

Fiscal Effects of Central Bank Recapitalization

Philipp Bagus and David Howden

Philipp Bagus
Universidad Rey Juan Carlos
Email: philipp.bagus@urjc.es

David Howden
St. Louis University – Madrid Campus
Email: dhowden@slu.edu

Date of original submission: 15 January 2014

Date of acceptance: 29 April 2014

Abstract: Monetary authorities enacted novel policies to exit the economic crisis of 2008. Fiscal backing of the monetary authority was important as central banks faced the growing threat of insolvency as unorthodox policies or political events, e.g., a potential Eurozone break up, allowed for central bank balance sheet losses. The fiscal authority has three options to support or recapitalize a central bank, with three resultant secondary effects. First, seigniorage can be foregone as notes and coins are given free of charge to the central bank for distribution (instead of the normal practice of selling them at cost). Second, the Treasury can halt profit remittances from the central bank to its own coffers. Finally, the Treasury can make a direct capital infusion to the central bank in the form of government bonds. We assess these options, and look at secondary effects on government borrowing rates and fiscal resources that result from a recapitalization of a central bank.

Keywords: monetary policy; fiscal policy; central bank independence; insolvency; joint analysis of fiscal and monetary policy

Introduction

The recent crisis of 2008 introduced novel monetary policies with some equally novel secondary fiscal effects. The threat of the zero lower bound (ZLB) for interest rates led central banks around the world to seek alternative stimulus measures. Hindered from provoking higher inflationary expectations, insufficiently low real interest rates hamper the central bank confined by the ZLB. As savers find themselves indifferent between holding low or negative yielding bonds and interest-free cash, aggregate demand is unable to be stimulated. The central bank finds itself in the midst of a liquidity trap.

The revival of deflationary fears has led economists to seek out new ways to implement monetary policy. While there is considerable agreement on how to avoid the liquidity trap, escape from its clutches once caught leaves much controversy (Svensson 2003: 149). Unorthodox monetary measures have left central banks exposed to balance sheet losses. In extreme cases some central banks have become insolvent, as in the cases of Zimbabwe and Tajikistan (Buiter 2008: 10), with others dangerously close as in the case with Iceland (Bagus and Howden 2011: 100). Speculating on the future, a breakup of the Eurozone may lead to the insolvency of the national central banks that are member of the Eurosystem. If Germany left the euro, a new Deutschmark (DM) would likely appreciate sharply. The liabilities of the Bundesbank would be constituted mainly by the monetary base of the new DM, while its assets, mainly TARGET2 credits denominated in euros, would depreciate, reducing the Bundesbank's capital.¹

1 We may view insolvency in two ways. Cash flow insolvency involves an inability to pay obligations as they fall due (more commonly referred to as illiquidity), while balance sheet insolvency involves

A fiscal authority stepping in to proffer a recapitalization when cash flows are strained solves this insolvency problem. This paper assesses some secondary fiscal effects of exiting the liquidity trap through unorthodox monetary policies that threaten the central bank's solvency.²

Central bank independence, far from being the boon that many economists believe, actually limits monetary policy options during times of crisis. Fiscal assurances via the Treasury establish not only a broader range of policy options, but also an increased credibility that the central bank may successfully pursue them. Insolvency becomes less of a binding constraint, as an infusion of Treasury bonds can quickly and easily provide recapitalization.

Central bank insolvency has gained both exposure and importance during the present crisis. No longer confined to the developing world, the recent Icelandic example has demonstrated that economies highly indebted in foreign-denominated liabilities face the stark potentiality of going bust (Bagus and Howden 2011; Howden 2013a, b). Lacking a credible lender of last resort, central banks of countries with similar situations face impotency and eventual insolvency as they lack hard assets to enact monetary policy – countries such as Estonia, Hungary, Latvia, Lithuania and Serbia spring instantly to mind, but Britain, Luxemburg, and Switzerland could also find themselves at risk. Even well-developed central banks with reserve-currency status – the Fed and Eurosystem – face the possibility of insolvency (Bagus and Howden 2009a, b; Bagus and Howden 2014).

Existing literature on fiscal and monetary holding liabilities in excess of assets. Rosa María Lastra (2007) and Buiter (2008: 5) assess the conceptual differences between these two types and implications thereof.

