

The Potential Instruments of Monetary Policy

By

C.A.E. Goodhart

SPECIAL PAPER 219

LSE FINANCIAL MARKETS GROUP PAPER SERIES

January 2013

Charles A. E. Goodhart is Director of the Regulation and Financial Stability Research Programme at the Financial Markets Group and Professor Emeritus of Banking and Finance at the London School of Economics. Any opinions expressed here are those of the author and not necessarily those of the FMG. The research findings reported in this paper are the result of the independent research of the author and do not necessarily reflect the views of the LSE.

The Potential Instruments of Monetary Policy

By C.A.E. Goodhart
Financial Markets Group
London School of Economics

1. Introduction

In most standard (Dynamic Stochastic General Equilibrium, DSGE) macro-models, there is a single riskless rate, set by the Central Bank in accord with some reaction function, as developed by John Taylor (1993/1999). In this model all agents can lend and borrow at this same rate, because default, and hence credit risk, is assumed away. The one extra degree of freedom that a Central Bank may have in such a model is to play on the public's expectations of their future policy. In particular, some have argued that, should a lower, zero bound to nominal interest rates be hit in a depression, then the Central Bank should publicly aim to achieve higher future inflation in order to lower real interest rates now. But this is dangerous for two reasons. First, with nominal interest rates at the lower bound, it is not clear exactly what policies will achieve that higher future inflation. In the absence of such policies, the higher inflation target may not be credible. This has been argued by the Bank of Japan.

Second, the suggestion that inflation be consciously raised for macro-economic purposes, e.g. to reduce inherited debt, is inherently dangerous. Should the government, usually the largest debtor, be perceived to be intentionally inflating its way out of its own debts, confidence in the future value of money (and of the government's other promises) could erode quite quickly. Nominal interest rates could start to rise rapidly, and creditors holding such fixed interest debt, e.g. banks and pension funds, could run into trouble. To prevent a financial crisis, the Central Bank would then have to flood the system with even more liquidity. The eventual outcome could be dangerously volatile. That is not the way to go, despite M. Woodford's advocacy (2012).

So the Central Bank has, apparently, just one instrument, the short term official interest rate, which it should use primarily to achieve a low, and stable, inflation target. Nothing has taken place in the recent financial crisis to lead to any revision or reassessment of that, by now conventional, wisdom, that the primary objective of monetary policy should be price stability over a medium-length

horizon. When a Central Bank chooses a positive level at which to set its interest rate, it cannot then simultaneously choose a quantity, an amount, for the monetary base (cash plus commercial bank deposits at the Central Bank). The CB has to validate its choice of interest rates by creating exactly the amount of high-powered money, H, monetary base, that the public and banks want to hold at that interest rate. The well-known (textbook) money multiplier,

$$M = H \frac{(1 + C/D)}{(C/D + R/D)}$$

(where M is the money stock, C currency held by the public, D deposits held by the public, and R are bank reserves with the CB), actually worked in reverse. The level of interest rates (i), and a host of other variables, determined M. Given M, the desired C/D and R/D ratios determined how much H the CB had to create to maintain its chosen level of i.

2. The Collapse of the Money Multiplier

This constraint on CB operations, i.e. that it could not simultaneously choose H and i, (the level of the official short term interest), rate has, however, become relaxed once the zero nominal bound to nominal interest rates was approached. Since anyone can convert other assets into currency, and since currency has a zero nominal interest rate, one cannot force nominal interest rates much below zero, (depending on the costs of holding ever larger stocks of notes), unless one can dream up mechanisms for making holdings of currency more costly. But this also has the implication that, once the lower nominal bound to interest rates had been hit, the CB could now choose to expand H, the monetary base, as much as it might wish, since i, the official interest rate, was approximately stuck at zero. And CBs have done so, expanding H with enthusiasm, via QE quantitative easing, CE credit easing, LTROs, long term refinancing operations, etc. As a rule of thumb, H has been multiplied by a factor of three, tripled, in the main developed countries, though by even more in the UK, and prospectively so in the USA, now that the Fed has embarked on QE3.

