Why central banking should be re-imagined

Perry Mehrling[1]

Why does central banking need to be re-imagined?

The urgency of the task arises from the experience of the Global Financial Crisis, during which central banks intervened in dramatically new ways and to a dramatically greater degree than ever before, at least in peace time. Central banks invented new tools on the fly, because the familiar old tools were not working. Now the crisis is over comes the important intellectual task of understanding how these new things fit within the standard pre-crisis toolkit. Just so, Borio and Disyatat (2009) distinguish between the old "interest rate policy" and the new "balance sheet policy", urging us to understand the latter as, on the one hand, nothing more than an extension of traditional techniques of FX intervention to a broader asset class and, on the other hand, nothing more than use of the central bank balance sheet to implement debt management policy that is more traditionally undertaken by the Treasury. The present paper can in part be understood as a critical but sympathetic reconsideration of this early appraisal.

But the challenge of re-imagining central banking is not just because of the crisis. In retrospect, the crisis can be viewed as the first full-fledged test of the emergent system of financial globalisation, which had been building bit by bit for three decades at least. The "financial" dimension of this construction has involved ever-increasing integration of capital markets with money markets; so-called "shadow banking", which is to say money market funding of capital market lending, is the quintessential institutional form of this new construction (Mehrling et al (2013)). Meanwhile, the "globalisation" dimension has involved ever-increasing integration of funding markets with the central dollar funding market. Not only is the dollar the world's reserve currency, but the dollar money market is also the world's funding market, and the dollar money market is linked to all other funding markets through the foreign exchange markets, all of which are backstopped to varying degrees by national central banks (Mehrling (2013)). Either of these developments alone would have warranted re-imagining central banking, even had there been no crisis.

A great deal of what needs to be re-imagined concerns narrowly technical matters, of course, but it is important to appreciate that the challenge of re-imagining central banking is not merely technical. Indeed the political economy challenge is just as great, perhaps even greater. In the heat of the moment, central banks acted substantially on their own, and the backlash from this perceived overreach has been significant and may even be gathering strength. In the United States, in particular, central banking has always been a highly suspect enterprise, embodying as it does the three biggest bogeymen of American politics: Big Finance, Big Government, and the Big Wide World. Other countries face their own political economic challenges, but the central role of the dollar in the global funding system, and the central role of the US Federal Reserve System as ultimate backstop of that

[1] Institute for New Economic Thinking, and Barnard College, Columbia University.

system, renders the US political economic challenge of larger global concern. The task of re-imagination is also a task of re-legitimation.

In peacetime, when the special role of central banks in facilitating war finance recedes from memory, the legitimacy of central banking derives from its success in putting bounds on what Ralph Hawtrey famously called the "inherent instability of credit" (Hawtrey (1913)). Before the business cycle, there was the credit cycle, in which a credit-fuelled economic upturn tended to feed upon itself on the way up in a euphoric but unsustainable expansion until it hit some supply constraint or other, whereupon a self-reinforcing downturn would commence. The most fundamental task of central banking is to put a floor on such downturns, so sustaining economic activity during the period of necessary restructuring that follows any boom; this is the classic "lender of last resort" role. A more refined task is to "lean against the wind", with the idea of slowing unsustainable booms in order to reduce their euphoria-driven inefficiency and extend the period of expansion, while shortening the period of contraction on the way down; this is classic "monetary policy".

In classic central banking, instability is an endogenous feature of the credit system, a feature inherent to all forms of credit and the central justification for expert management in the public interest. A perennial challenge for that management is the tendency of the specific mechanism of instability to change over time as the institutional structure of the underlying economy changes. Just so, Hawtrey (1932) was primarily concerned with a cycle driven by credit-financed trade inventories, while Hyman Minsky (1986) was concerned with a cycle driven by credit-financed business investment. For our own times, the bank-loan channel of credit has been substantially replaced by a capital-market channel, while free international capital flows provide global funding for domestic credit expansion. And yet, despite these institutional changes, the inherent instability of credit clearly survives, as the financial crisis so abundantly proved. The challenge for modern times is to devise mechanisms of stabilisation, both last resort and monetary policy, for expert management of the modern mechanism of instability.

