Act establishing the supposedly independent central bank that permit the fiscal authority, in an emergency or under exceptional circumstances (to be defined by the fiscal authority), to give binding instructions to the central bank or even to take over the making of monetary policy from the Governor of the Central Bank and/or the committee making monetary policy.

In the case of the Bank of England, the Treasury has the Reserve Powers clause of the Bank of England Act 1998, described in Article 19 of that Act.[4] New Zealand pioneered the modern operationally independent, inflation-targeting central bank in 1989, but the Reserve Bank of New Zealand Act 1989 contains Article 12, which allows the Executive branch of government to give the Reserve Bank alternative, binding instructions.[5]

The Fed only regained its powers to set interest rates in 1951, through the Treasury-Federal Reserve Accord of that year, after losing it in 1942 at the beginning of World War II (see Hetzel and Leach (2001)). The Accord is not even an Act of Congress, just an agreement ratified by the FOMC and the US Treasury, and it is clearly not an agreement between equals — the Treasury is the senior party. Abrogation of the Accord by the Treasury would, in all likelihood, require Congressional support, if not an Act of Congress. In any case, an Act of Congress (and Presidential support for the Act or enough Congressional support for the Act to override a Presidential veto) is all that stands between the Fed and a change in its mandate or a change in the composition of the Board and the FOMC. Were there to be a stand-off between the Fed and the Treasury (backed by the US Congress), there is, in our view, little doubt that the Treasury would prevail.

ECB stronger vis-à-vis 16 EA national Treasuries than Fed or Bank of England vis-à-vis their single national Treasury

The ECB may be the only leading central bank for which the outcome of a stand-off between the Monetary Authority and the Treasury (the set of 16 national Treasuries) would not, in our view, result without much doubt in a clear victory for the Treasury. The reason for this is only to a rather limited degree the formal independence of the ECB, guaranteed by the Treaty and the associated Protocols.[6] Even the formal instrument independence of the ECB is not unqualified, because the external exchange rate of the euro is a joint competence of the ECB and the Council (i.e. the Council of Ministers, in this case the Council of Ministers of Finance of the 27 EU member states, or Ecofin), as is clear from Article 219.

This contains, in Paragraph 1, the unsurprising statement that the Council can decide, by unanimity, to change the exchange rate regime of the Euro Area (say by reconstituting Bretton Woods) "*1. ..., the Council, either on a recommendation from the European Central Bank or on a recommendation from the Commission and after consulting the European Central Bank, in an endeavour to reach a consensus consistent with the objective of price stability, may conclude formal agreements on an exchange-rate system for the euro in relation to the currencies of third States. The Council shall act unanimously after consulting the European Parliament and in accordance with the procedure provided for in paragraph 3.*"

[4] Bank of England Act 1998, http://www.bankofengland.co.uk/about/legislation/1998act.pdf.

[5] Reserve Bank of New Zealand Act 1989, http://www.legislation.govt.nz/act/public/1989/0157/latest/DLM199364.html

[6] See e. g. Consolidated versions of the Treaty on European Union and the Treaty on the Functioning of the European Union, http://www.ecb.int/ecb/legal/pdf/fxac08115enc_002.pdf, especially Chapter 2 (Monetary Policy), Articles 127-133, Chapter 4 (Provisions specific to Member States whose currency is the euro), Articles 136-138, Protocol 4 (on the statute of the European System of Central Banks and of the European Central Bank), and Protocol 14 (on the Euro Group).

Rather more surprisingly, Paragraph 2 states that, "*2. … In the absence of an exchange-rate system in relation to one or more currencies of third States as referred to in paragraph 1, the Council, either on a recommendation from the Commission and after consulting the European Central Bank or on a recommendation from the European Central Bank, may formulate general orientations for exchange-rate policy in relation to these currencies. These general orientations shall be without prejudice to the primary objective of the ESCB to maintain price stability."* Such orientations can be made by qualified majority vote.

Typical for such a potentially crucial paragraph, neither is the word 'orientation' defined, nor is it stated whose view (the ECB's or the Council's) shall prevail in case there is a disagreement between them on whether or not there is a threat to the primary objective of price stability. 'Orientation' is not used in the English language in the sense it is used in this document. The closest one gets to its French language origin is *"Introductory instruction concerning a new situation"*[7], as in 'student orientation day'. The French use of 'orientation' in the sense of guidance, instruction, advice, or direction can get close to 'instruction', 'command' or 'order', depending on the context.

If exchange rate 'orientations' by the Council were to be interpreted as binding instructions concerning the management of the external value of the euro, there would, because the Euro Area has unrestricted cross-border mobility of financial capital, be no substantive monetary policy independence left for the ECB. Should it ever come to that point, the European Court of Justice would have to settle the issue. Until it is resolved, there remains some doubt even about the formal monetary policy independence of the ECB.

A source of *de facto* ECB independence that has nothing to do with the letter of the Treaty and Protocols is the division of the Euro Area fiscal authority into 16 national fiscal authorities. Because the 16 national fiscal interests are never perfectly aligned with each other, this weakens the ability of a divided Euro Group to bring effective pressure to bear on the ECB. The Treaty forbids any such pressure from national authorities on the ECB or on the national central banks (NCBs) of the member states. However, there is no mechanism for backing up or enforcing this prohibition, and nature will run its course. The ECB is therefore more likely to be able to resist the pressure of an internally divided Euro Group than it would be if there were a unified, supranational or Federal European fiscal authority.

4. Weak vs. strong fiscal dominance

Neither Monetary Dominance likely in EA, nor Strong Fiscal Dominance

Although a test of wills between the supranational ECB and the members of the Euro Group is therefore likely to be a less one-sided affair than that between a conventional national central bank and its national Treasury — which tends to result in Fiscal Dominance — it is by no means clear that the outcome for the Euro Area will be Monetary Dominance, with the ECB able to resist the pressures of the 16 national fiscal authorities to purchase sovereign debt outright or to engage in a wide range of other quasi-fiscal actions.

[7] See http://www.thefreedictionary.com/orientation.

Weak Fiscal Dominance Likely in EA: fiscal authorities cannot force ECB to raise NPV of future seigniorage through higher inflation ...

Even if the ECB succeeds in resisting being forced into monetary issuance to such an extent that its price stability mandate would be threatened, it can still engage (voluntarily or under pressure from the Euro Area fiscal authorities) in a wide range of quasi-fiscal actions. We think it useful to distinguish between *Strong Fiscal Dominance* (SFD) and *Weak Fiscal Dominanc*e (WFD). There is SFD if the fiscal authority (or authorities) can force the central bank into current and future monetary issuance that can reasonably be expected to lead to future inflation higher than the central bank deems consistent with price stability. We believe that it is unlikely to happen in the Euro Area. The ECB will not, in our view, be forced into monetising public or private sector deficits or debt to such an extent, now and in the future, that its price stability objective (operationally an inflation rate in terms of the Harmonized Index of Consumer Prices or HICP below but close to 2 percent per annum in the medium term) is threatened.

... but ECB can be induced to shift forward in time the distribution of a constant NPV of future seigniorage to the fiscal authorities ...

We also believe, however, that the ECB can be pushed into actions that, although not driving the medium-term and long-term growth rates of the monetary aggregates above the levels consistent with the ECB's price stability mandate, will provide short-term or even medium-term budgetary and financial relief to the fiscal authorities of the Euro Area and/or to some private sector entities, notably the commercial banks that are the frequent counterparties of the ECB/Eurosystem in its transactions. This we call Weak Fiscal Dominance. There is no significant transfer to current and future fiscal authorities in net present discounted value (NPV) terms from the ECB (over and above the transfer that would be implied by the ECB meeting its price stability objective), but the ECB redistributes over time the constant NPV of its fiscal contributions. Typically, because political pressure is invariably myopic, it shifts the transfer of Eurosystem resources to the Euro Area fiscal authorities towards the present, robbing future Peter to pay present Paul.