Goodhart's Law, that "any observed statistical regularity will tend to collapse once pressure is placed upon it for control purposes", (Goodhart, 1975/1984), then swung into action. Previously, with the CB setting i, H was endogenous and the money multiplier had virtually never been used for direct control purposes. During this prior period the multiplier had remained quite stable in most countries most of the time. Now CBs were consciously pumping H into the financial system, as if there was no tomorrow, and yet the broad money stock hardly budged and bank lending to the

private sector stagnated, or at times even fell. The money multiplier collapsed both in size, and as a useful intellectual concept (not that it should ever have been so accepted).

This observed collapse of the money multiplier does not, of itself, mean that QE, CE, LTROs, etc., had no expansionary effect. Patently at times such (quantitative) expansionary measures did lead to higher output (and inflation) than would otherwise have occurred, especially QE1 in both the USA and UK and the ECB's LTRO in 2011/12. They did so by reducing (liquidity) risk premia, raising asset prices, restoring confidence, lowering exchange rates, etc.; for an empirical study of the effects of QE (both 1 and 2) on the UK economy, (see Ashworth and Goodhart, forthcoming 2012/13). It is also certainly arguable that, without QE and the resultant increases in H, then M and credit expansion would have been much lower, in part because the macro-economy would have gone into a much worse tail-spin. One can, however, never really test a counter-factual.

Be that as it may, it still remains the case that one key channel (via the monetary multiplier), through which such unconventional monetary policy was meant to work, failed badly. We need to analyse and to explain this, partly in order to redesign monetary policy. With our economic systems having been already stuffed to the gills with liquidity, there is a feeling beginning to take hold that there is a limit to what expansionary monetary policy can do further, a fatalistic resignation that there may be strict limits to our ability to climb out of the present depression by monetary policy. (N.B. it is not the purpose of this note to discuss what may be the constraints on fiscal policies).

Numerically the reason why the money multiplier collapsed has been that banks more or less completely offset the increase in H by a countervailing increase in their reserve ratio, mostly deposits held at the Central Bank, as can be seen from Table 1 below:-

Table 1

		H	R	R/D%	C/D%	Broad Money	Bank Lending to the Private Sector
USA	2006 Q2	804	45	0.8	12.8	6787	5690
	2012 Q2	2619	1566	18	12	9892	7070
	%ch	226	3380	2150	-6.25	46%	24%
Eurozone	2006 Q2	727	159	1.2	4.5	7344.5	8679.4
	2012 Q2	1756	1087	6.2	5	9604.4	11161.4
	%ch	142	584	417	11.1	31%	29%
UK	2006 Q2	68	23	2.44	4.7	1406	1761
	2012 Q2	295	232	17.6	4.9	2073	2308
	%ch	334	909	621	4.3	47%	31%

Following on from the financial crisis, there was a generalised belief, amongst both regulators and banks, that bank holdings of liquid, marketable assets had been allowed to drop far too low, in some large part in the then mistaken belief that funding liquidity via access to wholesale markets would always be available. So regulations about liquid asset holdings were thereafter tightened to some degree almost everywhere. In the UK the FSA has required banks to hold some 7% of their UK funded assets in liquid form. But the definition of such liquid assets includes (UK) government debt, as well as deposits with the Bank of England (BoE). There is no necessity to hold liquid assets at the BoE rather than in gilts. Moreover, present holdings of liquid assets, 2012 end September, at about £470 bn, are well over the required amount to hit the ratio. The huge holdings of bank reserves at the BoE are not there because of regulatory constraints; they are far in excess of that. So suggestions from the Bank of England, and others, that some sizeable part of such liquid reserves could be used, and run down, without incurring official displeasure are wide of the mark as a means to encourage bank asset expansion. The banks in the UK, in the USA and in many (but not all) parts of the Eurozone are not (and rarely have been historically) liquidity constrained. The money multiplier approach implicitly assumed that banks were liquidity restrained; this has rarely been true, and is not true now.