2 Mark Stone *et al.* (2011) provide a summary of unorthodox monetary policies, especially those that have a fiscal dimension to them in the post-2008 world

policy links has focused on four main areas of policy interaction (Svensson 2009): the effectiveness of fiscal stimulus on the real economy, the degree of Ricardian equivalence, the structure of public expenditure, and the distribution between expenditure increases and tax reductions. These areas overlook the secondary fiscal repercussions stemming from central bank insolvency or the threat thereof.

The impotence and eventual insolvency of the monetary authority implies – implicitly or explicitly depending on the country – a rescue by the fiscal authority.³ As a monetary authority would only find itself insolvent under extreme and adverse market conditions, the fiscal authority will likely also be under pressure. We focus on three particular concerns resulting from a Treasury recapitalization of the central bank: 1) the shift of resources from conventional fiscal activity to central bank recapitalization, 2) the upward pressure placed on interest rates of Treasury debt stemming from the increased debt issued to fund the recapitalization, and 3) the effect of reduced government spending as fiscal spending is directed toward the central bank. Finally, as the inflated money supply will place upward pressure on prices prior to the Treasury recuperating the recapitalization funds, the effectiveness of Treasury spending is hampered accordingly.

Central Bank Recapitalization and Resource Shifts

3 America's Federal Reserve System (Fed) operates with an implicit link to the Treasury. Recapitalization by the Treasury is a straightforward process, allowing the Fed to operate with increased assurance that future losses will not lead to insolvency. The European Central Bank (ECB), conversely, lacks this same insulation from market forces, leaving it with no automatic fiscal support availability. This results in relatively fewer options for "unconventional" monetary policy compared to its American counterpart.

As the outstanding liabilities of a central bank exceed its assets, or come dangerously close to doing so, a recapitalization by the Treasury augments its coffers with government debt. Assets would be replenished and monetary policymaking ability restored.⁴

The central bank generally acts as the fiscal agent to the Treasury. In the American system, the Treasury holds a checking account with the Fed through which federal tax deposits and outgoing payments are processed. The Fed sells and redeems government securities – Treasury bonds, notes, and coins – as part of this working relationship.⁵ Specifically, the Bureau of the Mint and the Bureau of Engraving and Printing produce the United States' money supply (notes and coins) and sell them to the Fed at cost (currently around 4 cents per note). The Fed then issues these notes through its member banks to the nation.

The Fed's balance sheet assets are composed, historically and primarily, of U.S. Treasury bills. The Fed remits interest earned on these bills to the Treasury at year-end, net of operating expenses. For the Fed to become insolvent, it would need to suffer a loss on these assets. There are three manners which the fiscal authority can recapitalize a central bank nearing insolvency under such conditions.

First, the Bureaus of the Mint, and of Engraving and Printing, can sell coins and notes to the Fed for distribution at no cost.

4 We need not address the problem of central banks indebted in foreign-denominated or indexed liabilities. Maxwell Fry (1992), Bagus and Howden (2014) and Willem Buiters (2008) address recapitalization difficulties for central banks constrained by these conditions.

5 The Federal Reserve Act prohibits the Fed from buying bonds directly from the Treasury (with the exception of rolling over existing securities). From this the Fed gains an element of independence from the Treasury as it must turn to the open market to purchase government debt.

The Fed currently enjoys a profit spread on the difference between currency purchased from the Mint at cost, and sold to the banking system at par. This profit spread can be increased by decreasing the cost of money supplied to the Fed. The increase in Fed profits can be used to recapitalize itself, instead of being remitted to the Treasury at year end.