The ever-present danger, in our own time just as much as in Hawtrey's, is the prospect of rewarding bad behaviour. This is a technical problem, of course, but also a political economy problem. Bankers inevitably urge the systemic importance of their own personal survival in the downturn, even while they resist purportedly misguided interference on the way up. The political economy challenge was bad enough back when the cycle was bank-based and domestic; with practice we learned how a public-spirited central bank could, at least in principle, bring to heel the self-serving agendas of profit-seeking banks. But the problem is much more difficult in modern times when the cycle involves capital market finance at a global level. Individual national central banks, however public-spirited they might be, are no match for the self-serving agendas of globe-straddling modern banks, much less their non-bank penumbra, and anyway what is public interest at the national level may be quite a different thing from public interest at the international level.

The dream of a full-fledged global analogue to domestic political equilibrium between the money interest and the public interest seems likely to remain just that, a dream. But partial analogues are not only possible but also seem actually to be emerging in various sub-global organisational forms for central bank cooperation, both at the top of the hierarchy (central bank swap lines) and farther down (regional cooperation such as Chiang Mai and the European Monetary System). For the purposes of this paper, we take these emerging structures of a new international

monetary system for granted, and focus instead on the re-invention or re-imagination of the role of individual central banks within that system.

What do central banks do?

Discussion about the role of central banking commonly distinguishes three areas of responsibility: lender of last resort, regulation and supervision, and monetary policy for macroeconomic stabilisation. It is natural therefore to organise the re-imagination task by asking how emergent financial globalisation challenges the role of central banks in each of these three dimensions.

Lender of last resort

In previous work, I have characterised the evolution of central bank last resort intervention during the crisis as a matter of three stages (Grad et al (2011)). First came aggressive monetary easing as the Fed cut the Fed Funds target from 5% to 2% in the months before Bear Stearns; then came lender of last resort as the Fed liquidated its holdings of Treasury bills and lent the proceeds to a wide variety of counterparties against a wide variety of collateral; and then, after Lehman and AIG, came a stage that I have called dealer of last resort (Mehrling (2011), see also Buiter (2007) and Tucker (2009)).

In this third stage, the Fed finally put a floor on the crisis by intervening as a market-maker, first in the short-term money market, where it served as the central counterparty standing between borrowers and lenders who were no longer willing to do business bilaterally, and then in the long-term capital market, specifically in the market for mortgage-backed securities where the Fed was for a while purchasing 90% of all new issues in an effort to get that market going again. In the process, the Fed's balance sheet ballooned to three times its pre-crisis size, even while private bilateral credit markets shrank by even more. This third-stage dealer of last resort intervention is the biggest new thing that requires re-imagination.

In an important sense, dealer of last resort is merely a modern version of the classic Bagehot Rule for lender of last resort, which famously urged lending freely at a high rate against security that would be good in normal times. The natural analogue for today's dealer of last resort would urge trading freely at a wide bid-ask spread, against good security in the money market and in the class of good securities in the capital market. Analogously to the high rate of the Bagehot Rule, the purpose of the wide (or outside) spread is to ensure that the intervention is only supporting, not replacing, the market until it recovers and begins to trade again at a narrower (inside) spread.[2] Such intervention is thus, in principle, self-liquidating; after the crisis is over, counterparties on both sides of the central bank balance sheet should be able to find better pricing by doing business with each other directly. And as counterparties find one another, private credit should expand in line with central bank balance sheet contraction, in principle eventually back to normal.

In some respects, this self-liquidation channel for exit was operative, as for example in the case of the Commercial Paper Funding Facility. But it was hard to

[2] Last resort trading at prices away from fundamentals also works to mitigate moral hazard problems.

notice that exit in the aggregate data because it was overwhelmed by other interventions, specifically so-called quantitative easing, which sought to stimulate the economy more generally by pushing around interest rates and asset prices. This latter kind of intervention is monetary policy, not lender of last resort, and so requires separate discussion. The important point for now is simply to appreciate the consequence of dealer of last resort intervention for both the size and the composition of the central bank balance sheet.