...and ECB can be induced to redistribute resources between different private sector agents

In addition to shifting forward in time a given NPV resource transfer *to* current and future fiscal authorities, the ECB/Eurosystem can, through its actions and through the current and future responses of the fiscal authorities to these actions, redistribute wealth and resources between different private sector entities, either at a point in time or over time. This happens, for instance, when the ECB/Eurosystem subsidises its counterparty banks through the terms of its repo operations or through its actions in the secondary markets for sovereign debt or for private debt. So far only just over €60 billion of covered bonds have been purchased by the ECB/Eurosystem, as well as €60bn of sovereign debt, but under the Securities Market Programme (SMP), the ECB/Eurosystem can not only purchase sovereign debt outright, it could also purchase *any* private securities it sees fit, including, in principle, bank debt, bank subordinated debt or bank equity. To the extent that these transactions contain an element of subsidy, the ECB will pay less dividends to its shareholders (the NCBs of the 16 Euro Area member states are the dividend-receiving shareholders of the ECB). These 16 NCBs will pay less 'dividends' to their beneficial owners, in practice, the Treasuries of the 16 Euro Area member states.

The ECB/Eurosystem can therefore act in a quasi-fiscal capacity, achieving through financial market transactions redistributions between on the one hand the owners of banks and/or unsecured creditors of banks, and on the other hand tax payers or beneficiaries of public spending. And it can do so without shifting the NPV of its contributions to the 16 national exchequers forward in time.

We believe that the actions of the ECB have resulted both in a redistribution between private agents and in a bringing forward in time of a given NPV resource transfer to the fiscal authorities. We expect to see more of the same in the future. There is also a risk, small in our view, that the ECB could be forced into making a larger total NPV contribution to the budgets of the 16 national Treasuries, by being forced to produce a Euro Area rate of inflation in excess of what the ECB deems consistent with price stability.

The ECB can engage in these quasi-fiscal actions through its outright market purchases and through its repo transactions. Consider the SMP purchases of sovereign debt that began on May 10, 2010. Until we know precisely which sovereign debt instruments were bought, at what prices/on what terms and from whom, it is hard to resist the suspicion that there may have been quasi-fiscal subsidies involved. Indeed, ever since the beginning of the financial crisis in August 2007, the ECB is likely to have engaged in significant quasi-fiscal actions by accepting low-grade collateral from Euro Area commercial banks, including banks of doubtful creditworthiness, on terms that may well have involved significant quasi-fiscal subsidies.

The ECB has, despite repeated requests, refused to put in the public domain either the internal models used to value illiquid collateral offered to the Euro System by eligible banks, or the exact valuations of the specific items of collateral offered to the Eurosystem. Even with liquid securities, for which a relevant market price benchmark can be observed, that market price will not be independent of the presence and actions of the ECB in these markets. The Bank of England and the Fed have been equally unwilling to reveal exactly what was either bought outright, or accepted as collateral, at exactly what price and on what other relevant terms, and from which counterparties. Clearly, market sensitivity and other normal commercial confidentiality considerations would make the immediate publication of some of this information inappropriate. But with a lag or 3 or 6 months, there are no valid grounds for anything except complete openness and transparency about the full array of financial market operations of the central banks.

5. The quasi-fiscal role of the ECB and its financial stability mandate

Fear of financial instability (bank failures) may lead ECB to bail out banks or sovereigns if ECB believes national fiscal authorities, directly or through Facilities, cannot or will not act

The formal financial system supervisory role assigned to the ECB/Eurosystem in the Treaty is very modest. The sum total of references to the ECB's potential contribution to financial stability are contained in Article 127, Paragraphs 5 and 6. *"5. The ESCB shall contribute to the smooth conduct of policies pursued by the competent authorities relating to the prudential supervision of credit institutions and the stability of the financial system. 6. The Council, acting by means of regulations in accordance with a special legislative procedure, may unanimously, and after consulting the European Parliament and the European Central Bank, confer specific tasks upon the European Central Bank concerning policies relating to the prudential supervision of credit institutions and other financial institutions with the exception of insurance undertakings."*

Nevertheless, the ECB has as a result of the financial crisis played an increasingly prominent role in Euro Area supervision of systemically important financial institutions and markets. That role will be expanded through the newly established European Systemic Risk Board, which is to be chaired by the President of the ECB, and on which the ECB/Eurosystem has 18 out of 33 votes.

Providing liquidity support to fiscally challenged sovereigns in the Euro Area is supposed to be the responsibility of the new Facilities set up by the European Union (EU) and Euro Area member states. This includes the €110bn Greek Facility (of which €30bn comes from the IMF), which already has loaned €20bn to the Greek sovereign, and two Facilities for the other Euro Area member states: the €60bn supranational EU facility (which in principle can be accessed by all 27 EU member states) and the €440bn intergovernmental European Financial Stability Facility (EFSF) for the 15 Euro Area sovereigns other than Greece. The IMF is expected to contribute €250bn to these last two Facilities.

Stress tests likely to result in quite a few banks needing more capital

Recapitalising under-capitalised banks (quite a few of which may be revealed following the publication of the banking sector stress tests for 91 Euro Area banks, starting on July 23) is supposed to be the responsibility, first, of these banks themselves. They should try to raise capital in the markets. If an undercapitalised bank cannot raise equity in the markets, its sovereign is supposed to come to the rescue if the bank is systemically important — too important to fail. The sovereign may have a dedicated bank recapitalisation facility. Examples are SoFFin in Germany, which still has €50bn left in the kitty, the Spanish Frob, whose life may be extended to the end of 2010 and which was in principle set up to provide up to €99bn worth of bank recapitalisation fund, but which has authorised only €12bn thus far, and the €10bn Greek facility, set up with funds earmarked for this purpose from the €110bn Greek Facility. If more is required, or if there is no dedicated national bank recapitalisation fund, the sovereign could access the markets to borrow the necessary funds. If the sovereign is unable or unwilling to access the markets, he can turn to the Facilities and borrow from them. If the sovereign is unable or unwilling to borrow from the Facilities, there is nothing that stands between a potentially systemically important undercapitalised bank and the risk of default except the ECB/Eurosystem.

If capital-deficient banks cannot go to market and if their sovereigns cannot or will not provide the required capital, directly or through Facilities ...

The ECB could buy the debt of the sovereign that is unwilling to borrow in the markets and unwilling to borrow from the Facilities — loans from the Facilities will come with tough IMF/European Commission (EC)/ECB conditionality attached. Even though the ECB cannot buy debt directly from the sovereign in the primary issue markets, the very presence of the ECB as a buyer in the secondary markets is bound to make a material difference to the terms on which sovereign debt is sold in these markets. Alternatively, the ECB could buy the debt (or even the equity) of the capital-challenged bank outright — the SMP permits it to do so, although it has not yet done so and would undoubtedly be most unhappy and reluctant to do so, unless there were a threat to systemic financial stability.

... ECB may have to choose between bailing out banks and/or governments and financial crisis

We clearly have here all the elements of a game of Chicken between the ECB and the national Treasuries of the Euro Area, whose resources are visibly at risk in the Facilities. It would be much more attractive politically, for a political entity with a relatively short time horizon such as a national Treasury, to let the ECB do the heavy lifting of bank recapitalisation and sovereign liquidity support, let alone of taking the risk of seeing liquidity support of a sovereign turning into a transfer or grant when the sovereign (perhaps unexpectedly) ends up defaulting and imposing a haircut on its creditors.

If the ECB sticks to its price stability guns, any costs incurred by the ECB/Eurosystem through the up-front provision of resources by the ECB/Eurosystem to recapitalise banks or to take the credit risk of Euro Area sovereigns will ultimately be reflected in lower long-term pay-outs by the ECB/Eurosystem to the ultimate beneficial owners of the central banks — the 16 national Treasuries and through them the tax payers and beneficiaries of public spending in the Euro Area.