There are significant difficulties with this type of recapitalization scheme. First, it falls into the category of “too little, too late.” Devastating effects may already have been incurred by the time a central bank suffers balance sheet insolvency, making this alternative “too late.” Confidence or credibility in the central bank policies as well as currency may evaporate quickly as the quality of its balance sheet decreases (Bagus and Howden 2009a, b). In such circumstances, immediate and strong action is necessary to maintain confidence and credibility. Escape from a liquidity trap imposed by the ZLB involves a central bank credibly promising to be irresponsible with its future inflation path (Krugman 1998). With a full depletion of the central bank’s monetary policymaking abilities, this credible commitment will be lost with detrimental effects on future potential monetary policy – even in the case of a recapitalization. Recapitalization by this method will also be “too little” as it will only provide a diminutive amount of cash to the central bank. Annual seigniorage in the United States is approximately \$25 billion annually, which currently amounts to less than 1% of the Fed’s assets. If the Fed’s cash flow problem is not too pressing, a gradual recapitalization by allowing it to keep this seigniorage will be possible. A more severe loss in the central bank’s capital through asset losses will require a more substantial recapitalization measure than this method can provide.

More importantly for the analysis at hand

is that any recapitalization by the Treasury will impose a cost on the nation’s finances. By selling currency to the central bank at cost, seigniorage normally collected directly by the Treasury will be forwarded to the central bank. This loss of Treasury funding will not be problematic provided that the central bank emerges solvent. Such a scenario merely shifts the Treasury’s budget constraint out into the future. Consider that the Fed remits all net-profit to the Treasury at year-end. If the Treasury gave notes and coins to the Fed at no cost (instead of its current 4-cent premium), the profit spread would still be remitted eventually to the Treasury: when the central bank returns to profitability these remittances to the Treasury would be resumed. The only adverse effect will be *when* the Treasury realizes the seigniorage profit on note and coin issuance. The increased seigniorage profits will allow the central bank to compensate for asset losses in the meantime.

Second, prior to the Fed entering insolvency a reduction or cessation of the remittance payment of its operating profits may be undertaken. The Treasury may forego the remittance of net interest earned on holding government bonds in order to recapitalize it. This remittance is best viewed as a tax on the central bank, as the amount and enforcement of the payment are controlled directly by the Treasury (Buiter 2008: 6). This remittance has been positive every year of the Fed’s existence, though this need is not always the case. The Treasury can make, at any time, the transfer payment negative (effectively eliminating it for a period). The result is a recapitalization mechanism that involves no structural changes to fiscal or monetary authority operating procedures, nor legislative changes to the scope of their operations. As this need not be solely a one-time occurrence, the Treasury can slacken the central bank’s