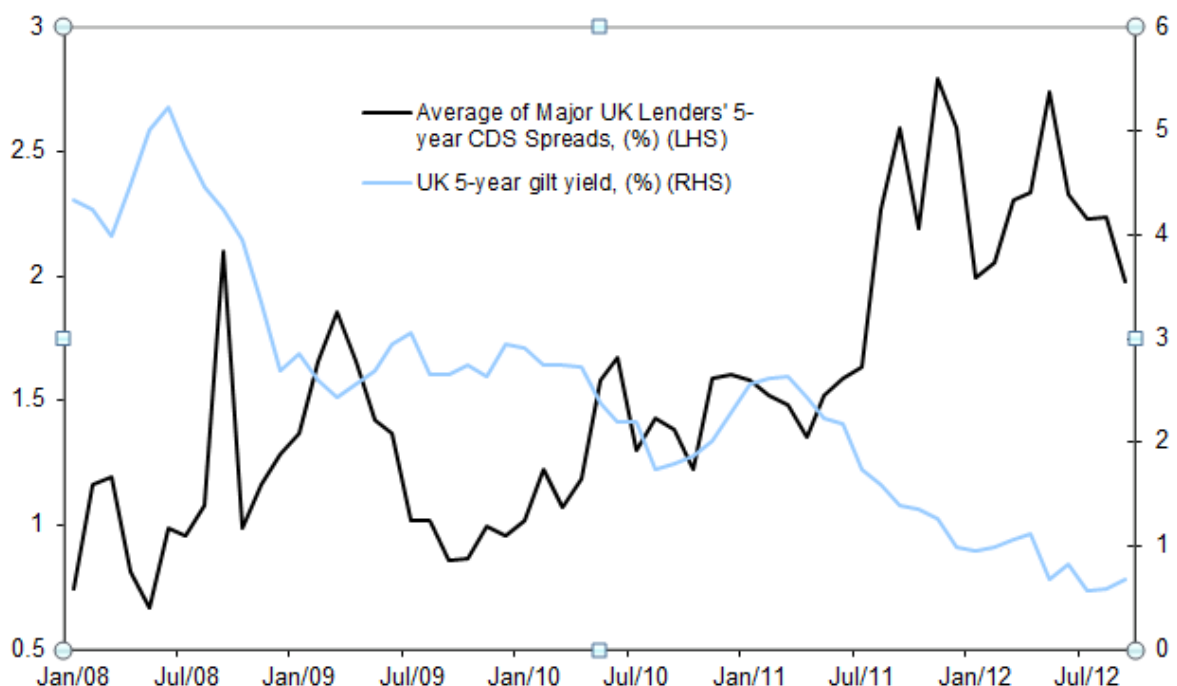
3. What Determines Bank Lending to the Private Sector?

Banks will attempt to expand their assets, if the return on equity (RoE), after adjustment for risk, by so doing appears high enough to them. They focus on RoE, rather than the overall return on total assets (RoA), for several reasons. Bank managers are subject to the governance of shareholders, and shareholders are naturally concerned about RoE (not RoA). If earnings per share fall too much, the market price of equity could drop to a point which puts the jobs of the existing management team at risk. Moreover, bank bonuses are normally paid in the form of deferred claims on their own bank shares. So management, like other shareholders, have a natural vested interest in RoE.

Although official interest-rates, without credit risk, go down in slumps, and remain currently very low in most sovereign countries (i.e. excluding the Eurozone periphery), perceptions of credit risk rise quite sharply both for banks and for potential private sector borrowers from banks. So bank funding costs, e.g. for longer-term funding whether in deposit or bond form, will increasingly diverge from the official riskless rate. Therefore a reduction in official interest rates does not guarantee an equivalent fall in bank funding costs. In Chart 1 below, we compare the path of rates of 5 year gilts with an index of 5 year bank CDS spreads from 2005 Q1 to 2012 Q2.