The Fed's balance sheet, before and after the crisis, is shown below:

Federal Reserve (4 July 2007), in trillions				Federal Reserve (6 July 2011), in trillions			
Assets		Liabilities		Assets		Liabilities	
Treasury securities	$.79	$.82	Currency	Treasury securities	$1.6	$1.0	Currency
		.01	Reserves	Mortgage securities	1.0	1.6	Reserves
Other	.12	.08	Other	Other	.2	.2	Other
TOTAL	$.91			TOTAL	$2.8		

Here we see both the tripling in the overall size of the balance sheet, and the change in composition by the addition of mortgage securities. But the dealer function of the central bank does not emerge very clearly in this way of presenting the numbers.

To see the connection between central banking and modern financial markets it is more illuminating to present the numbers as a series of swap exposures, by adding short-term T-bills and long-term T-bonds to both sides of the balance sheet, and rearranging as follows:

Federal Reserve (6 July 2011), in trillions, restated			
Assets		Liabilities	
[Treasury bills	$2.6	$2.6	Currency/reserves]
[Treasury bonds	$2.6	$2.6	Treasury bills]
[Risky securities	$1.0	$1.0	Treasury bonds]
Other	.2	.2	Other

In this way of looking at the numbers, three fundamental risk exposures can be distinguished. The first line shows a kind of overnight index swap, in which the Fed receives the three-month T-bill rate and pays an overnight money rate. The second line shows a kind of interest rate swap, in which the Fed receives a fixed long rate and pays a fluctuating short rate. And the third line is a kind of credit default swap, in which the Fed receives the risky rate and pays the risk-free rate.[3] In all three cases, the Fed has taken on risk exposures, and so made prices for those risk exposures, at a time when private profit-seeking dealers were unable or unwilling.

[3] Compare Borio and Disyatat (2009, Table 1, p 7) which proposes a typology of balance sheet policy that distinguishes between "Bank reserves", "Public debt/securities", "Private debt/securities", and "Foreign exchange". In the swap exposure typology, "Foreign exchange" exposure would be booked as an FX swap.

The point to emphasise here is that these exposures, and their scale, arose as a consequence of dealer of last resort intervention (Mehrling (2011)). Even more, they arose in more or less this order, the money market swap first and then the capital market swaps afterwards. In both cases, the Fed in effect quoted an outside spread, and then let its balance sheet absorb the inventories of risk exposure. The first stage concerned the term funding market, whose acute dysfunction was tracked by the LIBOR-OIS spread (Swagel (2009)), until it was backstopped by expansion of the Fed's OIS swap exposure. As money markets recovered, however, the OIS exposure was not allowed to run off but rather was rolled over and expanded by replacing short-term loans with longer-term and riskier bonds in an attempt to backstop dysfunction in the RMBS market.

Subsequently, all three exposures were expanded by quantitative easing to arrive at the current balance sheet, which is shown below for completeness, although discussion of monetary policy is deferred to a later section. The important point to emphasise for now concerns the fourth line of the restated balance sheet, which shows the Fed's current reverse repo "exit strategy" combined with the Treasury General Account (swollen temporarily on account of the tax season). The restated balance sheet shows clearly how the Fed's current exit strategy is in effect focused on reducing its overnight index swap position, *not* the interest rate swap or credit default swap positions, which apparently it intends to hold to maturity.[4] Observe that, if the Fed actually held any Treasury bills outright, it could easily reduce its OIS position simply by selling those bills, but it does not hold any Treasury bills. As a consequence it is forced to resort instead to term borrowing that, in effect, nets out against its implicit Treasury bill exposure. All of this is much clearer in the swap exposure accounts than in the standard accounts.