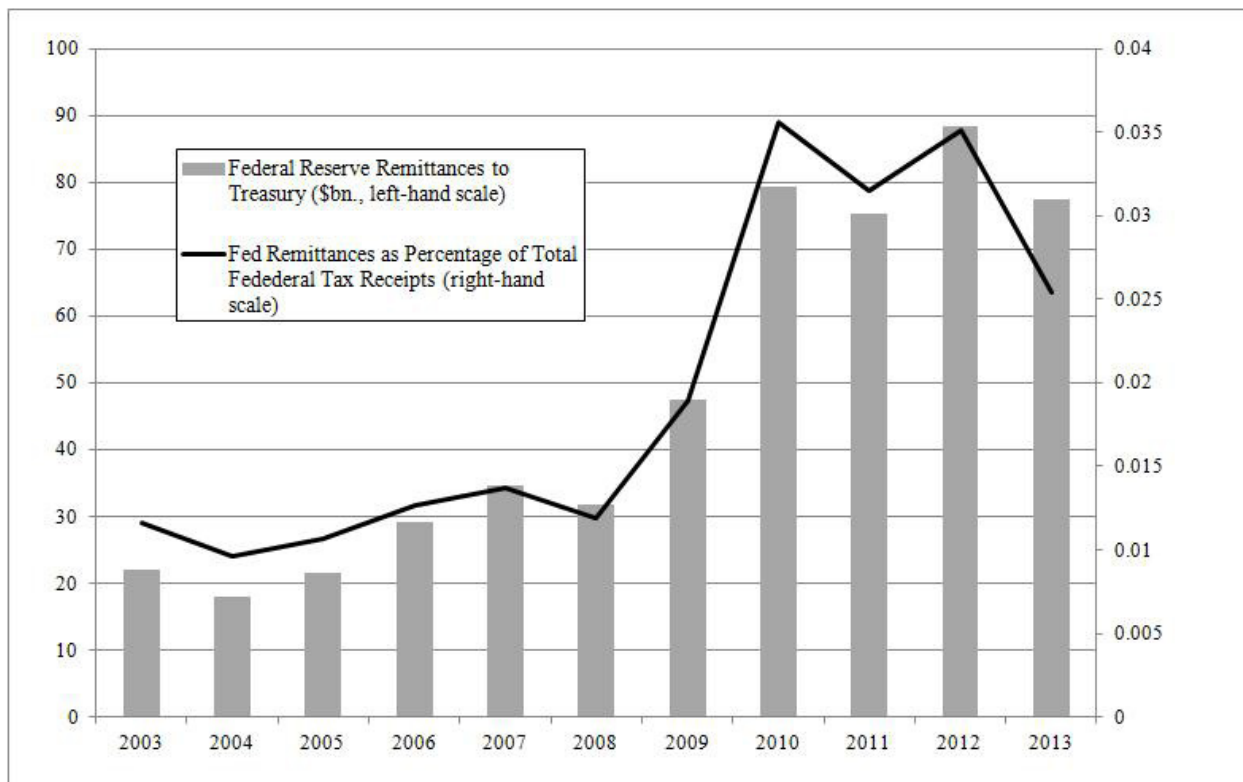


Figure 1: Fed remittances to the Treasury

operating constraint as a one-time aid, or as ongoing assistance.⁶

Two specific effects hinder the fiscal authority's policy objectives. First are the losses incurred as a result of the lack of central bank remittances that are no longer forthcoming. The Treasury can normally expect a sizable funding source by these Fed remittances. Since 2010, for example, the Fed has remitted to the Treasury over \$75 billion each year, and has accounted

for approximately 3.5% of the Federal government's tax-sourced operated funds (figure 1). Although small in relation to the Treasury's total budget, these remittances still represent a sizable funding source, especially during times of crisis. As the Treasury's budget constraint is under considerable pressure during crises due to declines in other tax revenues, any additional funding source relieves its budget strain.

The corollary to this loss of funding is that interest paid on Treasury debt is increased if these remittances end. Foreigners and domestic agents purchase Treasury issued debt. When domestic savers increase their purchases they crowd out private investment. In either case – whether foreign or domestic savers purchase the bonds – interest must be paid accordingly. In the case of domestic savers, government bonds held by the Fed mitigate this effect. As the Fed remits all net profits back to the Treasury, any bonds held by the Federal Reserve System can be issued

6 Buiter (2004; 2005; 2007; 2008), Alain Ize (2005) and Sims (2004; 2005) provide detailed analyses of this mechanism to recapitalize the central bank by shifting its intertemporal budget constraint. This makes it possible that a central bank's present net worth be negative, while maintaining solvency provided the present value of future seignorage is greater than the sum of the future transfer payments to the Treasury and operating expenses (Buiter 2008). With the possibility of a negative transfer payment to the Treasury, a central bank's net worth will allow for continued operations.

essentially interest free (less the operating expenses of the Fed). The Treasury's interest charge is reduced accordingly, allowing it to issue a larger amount of bonds (at the same interest charge) than would otherwise be the case lacking these Fed holdings.

As the Fed halts the net profit remittance to the Treasury, the Treasury finds itself paying an increased amount of interest on its outstanding debt. The Fed remitted \$77.7 billion to the U.S. Treasury in 2013. A Treasury-enacted cessation of this remittance payment would decrease its own funding by the same amount in an attempt to replenish the central bank's capital.

Last, if the central bank finds itself to be balance sheet insolvent, the Treasury may find it necessary to recapitalize it directly. There are two specific avenues that it can pursue. First, a diversion of existing funds can be channeled to the central bank, thus replenishing its reserves. Alternatively, if funding cuts cannot be made anywhere else, the Treasury may decide to increase its debt issuance by the amount necessary for a recapitalization.

Diversion of existing funding creates a strain on the fiscal authority's objectives. Either this diversion causes existing projects to accept budget cuts or proposed projects will need to be forgone. Depending on the specifics of the trimmed-down projects, drastic changes to the economy may result from this reduced fiscal spending.