But that will be in the possibly distant future, well beyond the political decision horizon of most governments. And there is always the small chance that the ECB/Eurosystem can be pushed into excessive long-term monetisation of public and private deficits and debt, raising the NPV of its future transfers to the national Treasuries by raising inflation. Even though a 'seigniorage Laffer curve' is likely to ensure that there exists a rate of inflation so high that further increases in inflation beyond that level will reduce the NPV of future seigniorage revenue and thus of ECB/Eurosystem transfers to the fiscal authorities, that NPV of seigniorage maximising rate of inflation is likely to be well above the roughly 2 percent level targeted by the ECB over the medium term.

The visible and audible signs of differing views between the ECB's managers and the Euro Area ministers of finance about how much of the funds to stabilise liquidity-challenged sovereigns and capital-challenged banks ought to be provided by the ECB/Eurosystem are there for all to see and hear. The ECB/Eurosystem, which started its outright purchases of Euro Area sovereign debt on 10 May 2010 with a €16.5 bn operation, has steadily reduced the scale of its purchases since then, with only €302m worth of additional sovereign debt purchased in its most recent intervention, during the week of 12-16 July 2010. We expect that there may be pressure from the ECB to sell its €60bn holdings of sovereign debt, if not in the markets, then possibly to the EFSF, when this Facility becomes active sometime late July or early August 2010.

ECB has done QE — sterilisation of sovereign debt purchases is semantic, not substantive

The IMF has argued for the ECB to engage in large-scale quantitative easing (QE) — the purchase of sovereign debt with base money as its counterpart on the liability side of the Eurosystem's balance sheet. The ECB not only does not wish to increase the scale of its QE, it denies it has engaged in any QE at all, because it has sterilised the effects on the monetary base of its sovereign debt purchases by increasing its 1-week term deposits. This, however, is semantic sterilisation only. If the additional deposits on the Eurosystem's balance sheet as the counterpart of the Eurosystem's outright purchases of sovereign debt had been overnight deposits, they would have counted as base money and there would have been monetisation of the public debt and the associated reminder of the horrors of the Weimar hyperinflation. With a one-week maturity for the banks' deposits with the Eurosystem, there is supposed to be no monetisation. Clearly, overnight deposits and one-week term deposits are near-perfect substitutes. What the ECB has done through its €60bn worth of sovereign debt purchases is, from an economic perspective, QE.

ECB has long played a quasi-fiscal role by taking private and sovereign credit risk on its balance sheet, probably without charging the proper price for this

It is ironic that the ECB is so concerned about outright purchases of sovereign debt when it has held large quantities of sovereign debt on its balance sheet in the form of collateral for repos. If the banks that offer the collateral are of doubtful creditworthiness, as some of them undoubtedly are, the difference between lending to banks secured against government debt and outright purchases of that same sovereign debt becomes blurred and in the limit vanishes altogether.

Fiscal authorities likely to want ECB to increase scale & scope of quasi-fiscal actions

We believe that far from welcoming the exit of the ECB from its small programme of outright sovereign debt purchases, many of the Euro Area finance ministers would welcome an increase in these activities, which they view not as a temporary placeholder until the EFSF is activated, but as a long-term quasi-fiscal substitute for explicit, on-budget and on-balance sheet fiscal actions.

6. Why the ECB may end up doing most of the 'heavy lifting' for a while

It is probably just as well that the ECB/Eurosystem appears to be willing to act in a quasi-fiscal capacity to bail out liquidity- and/or solvency-challenged sovereigns and undercapitalised banks. There are two reasons for this.

EFSF could be sunk by German Constitutional Court

First, there remains a small but non-zero risk that the EFSF, the €440bn SPV transformed into a limited liability company incorporated in Luxembourg, may never get off the ground. This could happen if the legal challenges to German participation in the EFSF and to the Greek Facility voted by the Bundestag (the lower house of the German parliament) on 7 May 2010, were to be successful.[8]

EFSF in any case is not yet operational (why the delay?)

Second, even if the legal challenges fail, as we fully expect them to, neither the EFSF nor the EU Facility are as yet operative, that is, neither facility is capable of dispensing funds 'at-crisis-speed' to governments that find themselves priced out of the sovereign debt markets. The IMF's presumed €250bn contribution to these two facilities will only become available one country, one IMF programme and one IMF Executive Board decision at a time. Again, this contribution cannot be tapped on the scale and with the speed required by a sovereign borrowing or debt rollover 'sudden stop'. The only ready source of emergency funding is therefore the ECB/Eurosystem.

a. The constitutional challenge to German participation in the Facilities and other potential legal pitfalls

The German Federal Constitutional Court in Karlsruhe still has to decide the merits of two legal actions brought against German participation in the Facilities. Should the Court find in favour of the plaintiffs (a highly unlikely outcome in our view), this would endanger not just the continued existence of the Euro Area but the whole EU project.

The first action was filed with the Constitutional Court within hours of the Bundestag approving, on 7 May 2010, the law governing Germany's contribution to the Greek Facility. The four plaintiffs argue that Germany's participation would violate Germany's Basic Law (Constitution), specifically that it would violate the constitutional right to property (Article 14 of the Basic Law) and other fundamental principles of the Constitution, such as the principle of democracy and the social state (Articles 20, 23 and 28 of the Basic Law).[9] The Court immediately rejected a petition for an injunction preventing the German President from signing the law into effect. The ruling of the Court on the merits of the complaint remains pending.

[8] The Greek Facility in addition has access to €30 bn of IMF funds, for a total of €110bn. The €440 bn EFSF can be supplemented with €220bn of IMF funds, for a total of €660bn and the €60 bn EU facility with up to €30bn worth of IMF funds, for a total of €90bn. Collectively, the three Facilities therefore mobilize €860bn.

[9] Article 14 of the Basic Law states: *"(1) Property and the right of inheritance are guaranteed. Their content and limits are determined by statute."* Article 20 states: *"(1) The Federal Republic of Germany is a democratic and social federal state…"* Article 28 states: *"(1) The constitutional order in the States [Länder] must conform to the principles of the republican, democratic, and social state under the rule of law, … "* Article 23 states: *"(1) To realize a unified Europe, Germany participates in the development of the European Union which is bound to democratic, rule of law, social, and federal principles as well as the principle of subsidiarity and provides a protection of fundamental rights essentially equivalent to that of this Constitution …"*

The second action before the Constitutional Court, brought by a member of the Bundestag, is based on the argument that the laws governing Germany's contribution to the Greek Facility and to the ESFS are in breach of Article 125 of the Treaty on the Functioning of the European Union (TFEU). This is the Article that contains what is often referred to as the 'no bail-out clause'.[10] The claimant argues that the Act has to be considered as an amendment of the European Treaties and could only enter into force if the necessary procedure for such amendments at the European level had been respected. Therefore, the claimant contends, the Bundestag did not have the competence to approve the guarantees.

Regardless of the legal merits of Constitutional Court challenges, politics are likely to be dominant: EFSF likely to survive

We shall not try to argue the legal merits of this interpretation, beyond pointing out that the word 'bail-out' or any word(s) with similar meaning does not appear in the Article. Instead, it prohibits member states from being liable for or assuming the commitments of the governments of other states. Strictly speaking, that would preclude member states from guaranteeing the debt of governments of other member states, not from buying that debt outright, lending bilaterally or multilaterally to these governments or guaranteeing the debt issued by a limited liability company that provides loans or credit lines to these governments or purchases their debt outright. It is even permitted, according to the Article, to be liable for or to assume the commitments of other governments provided this takes the form of mutual financial guarantees for the joint execution of a specific project. How about a 'Project for Greek Sovereign Liquidity', a 'Project for Euro Area Sovereign Liquidity' or a 'Euro Area Bank Recapitalisation Project'?