Chart 1

Low official rates do not guarantee low banking funding costs



Banks are, to some extent, price takers also in the loan market. Traditionally they lend at a mark-up over Bank rate, and that mark-up is normally quite sticky. If a bank tries to raise that mark-up (too much), and relative to other banks, it will lose customers and reputation. But times are not normal, and banks are currently raising their mark-ups (spreads), for example on standard variable rate mortgage loans (SVRs). In any case there is another way that banks can increase their risk-adjusted return on lending, and a way that comes naturally when their private sector borrowers are also perceived as more at risk. This is to toughen the collateral required, to raise the initial deposit on a mortgage, and to increase the default penalty on a loan. As J. Geanakoplos (2010, 2011) and A. Fostel and J. Geanakoplos (2008) has emphasized, there are two margins on any loan, the terms as well as the interest rate. Cyclically these often move in opposite directions. The authorities only have partial influence on the interest rates applicable to, and charged by, banks, and not at all on the associated terms of lending, and so the net effect on credit expansion can sometimes be the reverse of the interest rate change induced by the authorities. This also explains how banks can simultaneously claim to be providing loans to all credit-worthy borrowers, so the problem is one of demand, while borrowers contend that credit has become much more difficult to access. The resolution is that the collateral terms required by banks for borrowers to be deemed credit-worthy have become much more demanding. Unfortunately comprehensive, accurate, and aggregate data to measure the changing terms, as contrasted with interest rates, on bank lending, other perhaps than on mortgages, are hard to obtain, so there is much reliance on surveys of bank loan officers and borrowers; better than nothing but somewhat limited as a basis for analysis.

Under the Basel capital adequacy requirements (CARs), lending to the private sector has a relatively high risk weight. The spread over a bank's marginal funding cost has to be large enough to generate a return that meets that bank's target RoE. The risk adjusted return also depends on the assessed probability of repayment (plus interest). If the interest rate that can be charged borrowers is constrained, perhaps by competition or reputation, the risk adjusted return can be raised further by toughening the (collateral) terms, thereby enhancing the probability of repayment.

This indicates the main factors influencing the supply of bank loans to the private sector, beyond and besides the level of official rates on government debt. These are:-

- The target RoE.
- Marginal bank funding cost spread above the official rate.
- The perceived probability of default.

The higher these are, the lower will be a bank's willingness to expand credit to the private sector. If these worsen, a bank will react by raising its spread, (of loan rate), over official rates, and, to the extent that this latter is constrained, by toughening (collateral) terms.

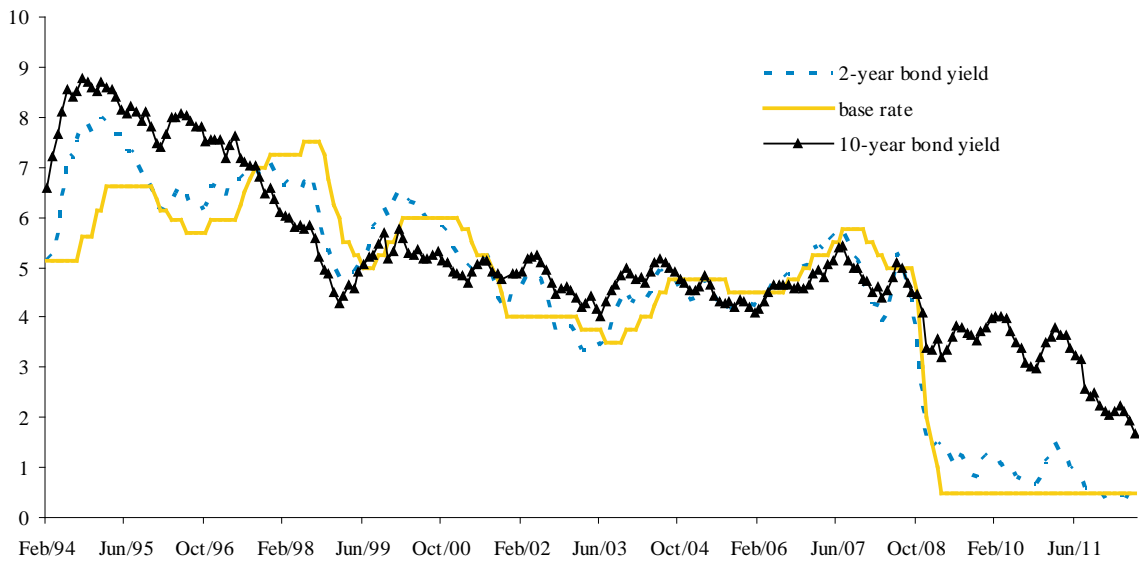
Although in recent years target RoE has come down somewhat, (not enough), the other two main forces have moved adversely, and considerably so. Under these circumstances small changes in official interest rates and increases in liquidity, except in so far as they affect marginal bank funding costs, are not likely to be efficacious in encouraging banks to lend to the private sector. QE will not work to generate such new lending; the UK funding for lending scheme (FLS) may do so by directly influencing bank marginal funding costs. We shall discuss subsequently what else might be done to encourage further bank lending to the private sector.