These three recapitalization schemes – through foregone seigniorage revenue, foregone interest remittances or through a direct recapitalization – all negatively affect the Treasury's finances. The latter alternative is especially controversial as it depends on what one's beliefs are concerning the multiplier effect of fiscal spending. The first two, however, represent salient issues not commonly addressed. The loss of seigniorage, although

minor, could represent a decrease in resources at exactly that time when it is least welcome. Alternatively, the increase in interest charges incurred on Treasury issued debt would occur as a secondary effect, with a tightening of the fiscal authority's budget constraint. In all of these cases a transfer of funds from the fiscal to the monetary authority leaves the Treasury with a tightened budget constraint.

Interest Rate and Inflationary Effects on the Treasury

Central bank recapitalizations affect Treasury interest charges in two ways. First, halting the net profit remittances from the central bank effectively increases the amount of interest *paid* on Treasury debt. Second, an increased bond issuance implies upward pressure on prevailing interest rates.

While the U.S. Treasury collects less than 4 percent of seigniorage revenue today directly through currency issuance, almost 100 percent is indirectly collected through the Fed's net profit remittance. The Treasury can use this seigniorage as a means to reduce the burden of the national debt (Thomas Sargent and Neil Wallace 1981; Douglas Waldo 1984; Wallace 1984). An informal, and indirect, tax is placed on currency users with the proceeds funneling to the Treasury's coffers for eventual use. Any revenue from a tax on the monetary base (i.e., seigniorage), however, is in modern economies a small fraction compared to the size of total government revenue.

Alternatively, the decrease in purchasing power is an additional type of seigniorage that can be used as a means to reduce the burden of the national debt (Jeremy Siegel 1979; Robert Eisner and Paul Pieper 1984). The absolute size of the government's debt is generally many multiples larger than the size of the monetary base being inflated. Inflation-induced changes

in the real value of debt will far outweigh the revenue effect from direct seigniorage.

There is one specific result of monetary policy at the ZLB that affects fiscal policy in previously unexplored ways. To decrease real interest rates sufficiently, the central bank must provide an inflationary shock, or, at the very least, the expectation that future inflation will prevail. One significant problem with private sector beliefs at the ZLB is that they are not easy to affect (Svensson 2003: 150). Svensson's (2003) "foolproof" way exit the liquidity trap at the ZLB largely relies on credible central bank inflationary threats. Particularly, it must commit to continued and elevated inflation targeting as a way to exit the situation successfully.

Somewhat paradoxically, credibility is largely a product of track record. One significant problem with the focus on credibility is that a central bank builds credibility by pursuing low inflation targets, not high ones (Marvin Goodfriend 2007: 63). Most central bankers undertake large efforts trying to anchor consumer expectations to low inflation rates creating problems when they try to change them to the upside. Credibility is also a product of transparency and competence (Moscarini 2007). With the aid of the fiscal authority both of these are easily changed. What is needed is the credibility to act irresponsibly: a large amount of resources are necessary to signal this possibility. Anyone can act irresponsibly; to do so *credibly* and in a controlled manner (i.e., not triggering hyperinflation) requires resources (Peter Stella 2005). Besides the existing assets of the central bank, the fiscal authority can provide these resources.

The return to inflation that is essential for the continued operations of the fiscal authority rests in the hands of the central bank. Credibility is the key. There is no better

way to ensure credibility of this institution than by having a guarantee that it will continue on its chosen policy path, regardless of the circumstances. Specifically, a central bank will undertake operations that are typically viewed as detrimental to the solvency of its balance sheet. By guaranteeing the central bank against insolvency, the fiscal authority can increase confidence among market participants that the central bank's words will be put to action: it will be able to not just talk the talk, but also walk the walk when the time arises.

To some it may seem paradoxical that a Treasury backed by the wealth of a nation would place its own assets at risk by guaranteeing such an undertaking. It is precisely because the central bank's inflationary policy reduces the real value of its debt that the fiscal authority's own longevity is promoted. Unconditionally supporting the central bank is in its best interest.

In a typical "tit for tat" arrangement, the Treasury can give the central bank the ability to act irresponsibly, thus mitigating the credibility issue. In return, the Treasury will see the real value of its nominally-denominated debt reduced through the prolonged inflation provided by the central bank's newfound source of irresponsibility.