The Court has not yet ruled on this action either.

We don't believe the €60bn EU Facility has been challenged (yet) in Court, although in many ways its Treaty-based justification seems weakest. The official legal basis for the supranational EU Facility is Article 122 of the Treaty on the Functioning of the European Union (TFEU).[11] This clearly involved a bit of an interpretative stretch: the Article concerns EU measures in support of member states, *"... appropriate to the economic situation, in particular if severe difficulties arise in the supply of certain products, notably in the area of energy."* Union financial assistance may be granted *"Where a Member State is in difficulties or is seriously threatened with severe difficulties caused by natural disasters or exceptional occurrences beyond its control, ... "*.

[10] Article 125 of the Consolidated version of the Treaty on the Functioning of the European Union (ex Article 103 TEC) states: *"1. The Union shall not be liable for or assume the commitments of central governments, regional, local or other public authorities, other bodies governed by public law, or public undertakings of any Member State, without prejudice to mutual financial guarantees for the joint execution of a specific project. A Member State shall not be liable for or assume the commitments of central governments, regional, local or other public authorities, other bodies governed by public law, or public undertakings of another Member State, without prejudice to mutual financial guarantees for the joint execution of a specific project.*

2. The Council, on a proposal from the Commission and after consulting the European Parliament, may, as required, specify definitions for the application of the prohibitions referred to in Articles 123 and 124 and in this Article."

[11] Article 122 TFEU (ex Article 100 TEC) states:

1. Without prejudice to any other procedures provided for in the Treaties, the Council, on a proposal from the Commission, may decide, in a spirit of solidarity between Member States, upon the measures appropriate to the economic situation, in particular if severe difficulties arise in the supply of certain products, notably in the area of energy.

2. Where a Member State is in difficulties or is seriously threatened with severe difficulties caused by natural disasters or exceptional occurrences beyond its control, the Council, on a proposal from the Commission, may grant, under certain conditions, Union financial assistance to the Member State concerned. The President of the Council shall inform the European Parliament of the decision taken.

Other legal challenges conceivable

In addition, there could be legal action, presumably only at the Court of Justice of the European Communities, against the European Central Bank (ECB) and/or the 16 National Central Banks (NCBs) for possible violations of Article 123(1) TFEU, which prohibits the ECB or the NCBs from providing credit facilities to or from making *direct* purchases of debt instruments from member states, and/or of Article 124 TFEU, which prohibits measures providing EU institutions or member state entities privileged access to financial institutions.[12] It would be interesting to hear the Court's view of the relevance of the distinction between direct purchases of public debt by the Eurosystem (that is, purchases in the primary issue market) and outright purchases in the secondary debt markets.

If, as we expect, the EFSF will be given privileged access to the Eurosystem, say by being made an eligible counterparty for repos and other forms of collateralised borrowing from the Eurosystem, it would be interesting to hear the Court's view on whether the legal establishment of the EFSF as a limited liability company incorporated in Luxembourg means that it is not an EU institution or member state entity.

From a legal layman's perspective, all three Facilities would appear to rest on shaky legal foundations. However, the decisions to be taken by the German Constitutional Court, and possibly by the European Court, have always been intensely political: neither the letter nor the spirit of the law or the Treaty are likely to be decisive in the Courts' ultimate decisions. It is overwhelmingly likely that the German Constitutional Court will rule in a way that allows the three Facilities to function as intended. There is, however, a tail risk — a very small probability of an adverse ruling — that would have catastrophic implications for the capacity of the EU, the Euro Area and the ECB to prevent unwarranted sovereign defaults and thus to avoid the resulting sovereign debt turmoil from triggering another leg in the Euro Area banking crisis.

7. Quasi-fiscal activities of other central banks

Fed and Bank of England too have engaged in significant quasi-fiscal activities

The ECB/Eurosystem is by no means the only central bank to act in a quasi-fiscal capacity, by engaging in transactions and other actions (like imposing reserve requirements) that are from an economic perspective equivalent to making transfer payments, paying out subsidies or grants, and imposing taxes, levies and duties. Both the Fed and the Bank of England have trebled the size of their balance sheets since the beginning of the financial crisis, and have engaged in off-budget and off-balance sheet operations like the Special Liquidity Scheme of the Bank of England and the Maiden Lane, Maiden Lane II and III SPVs incorporated by the Fed in Delaware.

[12] Article 123 TFEU (ex Article 101 TEC) states: 1. Overdraft facilities or any other type of credit facility with the European Central Bank or with the central banks of the Member States (hereinafter referred to as 'national central banks') in favour of Union institutions, bodies, offices or agencies, central governments, regional, local or other public authorities, other bodies governed by public law, or public undertakings of Member States shall be prohibited, as shall the purchase directly from them by the European Central Bank or national central banks of debt instruments.

2. Paragraph 1 shall not apply to publicly owned credit institutions which, in the context of the supply of reserves by central banks, shall be given the same treatment by national central banks and the European Central Bank as private credit institutions.

Article 124 TFEU (ex Article 102 TEC) reads: Any measure, not based on prudential considerations, establishing privileged access by Union institutions, bodies, offices or agencies, central governments, regional, local or other public authorities, other bodies governed by public law, or public undertakings of Member States to financial institutions, shall be prohibited.

These facilities and the transactions that maintain them are likely to involve both redistribution of wealth and income between financial institutions and tax payers/beneficiaries of public spending and the shifting forward in time of the central banks' contributions to the budgets of the sovereigns — two manifestations of Weak Fiscal Dominance. In addition, if these central banks can be knocked off their price stability perches, there could be an increase in the NPV of current and future seigniorage and in the NPV of the central bank's contribution to the sovereign budget. That would be an example of Strong Fiscal Dominance.

8. How deep are the non-inflationary pockets of the central bank?

In this section, we shall demonstrate that the game of Chicken we perceive to be played between the central banks and the fiscal authorities is not *de minimis*. The central bank can mobilise massive resources and transfer them over time and among different claimants at a point in time.

Central bank has hugely profitable monopoly of issuance of legal tender — currency and bank reserves

The central bank has a unique and extremely profitable monopoly. It is in most countries the sole issuer of 'legal tender' — financial instruments that, in the jurisdiction of the central bank, must be accepted in final payment for most transactions and as final settlement of virtually all financial obligations. Legal tender status typically attaches to currency (notes and coins issued by the central bank) and to bank reserves (balances in certain current accounts held with the central bank by eligible counterparties, typically commercial banks). These financial instruments tend to be the most liquid instruments in the jurisdiction of the central bank. Only during periods of extremely high inflation or hyperinflation does their status as the most liquid instruments get challenged by foreign currency, gold and intrinsically valuable durable commodities.

In the Euro Area, we shall define the monetary base, also called base money, high-powered money or M0, to be the sum of currency (notes and coin in circulation) plus required reserves or minimum reserves held by the banks with the Eurosystem plus overnight deposits held by banks with the Eurosystem. The ECB itself does not include coin in its definition of the monetary base, but coins are small relative to notes outstanding — in May 2010, the value of the euro notes outstanding was €805bn, while the value of the euro coins was just under €22bn.[13]

Opportunity cost or 'interest saved' measure of resources appropriated by central bank through base money monopoly

Currency (or at least notes) can be produced at effectively zero marginal cost. For simplicity, and because it does not affect our main conclusions, we shall ignore the fixed cost of producing and distributing currency. An obvious measure of the profits earned by the central bank in period *t* from its currency monopoly is the *opportunity cost* measure or *interest saved* measure $\left(\frac{i_t - i_t^C}{1+i_t}\right)C_{t-1}$. Here i is the interest rate the central bank would have had to pay if it had not been able to issue currency (a short nominal interest rate free of default risk, like that on safe, short maturity Treasury bills), i^C is the interest rate on currency, and C_{t-1} is the stock of currency outstanding at the beginning of period t. For reasons that are partly technical and partly conventional, the interest rate on currency is zero.