Federal Reserve (23 Apr 2014), in trillions				Federal Reserve (23 Apr 2014), in trillions, restated			
Assets		Liabilities		Assets		Liabilities	
Treasury securities	$2.3	$1.3	Currency	[Treasury bills	3.9	3.9	Currency/reserves]
Mortgage securities	1.7	2.6	Reserves	[Treasury bonds	4.2	4.2	Treasury bills]
		.2	Reverse repo	[Mortgage securities	1.7	1.7	Treasury bonds]
		.1	Other	[Treasury bills	.3	.3	Reverse repo/other]
TOTAL	4.2						

The central question raised by looking at matters through a swap exposure lens is whether the exit strategy *should* be focusing on the OIS position first, or whether it might better focus on the IRS and CDS positions.[5] From a purely operational standpoint, of course, swapping bonds for bills first (ie exiting IRS) would make it easier to exit the OIS position second. But from a deeper point of view as well, it might be argued that a market-based credit system requires market pricing of

[4] An alternative interpretation of the reverse repo facility is that it is intended to provide direct liquidity support to the non-bank sector, rather than relying on indirect support through bank intermediation.

[5] Borio and Disyatat (2009) in effect endorse exit from OIS first, on two grounds. First, such exit would enable desired reversion from Scheme 2 (market interest on reserves) to Scheme 1 (below-market interest on reserves). Second, liquidation of the other swaps would likely involve taking capital losses, with unknown political economy repercussions.

capital assets as a prerequisite for market funding. The assets are collateral for the funding, and if the market does not believe the asset prices then it's going to be pretty hard to get the funding, and if the private sector won't fund private holding of the Fed's asset positions then exit is *de facto* impossible. During the crisis, the Fed was essentially forced to bring the shadow banking system onto its own balance sheet and there it will remain until private balance sheets are willing to take it back.

So far, our discussion has focused on the balance sheet of the Federal Reserve in isolation from other central banks, but in fact most of the other important central banks experienced similar balance sheet changes, because the crisis was global. The crisis was global because money market funding is global, but the collapse of shadow banking onto the traditional banking system was local (national), depending on which particular nationally domiciled bank had the responsibility of rolling over the money market funding of a given shadow banking entity. Behind each of these nationally domiciled banks was a national central bank, which found itself responsible for rolling over funding in a foreign currency. The crisis thus made it apparent that financial globalisation requires a *global* lender (and dealer) of last resort.

Because the funding of the global shadow banking system was reliant on the Eurodollar market, the question of global lender of last resort was really a question about backstop for that market. Although spot Eurodollars never broke the buck against spot Fed Funds, term Eurodollars did diverge strongly. After Bear Stearns, that divergence was capped for a while, presumably through foreign central bank support with implicit Fed backstop. But then, after Lehman and AIG, the implicit Fed backstop got triggered and became explicit to the tune of $600 billion in central bank liquidity swaps.

It is thus clear that re-imagining central banking requires at a minimum building out this central bank swap facility, and the first steps in that direction have already been taken. The decision in October 2013 to establish permanent unlimited swap lines between the C6 – the Fed, the European Central Bank, the Bank of Japan, the Bank of England, the Swiss National Bank and the Bank of Canada – is part of that re-imagining, as also is the Bank of England's new expanded liquidity insurance facilities (Bank of England (2013))[6]. What is emerging is a dealer of last resort system for the world money market that operates through a consortium of central banks, not exclusively the Fed. Given the swap line backstop, there is now nothing to prevent any central bank from lending in dollars to its own nationally domiciled banks by creating its own dollar liabilities.[7] The next step is to integrate other currencies into this system, not so much by expanding membership in the C6 as by implementing bilateral swaps with particular members of the C6, or with the IMF. There remains a lot of work to be done, but the experience of the crisis has given clear direction for re-imagining the lender of last resort function for a financially

[6] Quite properly the new liquidity insurance facilities are characterised as experimental. It is important to appreciate that the most important dimension of experimentation concerns pricing. Here the idea that central banks want to be providing an outside spread, not an inside spread, is crucial for avoiding mispricing.

[7] It should perhaps be noted that the emergent system appears *not* to be the multipolar system imagined by many academic authors. It is still very much a dollar system, but with responsibility for backstop distributed across the C6 rather than exclusively held by the Fed. The crisis has made clear to everyone that no individual central bank, including the Fed, is prepared to serve as global lender of last resort.

globalised world. This emergent system recognises the essential fact that liquidity is a public good, indeed a global public good.