Aggravating the Phillips Curve

Unanticipated money supply shocks cause real effects due to sluggish short-term price changes. *When* you receive access to increased funds via an inflated money supply matters almost as much as *if* you get access to these funds at all. Normally, the Treasury allocates funds directly for its own fiscal projects. As it is a primary user of these funds, an unperceived increase in the money supply will allow it to conduct fiscal policy at existing prices. These prices will be lower than the

future inflated prices. Consequently, the fiscal stimulus may have a strong initial effect, as the Treasury is able to allocate funds to projects before the price changes caused by its actions have taken effect. This is one justification for the existence of the short-run Phillips curve whereby inflationary pressures boost short-term output in government-approved projects.

With funds previously earmarked for fiscal projects redirected to the monetary authority to prevent insolvency, the situation is altered. Now a portion of Treasury funding no longer enjoys the first-mover advantage regarding price changes. The central bank gains access to the newly appropriated funds and this will only filter its way to the Treasury later. The recapitalization of the central bank will have occurred with the implicit reason of saving the financial system from meltdown and contagion. If this also salvages the financial system, the funds will eventually find their way back to the Treasury's coffers through tax revenue.

This process may require, however, a prolonged amount of time. The current crisis, for example, has seen an increase in excess bank reserves. The unique outcome is that the increase in excess reserves are surely being held because of increased uncertainty.⁷ This is also exactly what the Treasury would like to see done with the assets that the Fed has purchased to expand its own balance sheet. While the Treasury is not currently receiving any stimulus from these excess reserves, it will eventually be able to realize increased tax revenue once the reserves are lent out and invested.

In the meantime the Treasury will be

⁷ Alternatively, Todd Keister and James McAndrews (2009) provide evidence that the total level of reserves held is not endogenously determined by the banking system, but is exogeneously determined by the Fed. The high level of excess reserves tells us little about individual bank expectations, but much about the size of the Fed's initiative.

forced to make do with decreased fiscal policy effectiveness. Instead of being the first user of any increased funds in the money supply – e.g., through an increase in government debt issuance, the Treasury will only become a later user. This later date involves the crux of the problem as it may imply an inflated price level that. As a result, a dollar of fiscal policy will not go as far as it did before. The decrease in the purchasing power of a dollar through inflation reduces the effectiveness of fiscal policy accordingly.

To the degree that more Treasury funding must be allocated to the central bank to avoid insolvency, fiscal stimulus will be of reduced effectiveness. Inflationary adjustments between the time the Treasury recapitalizes the central bank and when it finally recuperates this “investment” will place upward pressure on the price level. Each dollar of fiscal stimulus will have a diminished effectiveness compared to if it were used directly on fiscal activity.

A Conclusion, and a Melding of Policy Options

The zero lower bound of interest rates creates a liquidity trap; monetary policy by itself is unable to perform its stated goals. This paper has reviewed some of the more salient features that collaboration between monetary and fiscal authorities implies, and which have been largely overlooked until now. One result of recent unorthodox monetary policies is that several central banks are now facing the possibility of balance sheet insolvency, while many others are faced with the possibility that their policies will be sterile in light of the ZLB.

With the threat of central bank insolvency looming large, three effects will hinder fiscal authorities as they recapitalize their monetary counterparts.

First, the Treasury can shift resources to

the central bank during a recapitalization in one of three ways.

- 1) The Fed purchases notes and coins directly from the Bureau of Minting at a fraction of its cost. The seigniorage profit it earns on the difference is usually remitted back to the Treasury at year-end. Remittance of seigniorage can be halted in the event of a required recapitalization. The result is a reduction in one funding source that the fiscal authority currently enjoys (albeit, a relatively small source).
- 2) The Fed remits net profits, including profits earned on government debt, back to the Treasury at year end. The Treasury may gradually recapitalize a central bank by halting this payment, allowing its balance sheet to be rebuilt slowly. A significant funding source will be lost in this case, and the Treasury will have to either find alternative funding sources (e.g., higher taxes) or decrease fiscal outlays to compensate.
- 3) Central bank insolvency may be so imminent that a direct recapitalization by the Treasury seems warranted. Indeed, some central banks may now find themselves near to this position. This decrease in Treasury resources will imply, as in the previous outcome, either increased deficit spending or decreased fiscal stimulus. If the former option is pursued, the Treasury must be prepared to issue bonds at higher interest rates than before. A strain on Treasury funding occurs exactly when a recession has already caused other funding sources – mainly the tax base – to decrease.