[13] Source: ECB.

Bank reserves held with the central bank can earn any interest rate determined by the central bank as regards the 'required reserves' component. For the Eurosystem, required reserves are 2 percent of eligible bank deposits. At the discretion of the ECB, they are remunerated at the official policy rate, the refi rate, currently 1.00 percent. Excess reserves held as deposits earn the deposit rate, currently 0.25 percent. From the reserve component j, earning an interest rate i^{R^j} and with an amount R^j outstanding, the profit for the central bank in period t would therefore be $\left(\frac{i_t - i_t^{R^j}}{1+i_t}\right)R_{t-1}^j$. In the case of the ECB, R^1 could be the stock of required reserves with $i^{R^1} = 0.01$ and R^2 would be the stock of excess reserves with $i^{R^2} = 0.0025$. The monetary base, the sum of currency and the various reserve components, will be denoted M. The opportunity cost measure of central bank profits from its monopoly of base money issuance can therefore be written as $\left(\frac{i_t - i_t^M}{1+i_t}\right)M_{t-1}$, where the monetary base M is the sum of the stock of currency, the stock of required reserves and the stock of excess reserves, $M = C + R^1 + R^2$, and i^M, the effective interest rate on the monetary base is given by a weighted average of the interest rates on currency (zero), the interest rate on required reserves and the interest rate on excess reserves.[14]

Seigniorage measure of resources appropriated by central bank through base money monopoly

Another common measure of the revenue or resources appropriated in a given period, t, by the central bank through the issuance of base money is what is commonly called *seigniorage*, the change in the monetary base, $\Delta M_t = M_t - M_{t-1}$, minus the interest paid in period t on the outstanding stock of base money, $i_t^M M_{t-1}$, or $M_t - (1+i_t^M)M_{t-1}$.

The opportunity cost measure of the revenue the central bank gets from its issuance of base money and the seigniorage measure are related through the following identity:

$$NPV_t\left\{\Delta M - i^M M\right\} = NPV_t\left\{\left(\frac{i - i^M}{1+i}\right)M\right\} - \left(1+i_t^M\right)M_{t-1} \qquad (1)$$ [15]

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[14] $i_t^M = \frac{i_t^{R^1} R_{t-1}^1 + i_t^{R^2} R_{t-1}^2}{M_{t-1}}$

[15] Strictly speaking,

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

Where E_t denotes expectation conditional on information at the beginning of period t and $I_{j,t}$ is the (stochastic) nominal discount factor between periods *t* and *j*. We assume that $\lim_{N\to\infty} E_t I_{N,t} M_N = 0$.

Here $NPV_t\{...\}$ means the net present discounted value at time t of whatever is inside the curly brackets, from time t till the end of time. So the net present discounted value of current and future seigniorage income equals the net present discounted value of current and future interest saved through the issuance of base money minus the value of the initial stock of base money (inclusive of interest paid on the initial stock).

Let I denote the net present discounted value of current and future interest saved and S the net present discounted value of current and future seigniorage, that is, $I_t = NPV_t\left\{\left(\frac{i-i^M}{1+i}\right)M\right\}$ and $S_t = NPV_t\{\Delta M - i^M M\}$. Then we can rewrite (1) compactly as

$$S_t = I_t - (1+i_t^M)M_{t-1} \tag{2}$$

We want to be sure that our estimates of the depth of the pockets of the central bank are constructed as likely to be an underestimate rather than an overestimate. So in what follows, we restrict the calculation to currency only, assuming (counterfactually, as excess reserves earn a deposit rate that is generally less than the market rate) that the central bank derives no income from either required or excess reserves. In that case, the relationship given in equation (1) simplifies to

$$NPV_t\{\Delta C\} = NPV_t\left\{\left(\frac{i}{1+i}\right)C\right\} - C_{t-1}$$

or

$$S_t = I_t - C_{t-1} \tag{3}$$

This says that the net present discounted value of current and future seigniorage income (measured by the change in the stock of currency) equals the net present discounted value of current and future interest saved through the issuance of currency minus the value of the initial stock of currency.

Why is any of this interesting/relevant? Just hang in there!

The familiar balance sheet of a central bank typically looks like the one shown in Figure 1.

Figure 1. Conventional Central Bank Balance Sheet

Assets	Liabilities	
L(T): Loans to the private sector (including repos) secured against Treasury securities	M0: Monetary base	*C*: Currency
L(P): Loans to the private sector (including repos) secured against private securities.		*BOD*: Bank overnight deposits/reserves with central bank
T: Treasury securities (bought outright)	*L*: Non-monetary liabilities of the central bank	*BTD*: Bank term deposits with central bank
P: Private securities (bought outright)		*TD*: Treasury deposits with the central bank
L: Unsecured loans to the private sector		*CBB*: Central banks bills and bonds
X: Central bank foreign exchange reserves		
	W: Conventional Net Worth or Equity	

Source: Citi Investment Research and Analysis

The conventional balance sheet of the Eurosystem is shown in Figure 2, both for a date immediately before the financial crisis (August 3, 2007) and for a recent date (Jul 9, 2010).

Figure 2. Conventional Balance Sheet of the Consolidated Eurosystem, as of Jul 9, 2010 and 3 August 2007.

Assets (EUR millions)			Liabilities (EUR millions)		
	09-Jul-10	03-Aug-07		09-Jul-10	03-Aug-07
Gold & forex reserves	586,334	318,261	Banknotes in circulation	818,831	645,004
Collateralised loans to banks	635,009	448,009	Bank reserves	391,431	189,747
Debt held outright	496,083	107,268	Non-monetary liabilities	716,289	292,058
Other assets	287,320	284,437	Financial net worth	78,191	68,314
Total assets	**2,004,747**	**1,195,123**	**Total liabilities**	**2,004,747**	**1,195,123**

Note: "Debt held outright" includes public and private debt securities held for monetary policy purposes, including those resulting from the Covered Bonds scheme and the government debt purchases of the Securities Markets Programme announced on May 10, 2010. It also includes a small amount of sovereign debt securities held not for monetary policy purposes. Totals/sub-totals may not add up, due to rounding. Sources: ECB and Citi Investment Research and Analysis

Eurosystem has a €2 trillion balance sheet and €78bn of capital

The size of the balance sheet currently stands at just over €2.0 trillion, compared to around €1.2 trillion at the beginning of August 2007. The Eurosystem's capital or equity (paid-up capital plus retained profits) is around €78bn. That does not really set the world ablaze. Is this €78bn the limit of the losses the ECB could absorb without going into receivership? Fortunately not.

Conventional central bank balance sheet omits most important asset: NPV of future interest saved, i.e. value of the base money monopoly

The financial assets and liabilities of the central bank omit the most important asset and liability of the bank. When we take a forward-looking view of all current and future cash-flows into and out of the central bank, and reduce these to their net present discounted values, we get the *comprehensive balance sheet of the central bank* shown in Figure 3 below. It is also referred to as the *intertemporal budget constraint* of the central bank.