Regulation and supervision

Acceptance by central banks of their role in providing this vital public good inevitably provides the lens through which questions of regulation and supervision will be viewed henceforth. Central banks now recognise that any financial crisis in the new market-based credit system will inevitably land on their own balance sheets, so they have an incentive to build supervisory and regulatory structures that reduce the likelihood of financial crisis in the first place. To date, the main thrust of policy discussion has been to find ways to increase capital buffers throughout the system so as to safeguard the public purse, including quite significant global coordination to head off regulatory arbitrage across jurisdictions. This effort is well intentioned, and in places necessary, but it is quite definitely not sufficient. Capital buffers do little to safeguard against a liquidity-driven downward spiral, and currently the existing buffers seem to be operating mainly to suppress credit expansion. Re-imagining central banking means going beyond capital buffers.

The figure below provides one framework for thinking about the underappreciated liquidity dimension of the problem (Mehrling et al (2013, Figure 1).

A market-based credit system

Capital funding bank		Global money dealer		Derivative dealer		Asset manager	
Assets	Liabilities	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
RMBS	MM funding	MM funding	"deposits"	CDS	CDS	"deposits"	Capital
CDS				IRS	IRS		CDS
IRS				FXS	FXS		IRS
FXS							FXS

In this idealised map of the shadow banking system, money market funding of capital market lending takes place in so-called capital funding banks. To focus attention on liquidity issues, we suppose that the solvency issues of capital funding banks have been resolved by a robust system of risk transfer using derivatives. By construction, the CFB perfectly hedges all credit risk, interest rate risk, and foreign exchange risk, so that the only remaining risk is rollover funding risk.

As the figure makes clear, in a market-based credit system, the key to funding rollover is the dealer system that makes markets, including both the global money dealer, who makes money markets, and the derivative dealer, who makes the risk markets that establish the price of collateral. The recent regulatory move to organise the trading of swaps on exchanges, with explicit clearing house backstops to guarantee performance, represents a positive first step toward increasing the robustness of the private dealer system. The central argument for this move has been the importance of price transparency, but it should be clear that the same move is also important from a liquidity point of view. Centralisation of risk is key to management of risk; one lesson of the global financial crisis is that decentralisation of risk is not the same thing as diversification of risk!

In a market-based credit system, one wants to backstop asset markets, not individual institutions. A clearing house that guarantees the performance of its members has the incentive to put into place regulations that ensure that performance, as well as to hold sufficient liquidity reserves and backstop credit lines to enable it to continue to perform even if individual members fail; the central bank stands in the wings as lender/dealer of last resort. (Pricing of the central bank backstop is key to avoiding moral hazard.) The too-big-to-fail problem comes substantially from the fact that, until now, there has been no central clearing mechanism, so that the only way to backstop markets (a legitimate public good) has been to backstop individual dealers (not a legitimate public good). In future, given adequate support of the dealing system as a whole, individual dealers can be allowed to fail without fear of triggering downward liquidity spirals.

The move toward central clearing counterparties is however only a first step. At present the system of risk transfer in the real world is far from the perfection assumed in the figure for the ideal case; indeed, if any one flaw can singled out as the Achilles heel of the pre-crisis shadow banking system it would have to be the system of risk transfer, which largely involved re-purposing instruments and mechanisms, such as tranching and securitisation, that had originally been designed with quite different uses in mind. Not surprisingly, the resulting Rube Goldberg machine collapsed once it came under pressure.

In this respect, the move in regulatory circles toward reducing complexity is clearly on the right track, although it is perhaps insufficiently appreciated that derivatives may be part of the solution, not just part of the problem. (Just as, in my idealised shadow banking system, derivatives are assumed to effect perfect risk transfer so that the capital funding bank is perfectly hedged.) Keeping in mind the overarching objective of facilitating market pricing of the key dimensions of risk could help give direction to an otherwise unfocused attack on the overgrown financial shrub, an attack that otherwise risks pruning away essential stems instead of just unnecessary deadwood and congestion. There is a legitimate need for risk transfer; the challenge is to find better ways to effect that transfer.