The second effect hindering the fiscal authority as it recapitalizes its monetary counterpart is that when constrained by the

ZLB, fiscal support aids central banks and gives their policies credibility. Commitment to pursue reckless monetary policies is one of the few ways that a central bank can escape a liquidity trap. A lack of success implies either failure (as the best-case scenario) or insolvency (in the worst-case). By guaranteeing a central bank, the fiscal authority can help ensure that the central bank achieves its inflationary goals. In return, the fiscal authority receives a continual reduction in the real debt burden through inflation.

Finally, we have seen that any Treasury recapitalization of a central bank will imply reduced effectiveness of its fiscal policies. As the price level will adjust prior to undertaking any fiscal investments, each stimulus dollar will have reduced effectiveness compared to if the Treasury had used it directly.

A Treasury recapitalization of the monetary authority may not be necessary, as there is one unexplored alternative still open. The central bank may pursue an unorthodox, and wholly fiscal, procedure of assigning a tax to the money it issues. In this way, it may recapitalize itself without external assistance. More importantly, the Treasury can avoid any negative fiscal effects if such a path is pursued.

How would such a tax work? Buiter and Nikolas Panigirtzoglou (1999), Goodfriend (2000) and Buiter (2009: 25-28) propose taxing monetary transactions and bank reserves. Such a tax allows for negative nominal interest rates, which may allow the central bank the ability to use negative real interest rates to escape the liquidity trap.

Although offering much aesthetic appeal, this solution is less than feasible. While this option is technically possible on electronic transactions and bank reserves, consumer cash usage is decidedly more difficult to tax. Technological innovations such as notes embedded with electronic chips or a lottery to

determine what numbered notes in a series to be retired each period may make this option available someday (Svensson 2003: 154). Fiat money derives its value from the public's acceptance as a medium of exchange, aided by its status as legal tender. A critical degradation in fiat money's acceptability may occur if some notes are systemically deprived of their legal tender status, with detrimental effects on its value. Additionally, such an action would create great inconveniences in differentiating between notes of the same denomination, but trading at different discounts. Public

resentment toward a system making one person's dollar bill worth more than another's also adds a flavor of political infeasibility.

Until such a time that the monetary authority is able to implement fiscal policy directly and independently, we will have a separation of the functions. Given this limitation, we see a clear motivation for collaboration between the fiscal and monetary authorities, especially when constrained by a crisis.

References

- Bagus, Philipp, and David Howden. 2009a. The Federal Reserve and Eurosystem's Balance Sheet Policies During the Financial Crisis: A Comparative Analysis. *Romanian Economic and Business Review* 4(3): 165-85.
- Bagus, Philipp, and David Howden. 2009b. Qualitative Easing in Support of a Tumbling Financial System: A Look at the Eurosystem's Recent Balance Sheet Policies . *Economic Affairs* 29(4): 60-65.
- Bagus, Philipp, and David Howden. 2011. *Deep Freeze: Iceland's Economic Collapse*. Auburn, AL: Ludwig von Mises Institute.
- Bagus, Philipp, and David Howden. 2014. Central Bank Insolvency: Causes, Effects and Remedies. *Journal of Social, Political and Economic Studies* 39(1): 3-23.
- Buiter, Willem H. 2004. Two Naked Emperors? Concerns About the Stability and Growth Pact and Second Thoughts About Central Bank Independence. *Fiscal Studies* 25(3): 249-277.
- Buiter, Willem H. 2005. New Developments in Monetary Economics: Two Ghosts, Two Eccentricities, a Fallacy, a Mirage and a Mythos. *The Economic Journal* 115(502): C1-C31.
- Buiter, Willem H. 2007. Seigniorage. *Economics – The Open-Access, Open-Assessment E-Journal* 1.
- Buiter, Willem H. 2008. Can Central Banks Go Broke? *Centre for Economic Policy Research, Policy Insight* No. 24, (May).