Figure 3. Comprehensive Balance Sheet of Central Bank, (Intertemporal Budget Constraint)

Assets	Liabilities	
L(T): Loans to the private sector (including repos) secured against Treasury securities	*M0*: Monetary base	*C*: Currency
L(P): Loans to the private sector (including repos) secured against private securities.		*BOD*: Bank overnight reserves/deposits with central bank
P: Private securities (bought outright)	*L*: Non-monetary liabilities of the central bank	*BTD*: Bank term deposits with central bank
T: Treasury securities (bought outright)		*TD*: Treasury deposits with the central bank
L: Unsecured loans to the private sector		*CBB*: Central banks bills and bonds
I: NPV of future interest saved through the central bank's monopoly of base money	*E*: present value of future cost of running the central bank	
X: Central bank foreign exchange reserves	*T*: present value of future net payments to the Treasury	
	V: Comprehensive Net Worth or Equity	

Source: Citi Investment Research and Analysis

The intangible or implicit asset that is omitted from the central bank's conventional balance sheet is the present discounted value of its monopoly of base money creation. This is why I appears on the asset side of the Comprehensive Balance Sheet. In addition, there are two liabilities on the Comprehensive Balance Sheet that are not found on the conventional balance sheet: E, the NPV of the current and future costs of running the central bank, and T, the NPV of the payments made (taxes paid to) the beneficial owners of the central bank, ultimately the Treasury (the Treasuries in the case of the ECB) and through them the citizens as tax payers ad beneficiaries of public spending.

Central bank's conventional equity, W, need not be positive, but its comprehensive net worth, V, given by

$$V = W + I - E - T = W + S + C - E - T \qquad (4)$$

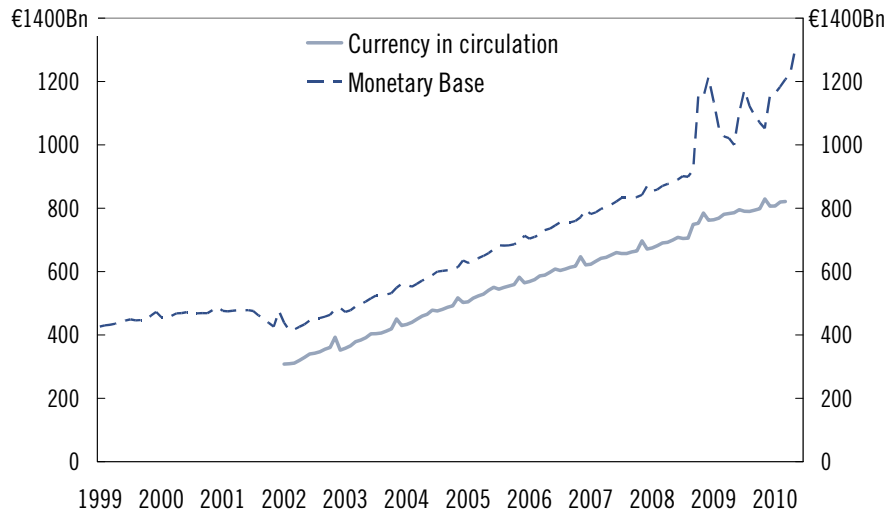
must be positive. If not, the central bank either is at risk of failing to meet its financial obligations or it will have to raise S or I (after, of course, having pared E to the bare minimum). This means increasing the current and future growth of base money. This in turn could threaten the price stability objective of the central bank. There could therefore be a conflict between meeting the price stability objective and staying solvent.

The Strong Fiscal Dominance outcome of the game of chicken would be where the fiscal authorities increase T by forcing the central bank to raise seigniorage, that is, I or S, which is done through higher inflation. The more likely (in the Euro Area) Weak Fiscal Dominance outcome leaves S (or I) and T unchanged, but either shifts the distribution over time of the central bank's contribution to the Treasury towards the present or has the central bank engaging in redistribution for a given *S* or *I* even without changing the timing of the net payments stream to the Treasury or Treasuries. How much could be shifted in this way?

Eurosystem base money stock €1.3 trillion and currency stock €827 bn

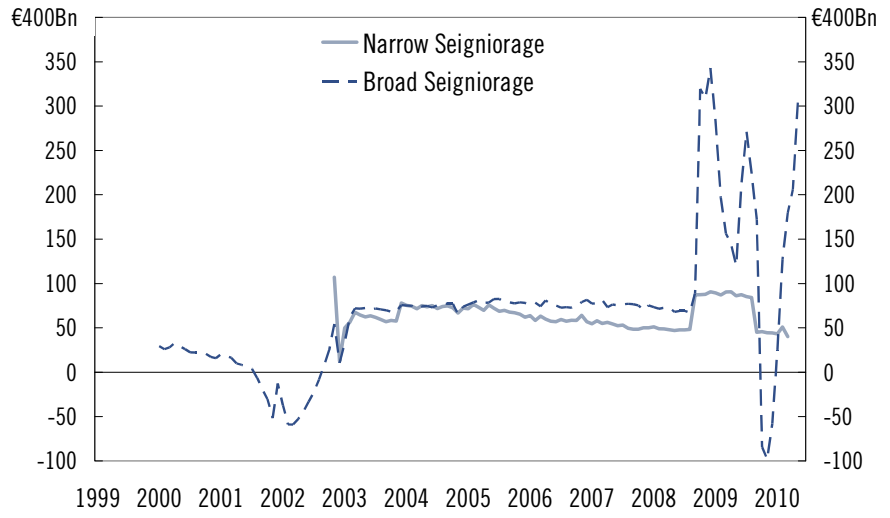
To get an estimate of S or I, we need estimates of the future stock of base money or, in our conservative estimate case, of the future stock of currency. The past behaviour of the Euro Area stocks of base money and currency is shown in Figure 4, that of seigniorage (the change in the stock of base money or, in the conservative estimate case, the change in the stock of currency) in Figure 5.

Figure 4. Euro Area – Stock of Base Money and Currency, 1999-2010



Sources: ECB and Citi Investment Research and Analysis

Figure 5. Euro Area -- Narrow and Broad Seigniorage, 1999-2010



Note: Narrow Seigniorage: change in Currency stock over 12 months earlier. Broad Seigniorage: change in Monetary Base stock over 12 monts earlier. Sources: ECB and Citi Investment Research and Analysis

Eurosystem: just under €50 bn annual seigniorage income (more during financial crisis) from currency alone

We see that the stock of currency (notes and coins) has risen steadily to reach around €827 billion in May 2010, just over 9 percent of Euro Area GDP. The monetary base is significantly larger (over €1.3 trillion in May 2010), but much more volatile. Annual narrow seigniorage (the twelve-month change in the stock of currency) is running currently at just under €50 bn, although for more than a year following the collapse of Lehman Brothers in September 2008, it ran at an annual rate of over €80bn. This narrow seigniorage is effectively free money for the Eurosystem, and it serves to emphasise just how poor a measure of the financial strength of the Eurosystem the conventional equity capital (just €78bn) represents.

Real demand for currency balances depends on real GDP & nominal interest rate

To obtain an estimate of the NPV of future narrow seigniorage, we need a currency demand function. A typical long-run currency demand function takes the following form:

$$\frac{C}{P} = kY^{\alpha} e^{-\beta\left(i - i^{C}\right)} \tag{5}$$

$$k, \alpha, \beta > 0$$

Here P is the general price level, Y is some scale variable like real GDP, α is the output (scale) elasticity of the demand for currency and $-\beta$ is the semi-elasticity of currency demand with respect to the opportunity cost of holding currency. For empirical estimation purposes, short-run dynamics are tagged onto the long-run relationship in (5).

Unfortunately, the euro is just eleven years old and euro currency just nine years old. Robust estimation on a time-series of that length is impossible. Theories of the demand for transactions balances that include fixed costs of portfolio management, like those of Allais, Baumol and Tobin, imply economies of scale in money demand, specifically $\alpha = 0.5$ — the so-called square root rule. However, the demand for global reserve currencies like the US dollar and the euro is driven as much by the need for an alternative liquid store of value in countries with endemically high rates of inflation and currency depreciation, by the store of value and transactions need of the informal, grey, black and outright criminal economies (including tax evasion and money laundering) at home and abroad, as by the 'formal economy transactions motive' modelled by Allais, Baumol and Tobin. The stock of euro currency (as much as half of which may be held outside the euro area (see Buiter (2010)) is therefore growing much faster than can be rationalised by the "square root rule". In what follows, we consider both the case where $\alpha = 1.0$ — other things being equal, the demand for euro currency grows proportionally to euro area GDP and $\alpha = 0.5$. For the semi-elasticity of currency demand with respect to its opportunity cost, we assume that a 1 percentage point increase in the opportunity cost (the short nominal interest rate) reduces the demand for real currency balances by 2 percent, so $\beta = 2.0$.