4. Bank Lending to the Public Sector and the Deposit Rate on Bank Reserves at the Central Bank

Before that, however, I shall consider another use of bank money, for banks to expand their holding of public sector, government debt. Such investment has been privileged in terms of risk weighting, bearing a zero risk weight, so no additional capital is required when such debt is bought. Moreover, the perceived probability of default, for those governments who also have command over their own printing press, is close to zero. With bank' liabilities being in nominal form, inflation risk is also unimportant. So the choice for banks between holding reserves at the Central Bank and holding government debt reduces to a simple comparison of risk adjusted returns. The return paid on reserves at the Central Bank is certain, riskless and has an option value of maximum flexibility. The return on government bonds is subject to the risk that interest rates may have become high when, and if, the bank needs to sell such debt before maturity. So, in a depression interest rates paid on (excess) reserves at the Central Bank will provide a floor for yields on short-dated government bonds, with yields on longer bonds determined by expectations. That relationship is depicted on Chart 2 below:-

Chart 2

Bank of England Base rate and 2-year and 10-year bond yields

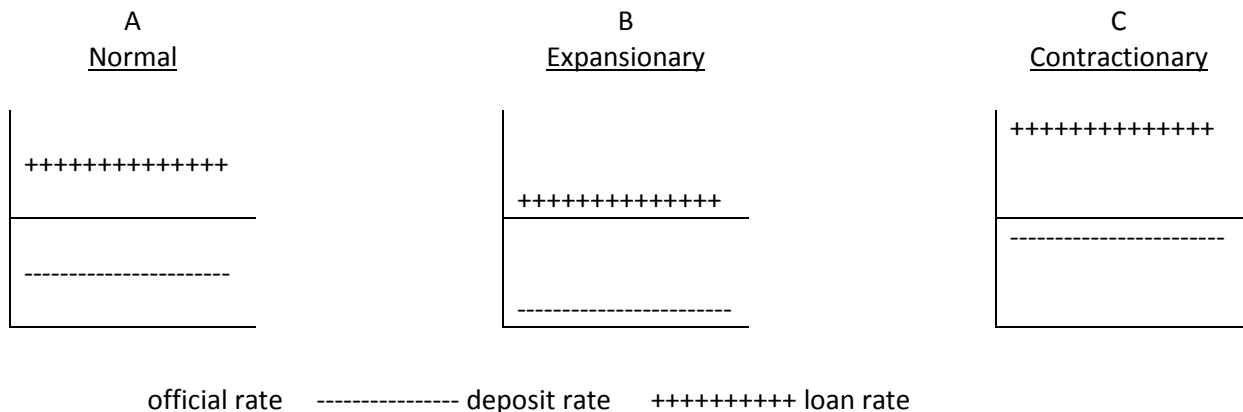


Source: Ashworth and Goodhart, Haver Analytics

Under these circumstances one might have expected Central Banks to make use of a second available instrument, their ability to vary the lower (deposit rate) and upper (official lending rate) bounds of the interest rate corridor relative to the official rate, as a second expansionary measure in a depression. In Chart 3 below, with the official interest rate in all cases assumed to be constant, say at 1%, we have the normal relationship with the corridor in A, an expansionary relationship in B and a contractionary relationship in C.

Chart 3

The Corridor and the Official Rate



The Central Bank of Turkey has, I understand, used this approach. With changes in official rates constrained (by concerns about capital flows), it has varied corridor rates, relative to the official rate, as an alternative means of monetary management, with, I believe, some success. The ECB has recently in effect also done so, leading to some sharp short-term associated movements in other public sector rates. The Fed inadvertently moved in the opposite direction, starting to pay interest on commercial bank deposits with itself at exactly the wrong moment of time.