- Buiter, Willem H. 2009. Negative Nominal Interest Rates: Three Ways to Overcome the Zero Lower Bound. *National Bureau of Economic Research*, working paper no. 15118.
- Buiter, Willem H., and Nikolas Panigirtzoglou. 1999. Liquidity Traps: How to Avoid Them and How to Escape Them. *National Bureau of Economic Research*, working paper no. 7245.
- Eisner, Robert, and Paul J. Pieper. 1984. A New View of the Federal Debt and Budget Deficits. *American Economic Review* 74(1): 11-20.
- Fry, Maxwell J. 1992. Can Central Banks Go Bust? *The Manchester School of Economics & Social Studies* 60 (Supplement): 85-98.
- Goodfriend, Marvin. 2000. Overcoming the Zero Bound on Interest Rate Policy. *Journal of Money, Credit, and Banking* 32(4): 1007-1035.
- Goodfriend, Marvin. 2007. How the World Achieved Consensus on Monetary Policy. *Journal of Economic Perspectives* 21(4): 47-68.
- Howden, David. 2013a. Separating the Wheat from the Chaff: Icelandic and Irish Policy Responses to the Banking Crisis. *Economic Affairs* 33(3): 348-60.
- Howden, David. 2013b. The Rise and Fall of the Icelandic Economy. *The Journal for Social, Political, and Economic Studies* 38(4): 389-424.
- Ize, Alain. 2005. Capitalizing Central Banks: A Net Worth Approach. *International Monetary Fund*, working paper WP/05/15.
- Keister, Todd, and James McAndrews. 2009. Why Are Banks Holding So Many Reserves? *Federal Reserve Bank of New York Staff Report*, no. 380.
- Krugman, Paul R. 1998. It's Baaack: Japan's Slump and the Return of the Liquidity Trap." *Brookings Papers on Economic Activity* 2: 137-87.
- Lastra, Rosa María. 2007. Cross-border Bank Insolvency. European Bank for Reconstruction and Development, *Law in Transition Online*. [Available] <http://www.ebrd.com/pubs/l egal/lit072h.pdf>
- Moscarini, Giuseppe. 2007. Competence Implies Credibility. *American Economic Review* 97(1): 37-63.
- Sargent, Thomas and Neil Wallace. 1981. Some Unpleasant Monetarist Arithmetic. Federal Reserve Bank of Minneapolis, *Quarterly Review* 5: 1-17.

- Siegel, Jeremy J. 1979. Inflation-Induced Distortions in Government and Private Savings Statistics. *Review of Economics and Statistics* 61(1): 83-90.
- Sims, Christopher A. 2004. Fiscal Aspects of Central Bank Independence. In *European Monetary Integration*, Hans-Werner Sinn, Mika Widgrén and Marko Köthenbürger, (eds.), pp. 103-116. Cambridge, MA: MIT Press.
- Sims, Christopher A. 2005. Limits to Inflation Targeting. In *The Inflation-Targeting Debate*, Ben S. Bernanke and Michael Woodford, (eds.), pp. 283-310. NBER Studies in Business Cycles, vol. 32.
- Stella, Peter. 2005. Central Bank Financial Strength, Transparency, and Policy Credibility. *IMF Staff Papers* 52(2): 335-365.
- Stone, Mark, Kenji Fujita, and Kotaro Ishi. 2011. Should Unconventional Balance Sheet Policies be Added to the Central Bank Toolkit? A Review of the Experiences So Far. *IMF working paper* WP/11/145.
- Svensson, Lars E. O. 2003. Escaping from a Liquidity Trap and Deflation: The Foolproof Way and Others. *Journal of Economic Perspectives* 17(4): 145-66.
- Svensson, Lars E. O. 2009. *Monetary Policy with a Zero Interest Rate*. Speech at the Sveriges Riksbank, February 17th. Stockholm: Sweden.
- Waldo, Douglas G. 1985. Open Market Operations in an Overlapping Generations Model. *Journal of Political Economy* 93(6): 1243-1257.
- Wallace, Neil. 1984. Some of the Choices for Monetary Policy. Federal Reserve Bank of Minneapolis, *Quarterly Review* (Winter): 15-24.