We consider a scenario where the future growth rate of real GDP, γ, the future inflation rate, π, and the future nominal discount rate, i, are all constant. Let the future proportional growth rate of the stock of currency be μ. Then S, the NPV of current and future narrow seigniorage (changes in the stock of currency) is, if μ is also constant, given by:

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

$$= \left(\frac{1+i}{1+i-(1+\pi)(1+\gamma)^{\alpha}}\right)\left((1+\pi)(1+\gamma)^{\alpha}-1\right)C_0 \qquad (6)$$

where the second line of (6) follows from the first because $1+\mu = (1+\pi)(1+\gamma)^{\alpha}$.

The initial value of the stock of currency is denoted C_0 . Since we assume in our estimate that the short nominal interest rate is higher than the current extraordinarily low level of, say, 1.0% (if we take the refi rate as the relevant benchmark), the stock of real currency demanded at, say, a nominal interest rate of 4 or 5 percent would be lower than the current real stock. Again we aim to bias our calculations against obtaining high figures for *S* or *I* by assuming that the entire reduction in real currency balances associated with a move from a 1 percent interest rate to 4 percent or higher, is achieved through a reduction in the nominal stock of currency, rather than through an increase in the general price level.

With $\beta = 2.0$, and the stock of currency €827bn when *i* =1.0%, it follows that C_0 = €779bn if *i* = 4.0%, C_0 = €771bn if *i* = 4.5% and C_0 = €763bn if *i* = 5.0%.

This is all we need to obtain some illustrative calculations of what the NPV of future seigniorage in the Euro Area might be worth. It is summarised in Figure 6 below.

Figure 6. Present discounted value of future seigniorage, *S*, in the Euro Area (α = 1)

	***i*=4.0%**	***i*=4.5%**	***i*=5.0%**
π=2.0%; γ=1.0%	€2,497bn	€1,644bn	€1,222bn
π=2.0%; γ=1.5%	€6,085bn	€2,932bn	€1,924bn
C_0	€779bn	€771bn	€763bn

Source: Citi Investment Research and Analysis

With 2 percent inflation & real GDP growth of 1 percent, Eurosystem currency monopoly worth about €2 trillion if currency demand is proportional to output; could be as much as €6.8 trillion

What Figure 7 shows is that, even in the most unfavourable case, with inflation at 2.0 percent, real GDP growth at 1.0 percent and a nominal discount factor of 5 percent, the value of the interest saved, *I*, that has to be added to the asset side of the conventional Eurosystem balance sheet is €1,222bn + €763bn = €1,985bn. In the most favourable case, with inflation at 2.0 percent, real GDP growth at 1.5 percent and a nominal discount rate of 4 percent, *I* = €6,085bn + €779bn = €6,864bn. The part of this intangible asset that is not eaten up by the expenses of running the Eurosystem (*E*) can either be paid out (as *T*) to the beneficial owners of the Eurosystem (the national Treasuries and through them the tax payers and beneficiaries of public spending of the Euro Area), or added to the conventional capital of the Eurosystem, *W*, to make up the comprehensive net worth of the Eurosystem, *V*.

As a further check that the numbers we come up with are unlikely to be over-estimates, we also consider the case where the elasticity of currency demand with respect to output, α, is only 0.5. This implies that, other things being equal, the ratio of currency to GDP goes asymptotically to zero as output grows. This feature is clearly counterfactual, and we include it only as an extra safeguard against irrational exuberance in our seigniorage estimates. The results are shown in Figure 7.

Figure 7. Present discounted value of future seigniorage, S, in the Euro Area (α = 0.5)

	i=4.0%	*i*=4.5%	*i*=5.0%
π=2.0%; γ=1.0%	€1,363bn	€1,015bn	€807bn
π=2.0%; γ=1.5%	€1,807bn	€1,281bn	€989bn
π=2.0%; γ=2.0%	€2,479bn	€1,636bn	€1,217bn
C_0	€779bn	€771bn	€763bn

Source: Citi Investment Research and Analysis

Halving output elasticity of currency demand reduces the minimal value of the currency monopoly to €1.5 trillion (could be as much as €3.2 trillion)

Naturally, the numbers are lower than for the case where, at a constant rate of interest, currency demand is proportional to output. But the numbers are still large. In the least favourable case, with 2 percent inflation, 1 percent real GDP growth and a five percent discount rate, the NPV of current and future seigniorage is €807bn. That means that another €1,570bn is added to the asset side of the Eurosystem's comprehensive balance sheet. With 2 percent inflation, a real GDP growth rate of 2 percent and a discount rate of 4 percent, €3,258bn can be added to the assets on the Eurosystem's comprehensive balance sheet.

Although these figures are huge, they are calculated on the assumption that the ECB cannot be pushed into inflating at a rate higher than 2.0 percent per annum. It also assumes, counterfactually, that the Eurosystem derives no seigniorage from the minimum reserves or required reserves it imposes on the Euro Area banks or from the excess reserves the banks hold on deposit with the ECB.

These big numbers for the size of the pockets of the central bank are not restricted to the ECB/Eurosystem. Figure 8 and Figure 9, Figure 10 and Figure 11, and Figure 12 and Figure 13 show the same calculations of the NPV of future seigniorage for the Fed, the Bank of England, and the Bank of Japan, respectively. For a number of parameter combinations, the growth rate of the demand for base money is greater than the discount rate when $\alpha = 1$. This accounts for the 'Infinite!' entries in the Figures.

Figure 8. Present discounted value of future seigniorage, S, in the US (α = 1.0)

	i=4.0%	*i*=4.5%	*i*=5.0%
π=2.0%; γ=1.5%	$6,545 bn	$3,155 bn	$2,071 bn
π=2.0%; γ=2.0%	$Infinite!	$7,614 bn	$3,629 bn
π=2.0%; γ=2.5%	$Infinite!	$Infinite!	$8,719 bn
C_0	$838 bn	$830 bn	$821 bn

Source: Citi Investment Research and Analysis

Figure 9. Present discounted value of future seigniorage, S, in the US ($\alpha = 0.5$)

	i=4.0%	i=4.5%	i=5.0%
π=2.0%; γ=1.5%	$1,944 bn	$1,378 bn	$1,064 bn
π=2.0%; γ=2.0%	$2,667 bn	$1,760 bn	$1,310 bn
π=2.0%; γ=2.5%	$3,885 bn	$2,297 bn	$1,626 bn
π=2.0%; γ=3.0%	$6,371 bn	$3,108 bn	$2,048bn
C_0	$838 bn	$830 bn	$821 bn

Source: Citi Investment Research and Analysis

Fed's currency monopoly worth at least $1.8 trillion; could be as much as $9 trillion because of higher growth rate

Figure 10. Present discounted value of future seigniorage, S, in the UK ($\alpha = 1.0$)

	i=4.0%	i=4.5%	i=5.0%
π=2.0%; γ=1.5%	£298 bn	£143 bn	£94 bn
π=2.0%; γ=2.0%	£infinite!	£346 bn	£165 bn
π=2.0%; γ=2.5%	£infinite!	£infinite!	£396 bn
C_0	£38 bn	£38 bn	£37 bn

Source: Citi Investment Research and Analysis

UK estimates range from £85bn to £443bn

Figure 11. Present discounted value of future seigniorage, S, in the UK ($\alpha = 0.5$)

	i=4.0%	i=4.5%	i=5.0%
π=2.0%; γ=1.5%	£88 bn	£63 bn	£48 bn
π=2.0%; γ=2.0%	£121 bn	£80 bn	£60 bn
π=2.0%; γ=2.5%	£177 bn	£104 bn	£74 bn
π=2.0%; γ=3.0%	£290 bn	£141 bn	£93 bn
C_0	£38 bn	£38 bn	£37 bn