One obvious problem is that official rates in most major developed countries are now so low that an attempt to lower deposit rates on excess reserves (now known as IOER) further relative to the official rate would require them to be negative. Anyone can hold, zero-yielding, currency rather than deposits. As a generality one cannot force negative nominal interest rates because currency is a bearer (not an owner registered) claim, so one does not know who holds it (and make such holdings liable to tax). But in the case of banks the authorities could require them to reveal their currency holding, at suitable intervals, and impose a tax equivalent to the negative deposit rate on (excess) reserves in deposit form at the Central Bank.

Banks could, in theory, respond by imposing a charge on (current) accounts held with themselves, blaming official policy for the need to do so. But there would be a limit to the capacity to impose such a charge, because currency held by non-banks is not readily observable and so cannot be taxed. Hence beyond some point, the C/D ratio would rise sharply, thereby squeezing liquidity out of the banking system. Besides, neither the banks nor the authorities would like to be held responsible for imposing a negative return on bank deposit holders.

Partly as a result, the general assumption is that a negative return on bank (excess) reserves at the Central Bank would be largely absorbed by banks in the shape of lower profits. A charge on banks that was absorbed by them, rather than passed on; that led to expansion of their overall assets (as they bought higher yielding government debt); and also led to lower interest rates on such government debt might seem to be made in heaven. But at this juncture Central Banks, notably the Bank of England, start to worry about bank profitability.¹ One might well reckon that it is a bit late,

¹ David Miles in 'Winding and unwinding extraordinary monetary policy', (<http://www.bankofengland.co.uk/publications/Documents/speeches/2012/speech598.pdf>), September 11, 2012, sets out a different argument, which is that the current "arrangement is in the spirit of Friedman's principle, which is that the opportunity cost of holding money faced by private agents should be zero because the social cost of creating reserves is zero". But the real social costs in the current disequilibrium/depression

and a bit hypocritical, to worry about bank profits in this instance after so much has been done elsewhere in both the monetary,² regulatory and the fiscal fields to constrain bank profitability. And why not reduce the existing tax levy imposed on bank liabilities, one for one, to offset the reduction imposed on bank profitability from a negative interest rate on bank excess reserves? Operationally this would be easy to do, though in the present climate of banker-bashing it might be politically tricky, and the latter (IOER) has beneficial expansionary effects that the former totally lacks, (for example this levy raises marginal bank funding costs).

Another argument against this is that the aggregate volume of bank reserves is created and determined by the Central Bank, so that imposing any cost, or burden, on banks from holding such reserves would be 'unfair'. But each individual bank can reduce reserves by using them to expand assets, which is an objective of policy. Perhaps concern with bank profitability and 'fairness' could be reconciled with the desire for monetary expansion by separating marginal and average rates of return on banks' deposit holdings at the Central Bank. Thus one could pay a higher rate on a generous allowance of inframarginal reserve holding, and a zero, or negative, rate on marginal 'excess' holdings. The aim would be to make banks want to expand their asset holdings at the margin, not to cut back on bank profitability on average.

The other concern is how would money market operations, including money market mutual funds, work in a world of negative interest rates? The unknown is always slightly frightening, but there has been no convincing reasons yet publicly reported to indicate that the system could not adapt and survive. Moreover the Nordic countries (Denmark and Sweden) have introduced (some) negative rates on banks' reserve holdings at their Central Bank, and the ECB has gone down to zero.

A further objection is that the aggregate volume of bank reserves is set by the Central Bank, even though the distribution of such reserves between the banks is determined by their relative individual behaviour. To levy a tax on banks whose base is separately also set by the Central Bank appears unfair.

arise from an unwillingness of banks to increase their balance sheets, and this cost is enhanced by making it comfortable for them to sit on ever larger remunerated reserves at the Central Bank.