Stabilisation

Before the crisis, the debate about stabilisation policy had achieved an extraordinary degree of refinement, and also of consensus focused narrowly on the use of interest rate policy to achieve an announced inflation target. Inflation targeting was supposed to work by stabilising expectations of the long-run price level, thus providing an anchor whereby private credit markets could find equilibrium. Unfortunately, this consensus wound up losing sight of the inherent instability of credit, a phenomenon ruled out by assumption in the general equilibrium models that guided policy. Meanwhile the crisis amply demonstrated that market-based credit is just as much prone to instability as bank-based credit. The first answer to the crisis involved re-imagining the lender of last resort, followed by supervision and regulation to ensure the robustness of private lenders of first resort. The task of re-imagining monetary policy comes next.

In a world of highly developed financial markets, there is a very real question why central banks have any leverage at all in ordinary non-crisis times. Indeed, the standard Brainard-Tobin framework depends crucially on market imperfections. As Tobin (1969, p 26) himself states explicitly: "If the interest rate on money, as well as the rates on all other financial assets, were flexible and endogenous, then ….there

would be no room for monetary policy to affect aggregate demand." But this is a feature of their model, not the world. The framework of Borio and Disyatat (2009) importantly diverges from Brainard-Tobin in one crucial respect, by introducing the settlement constraint in the payments mechanism, a constraint that the central bank can relax because the ultimate means of payment is its own liability. Even in a world of developed financial markets, this feature is the key source of central bank leverage over the overnight interest rate, since the overnight rate is simply the price of putting off settlement for a single day.

Here's how it works. Every day, agents who are in deficit at the clearing have to find a way to convince agents who are in surplus to help them settle, either by buying one of their assets (at a price) or by extending them credit (at a price). By targeting the overnight rate, monetary policy works essentially by relaxing or tightening the ultimate payment constraint, which is to say by making it easier or harder for deficit agents to delay settlement. Arbitrage then connects the overnight rate to longer-term rates, and also connects the rates in one currency to the rates in other currencies.[8] Control of the overnight rate is thus the source of indirect influence over financial markets more broadly, and arbitrage is the essential transmission mechanism for that influence.

This much, while perhaps not explicit in the treatment of Borio and Disyatat, is fully consistent with what they say. Going beyond Borio and Disyatat, it can also be argued that the central bank's special position in the payments system is also a potential *direct* source of leverage over other asset prices, not just the overnight rate, simply because the central bank can always buy an asset simply by paying with its own liabilities. This is the essence of typical war finance, when the central bank pegs the price of government debt, and makes good on that peg by buying debt as needed using its own liabilities. It is also the essence of so-called quantitative easing. In both war finance and quantitative easing, the central bank operates as dealer of first resort (not last), setting the inside spread (not the outside spread), directly making markets rather than supporting private dealers in their own efforts.

From this point of view, one can make a sharp distinction between dealer of last resort and quantitative easing. What central banks did when they took collapsing money markets and dysfunctional capital markets onto their own balance sheet was to become dealer of last resort, and can be understood and justified as the provision of a public good, namely liquidity. Central banks became the market because the market disappeared; they expanded their balance sheets and became public shadow banks as a way of putting a floor on the collapsing private shadow banking system. Had they stopped there, exit would have been relatively easy once the private market recovered. But they did not stop there.

The current exit problem has arisen not because of dealer of last resort, but rather because of quantitative easing. Under pressure to stimulate the economy, central banks have sought to drive market yields lower, not just on short-term funding but also on longer-term bonds, both risky and otherwise. In doing so, central banks became the market because policymakers preferred different, ie higher, prices. The mental model behind this policy was essentially Tobin-Brainard, but the world in which the policy was implemented was the modern one of financial

[8] To avoid possible misunderstanding, let it be clear that arbitrage is, in practice, not sufficient to enforce either the expectations hypothesis of the term structure or uncovered interest parity. These too are properties of idealised models, not properties of the real world.

globalisation, not the model world of market imperfection. In the real world, the sine qua non for exit from balance sheet policy is exit from policy-imposed levels of asset pricing.