Source: Citi Investment Research and Analysis

Figure 12. Present discounted value of future seigniorage, S, in Japan ($\alpha = 1.0$)

	i=4.0%	i=4.5%	i=5.0%
π=2.0%; γ=1.0%	¥629 trn	¥303 trn	¥199 trn
π=2.0%; γ=1.5%	¥infinite!	¥732 trn	¥349 trn
π=2.0%; γ=2.0%	¥infinite!	¥infinite!	¥838 trn
C_0	¥81 trn	¥80 trn	¥79 trn

Source: Citi Investment Research and Analysis

Japan estimates range from ¥162 trillion to over ¥900 trillion

Figure 13. Present discounted value of future seigniorage, S, in Japan ($\alpha = 0.5$)

	i=4.0%	i=4.5%	i=5.0%
π=2.0%; γ=1.0%	¥141 trn	¥105 trn	¥83 trn
π=2.0%; γ=1.5%	¥187 trn	¥132 trn	¥102 trn
π=2.0%; γ=2.0%	¥256 trn	¥169 trn	¥126 trn
π=2.0%; γ=2.5%	¥373 trn	¥221 trn	¥156 trn
C_0	¥81 trn	¥80 trn	¥79 trn

Source: Citi Investment Research and Analysis

The resources of the ECB and the Eurosystem, like those of all central banks, are ultimately tax payers' money. They accrue to the Euro Area tax payers and beneficiaries of public spending in a rather indirect and opaque way: through transfers from the ECB to the NCBs, from the NCBs to the national Treasuries, and from the national Treasuries to citizens as lower taxes or higher public spending.

The timing of these transfers, at each link of the chain, is also open to discretion. As a result of this, few tax payers and beneficiaries of public

spending are aware of the fact that they are the ultimate beneficial owners of the ECB/Eurosystem. The resources of the ECB/Eurosystem can therefore be used for many different purposes that may or may not serve the interests of the citizens of the Euro Area, without most of these citizens even being aware of it.

It is apparent that the resources of the ECB/Eurosystem are worth fighting over. It is not surprising that the Euro Area fiscal authorities would rather like to get their hands *right now* on some of the €2.0 trillion to €6.9 trillion worth of potential capital stored up in the ECB's comprehensive balance sheet. Even allowing for the cost of running the Eurosystem, the available resources dwarf the size of the three Facilities (€860bn) and the likely cost of recapitalising the Euro Area banking system (estimated by Credit Suisse to be around €90bn, but in our view more likely to be at least €200bn, if the exposure to doubtful sovereigns in the banking book of the banks is allowed for).[16] Of course, using the (non-inflationary) current and future seigniorage resources of the ECB/Eurosystem today means less will be available in the future. That consideration is likely to have limited impact on the desire of the political authorities in the Euro Area to shift the ECB's payments to its ultimate beneficial owners into the present.

9. Conclusion

The resources at the disposal of the leading central banks are vast. In the case of the ECB/Eurosystem, a very conservative estimate yields a figure about 30 times larger than the €78bn capital reported in the Eurosystem's balance sheet. The reason for the difference between the capital reported in the balance sheet and the resources ultimately available to the central bank is its current and future seigniorage — the revenues from the monopoly of base money creation. Even though in our estimates we constrain the central bank not to generate inflation above 2.0 percent per annum, the net present discounted value of the future seigniorage revenues of the leading central banks is awesome.

Even though the fiscal authorities of the Euro Area, the US, the UK and Japan are unlikely to have replicated the calculations reported here, there is no doubt that they are aware of the fact that their central banks could be much more lavish sources of up-front financial resources for cash-strapped governments than they currently are. If the fiscal authorities are unable to extract additional resources directly from their central banks (by raiding the gold revaluation account, say), they can achieve the same temporary relaxation of the government's budget constraint by getting the central bank to engage in quasi-fiscal actions on a larger scale. The ECB/Eurosystem, the Fed (through its myriad special facilities like the TALF and the Maiden Lane, Maiden Lane II and Maiden Lane III SPVs, and the Bank of England (through the SLS) all have engaged in non-trivial quasi-fiscal activities since the financial crisis erupted. But they could do a lot more, say by direct purchases of government debt at prices above fair value, by accepting government debt as collateral in repos and other collateralised transactions on terms that flatter their creditworthiness, and by quasi-fiscal subsidies to banks and other financial institutions that might otherwise have to be recapitalised by the national Treasuries (using methods similar to those that subsidise the government directly).

[16] Source for Credit Suisse estimate: Wall Street Journal, 8 July 2010.

Openness, transparency and accountability may suffer when the central bank is (ab)used for quasi-fiscal purposes, and the legitimacy of the institution can be undermined.

Central banks try to resist these pressures to become quasi-fiscal actors on an ever larger scale, but their ability to resist is limited. Ultimately, the legitimacy of central banks is less than that of elected governments. Central banks can augment their 'output legitimacy' by fulfilling their mandates competently. They can strengthen their 'input legitimacy' by becoming more open and transparent about the full array of their policy actions and about their procedures. None of the leading central banks have provided even a small fraction of the information required to judge the appropriateness and competence of their credit-easing policies (in the case of the Fed and the Bank of England) or of their enhanced credit support policies (in the case of the ECB).

Even if the leading central banks can resist being forced to monetise private or public debt and deficits to the point that their price stability mandates are compromised, the redistribution over time of a given NPV of seigniorage can have major political and fiscal (redistributive) consequences. Even without either raising the NPV of current and future seigniorage or shifting a given NPV of seigniorage forwards in time, the actions of the central bank as lender of last resort, market maker of last resort and quasi-fiscal subsidiser of last resort can redistribute wealth and income among financial institutions and between financial institutions and the rest of the private sector. The pressure is on for central banks to act in ways that relax the government budget constraint. The question is not *whether* central banks will be forced to act as quasi-fiscal actors, but the scale, scope, nature and transparency of their future quasi-fiscal interventions.

In the case of the ECB, the game of chicken between the fiscal authorities and the Eurosystem is plain for all to see. With the ECB/Eurosystem intervening to support the P5 debt markets since 10 May 2010, there is no reason for the Euro Group member states to rush the activation of the EFSF. When the stress test results begin to be reported on 23 July 2010, the EFSF will not yet be operational. Between 23 July and the date the EFSF finally becomes operational, any government other than Greece that needs to borrow because it has to recapitalise one or more of its banks but finds itself locked out of the sovereign debt markets can only turn to the ECB/Eurosystem for funds.[17] We predict that the clearly expressed wish of the ECB to exit from its policy of outright purchases of sovereign debt will not be heeded. That exposure to risky sovereign debt is, of course, but a small fraction of the total exposure to private and sovereign credit risk the ECB/Eurosystem has taken onto its balance sheet since August 2007. The losses suffered by the Eurosystem as a result of its exposure to Lehman and to the Icelandic banks clearly demonstrate the risks involved in central banks moving from the provision to liquidity to the supporting the solvency of banks and governments subject to material credit risk. Our analysis emphasises that the Eurosystem can absorb much larger losses without risking its solvency or undermining the effective pursuit of its price stability target. We don't, however, argue that the resources of the Eurosystem should be used in this quasi-fiscal manner. Openness, transparency and accountability suffer when the central bank is used/abused for quasi-fiscal purposes, and the legitimacy of the institution can be undermined.

[17] We assume that the €60bn EU facility is also not yet ready to supply funds at the speed of crises. The size of this facility is of course small relative to the likely financial needs of undercapitalised banks and their illiquid governments.

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Appendix A-1

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