² Thus to worry about the effect on bank profitability of shifting the deposit rate from 0.5% to, say, -0.25% after having ignored the same point while taking interest rates down from 5% to 0.5% seems a bit unbalanced. Similarly banks make a profit from an upwards sloping yield curve, borrowing short and lending long; much of QE, specifically Operation Twist, is consciously aimed at flattening the yield curve.

Both this latter objection and the concern about bank profitability can, however, be met by separating average and marginal rates of return on bank holdings of deposits at the Central Bank. Thus in Table 1 in the UK in 2012 Q2, the reserve/deposit ratio stood overall at 17.6%. One could provide remuneration then at the currently prevailing rate to all banks up to, say, 15% of their total deposits, but zero, or even negative, beyond that. Their profitability would not be badly affected, but at the margin banks would be induced to use their reserves for purchasing other assets.

My conclusion is that we should move now to negative interest rates on extra-marginal bank reserves (IOER). It will lead to some expansion of banks' holdings of public sector debt and to some further fall in government debt yields. As such, it would complement and extend QE. The deposit rate payable on bank reserves at the Central Bank, in the current conjuncture, sets the floor for all other short-term rates. Lower this and they will also fall.

But it is not a game changer. This is because neither IOER, nor QE, directly affects the main factors restricting bank lending to the private sector. These were, as explained earlier:-

- High bank targets for RoE;
- High marginal spreads of bank funding costs over official rates, largely influenced by fears over bank solvency;
- Bank concerns over their prospective borrowers' probability of default (PD).

5. A Public Sector Bank?

We turn next to how one might counter these restrictive factors, but, first, we will digress to deal with another issue, which is, if the commercial banks do not lend enough, why not introduce a public sector bank to do so instead?

There are several reasons why this is not a good way to go:-

- It would take a longish time to set up, to hire and train staff, so it cannot act as a short term fix.
- It would be a natural recipient for all the 'lemons', high risk projects deemed unsuitable by commercial banks.
- Its staff would be unsure what to maximise, growth, profits, or some combination of these.

- Because of the above considerations, it would make higher losses than competing commercial banks.
- It could cope with higher losses because as a public sector bank it would aim at a lower RoE and have lower funding costs, than equivalent private sector banks. But this could be represented as unfair competition under European rules on competition.
- A publicly-owned bank can be directed to lend to politically favoured borrowers. This is often commercially unwise. (N.B. In countries with poor institutional controls, private sector banks may also be established to channel funds into their owners' pet projects. In such cases publicly owned banks may be less bad than privately owned banks. Such conditions do not hold in the UK and most other developed countries, though they did in Iceland and Ireland.)

6. How to Encourage more Bank Lending to the Private Sector

Let us now turn to measures that might ameliorate the adverse factors constraining bank lending to the private sector, taking them in reverse order, i.e. starting with measures that might reduce banks' concerns over their borrowers' probability of default (PD).

As a generality it is hard to see how the authorities can usefully intervene here, though at times they have felt forced to do so, as in the example of the Fed's actions to induce J.P. Morgan to buy Bear Stearns. Commercial banks have, or should have, a comparative advantage vis-à-vis the authorities in assessing individual borrowers' PDs. Any scheme which allows banks to select those assets whose default risk is to be (partially) shifted on to the public sector is, therefore, likely to deluge the authorities with a massive crop of 'lemons'. Defaults and non-performing-loans vary cyclically. So any loss-sharing scheme will pass extra burdens on to the public sector in bad times, and usually without giving it any equivalent share of the profits in good times. There may be occasions when the authorities are desperate to get commercial banking cooperation in some project, when this can only be achieved by some form of credit risk sharing. But, in principle, this is not a good idea.

The second main factor restraining bank lending to the private sector is the sizeable spread of banks' marginal funding costs over the official riskless rate(s). It is in this respect that most effort has been made, in order to reduce such costs both directly and indirectly, e.g. by lowering sovereign yields in peripheral Eurozone countries via Outright Monetary Transactions (OMT). The Funding for Lending

Scheme (FLS), whereby (additional) bank lending to the private sector can be refinanced cheaply from the public sector for up to three years is an imaginative example of how this can be done. On a rather broader scale the ECB's LTROs had the effect of reducing banks' funding costs. A marginal scheme, relating to additional lending, such as the FLS, probably has more leverage, 'bang for the buck', than an average scheme. Nevertheless if the authorities thought that the market was exaggerating banking PD risks, they could encourage the Central Bank to buy bank bonds directly, either in the secondary or primary market. This would be better than underwriting some share of banks' lending risks, since it would give them participation in upside outcomes. Moreover buying bank bonds would be better than buying other private sector bonds, since it would have the same effect on H, while at the same time reducing bank funding costs.