Conclusion

The global financial crisis has revealed to all the necessity of last resort support for the emerging new system of market-based credit. In normal times, such support involves establishing a bid-ask spread outside the spread quoted by private profit-seeking dealers. In normal times the central bank supports the market; only in crisis times does it become the market.

Embracing this new responsibility inevitably involves embracing also the responsibility for ensuring robustness of the private dealer system through regulation and supervision, in order to reduce the probability that last resort support will be needed. Whereas in the bank-loan credit system regulation focused naturally on banks, in the modern system it focuses naturally on dealers. Continuity of price, both the price of capital asset collateral and the price of money market funding, is the key to avoiding crisis.

These first two steps toward re-imagining central banking are by now well under way. But the third, which involves the reconceptualisation of monetary policy, remains in its infancy. The zero interest rate policy, quantitative easing and also so-called forward guidance are all policies that derive their analytical legitimacy from an outdated theoretical framework that was devised to address the operations of the older bank-loan based credit system. That framework now requires significant updating for the modern world. Money does matter, notwithstanding flexible and endogenous asset prices and funding rates. The central bank's position at the apex of the clearing system gives it leverage over short-term interest rates. The challenge facing us is to reconceptualise how to use that leverage in the public interest, toward the goal of stabilisation.

Finally, re-imagining central banking is a technical challenge, requiring sustained engagement with the institutional realities of modern money markets, both domestic and international. But it is also a political economy challenge. Re-imagining central banking is fundamentally about re-imagining the interface between the central bank backstop and the private profit-seeking dealer system, as well as the interface between each individual central bank and the larger international monetary system. It is about re-imagining the interface between the money interest and the public interest, as well as the interface between national and global public interest.

References

Bank of England (2013): "Liquidity insurance at the bank of England", www.bankofengland.co.uk/markets/Documents/money/publications/-liquidityinsurance.pdf.

Borio, C and P Disyatat (2009): "Unconventional monetary policies: an appraisal", *BIS Working Papers*, no 292, November.

Buiter, W and A Sibert (2007): "The central bank as market maker of last resort", *willem buiter's maverecon* (FT blog post), *Financial Times*, 12 August, http://blogs.ft.com/maverecon/2007/08/the-central-banhtml/#axzz36xE5UokT.

Grad, D, D Neilson and P Mehrling (2011): "The evolution of last-resort operations in the global credit crisis", unpublished mimeo, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2232348.

Hawtrey, R (1913): *Good and Bad Trade; an inquiry into the causes of trade fluctuations*, Constable and Co.

Hawtrey, R (1932): *The Art of Central Banking*, Longmans, Green.

Mehrling, P (2011): *The New Lombard Street, How the Fed became the Dealer of Last Resort*, Princeton University Press.

Mehrling, P, Z Pozsar, J Sweeney and D Neilson (2013): "Bagehot was a shadow banker: shadow banking, central banking, and the future of global finance", in S Classens, D Evanoff, G Kaufman and L Laeven (eds), *Shadow Banking Within and Across Borders*, World Scientific Publishing Company.

Mehrling, P (2013): "Essential hybridity: a money view of FX", *Journal of Comparative Economics*, no 41, pp 355–63.

Minsky, H (1986): *Stabilizing an Unstable Economy*, Yale University Press.

Swagel, P (2009): "The financial crisis: an inside view", *Brookings Papers on Economic Activity*, Spring, pp 1–63.

Tobin, J (1969): "A general equilibrium approach to monetary theory", *Journal of Money, Credit, and Banking*, vol 1, no 1, pp 15–29.

Tucker, P (2009): "The repertoire of official sector interventions in the financial system – Last resort lending, market-making, and capital", Remarks at the Bank of Japan International Conference "Financial system and monetary policy: implementation", Tokyo, 27–28 May 2009.