Under some, unfortunately extreme, assumptions the probability distribution of a firm's (in this case a bank's) returns is independent of the structure of its financing, as between equity and debt. In such circumstances the RoE required by investors should come down as leverage falls, since its riskiness declines. Although bank leveraging is now falling fast, other cyclical, and regulatory, factors are enhancing the perceived risks to future bank equity returns. So, banks and their equity shareholders are still looking for a future RoE high enough to make current expansion of bank lending to the private sector unattractive.

One response to this could be to re-jig the regulatory framework by reducing the risk-weights applicable to bank lending to the private sector, perhaps offsetting this by toughening up on the simpler overall leverage ratio. It is not entirely internally consistent simultaneously to wish for more bank lending to the private sector (SMEs in particular) while at the same time loading the regulatory dice against such lending. Nevertheless risk-weighting should be (but rarely is) based on an objective assessment of (systemic) risk, and should be kept strictly independent of short-term conjunctural and macro-economic objectives. So, we assume that a re-configuration of the regulatory risk-weighting schema (though it may perhaps be desirable of itself) is not a potential means for encouraging bank lending to the private sector, though the UK FSA's recent waving of CAR requirements on bank loans made under the FLS scheme has already represented an exception to the above assumption.

Nevertheless there are some actions that the authorities could take, building on the precedent set by the US TARP exercise. Thus, the authorities could require any bank whose bank lending to the domestic private sector has grown by less than X% over the past year to issue new equity shares to

the government at a price equal to the current market price (say average of the last month) in an amount sufficient to meet the extra CAR on the difference between the target and the actual increase in lending. This would be, in effect, forcible dilution of banks' shareholdings whose target RoE was too high to encourage them to expand such lending. The threat of such forcible dilution would, I would expect, lead bank managers to ensure that it would rarely, if ever, happen. There would be (unintended) consequences, for example in more rapid deleveraging elsewhere on the balance sheet. There would also be questions whether forcible shareholder dilution was legal or appropriate for a capitalist country. But it would work. If there should be felt to be an over-riding need to get the banks to lend more to the private sector, this could be tried.

But for the time being let us see if the FLS, perhaps in an extended form, can do enough.

7. Conclusions

Although QE was originally successful, it is now largely a spent force. It could be given some additional power by complementing it with IOER. But neither will have any significant effect in raising bank lending to the private sector. In order to kick start that, one should aim to lower bank marginal funding costs. FLS is a good start. If that should not be enough, then have the Central Bank buy bank bonds, and, if yet more is required, try forcible dilution, whereby the authorities injects more equity into those banks which are failing to expand.

References

Ashworth J. and C.A.E. Goodhart, (forthcoming), 'QE: A Successful Start may be running into Diminishing Returns', Morgan Stanley.

Fostel, A., and J. Geanakoplos, (2008), 'Leverage Cycles and the Anxious Economy', *American Economic Review*, 98(4), pp 1211-1244.

Geanakoplos, J., (2010), 'The Leverage Cycle', in *NBER Macroeconomic Annual*, Vol. 24, edited by D. Acemoglu, K. Rogoff and M. Woodford, University of Chicago Press, pp 1-65.

Geanakoplos, J., (2011), 'What's Missing from Macroeconomics: Endogenous Leverage and Default', in *Approaches to Monetary Policy Revisited – Lessons from the Crisis*, edited by F. Smets and C. Thimann, Sixth ECB Central Banking Conference, 18-19 November 2010, European Central Bank, pp 220-238.

Goodhart, C.A.E., (1984), 'Problems of Monetary Management: The UK Experience', Chapter III in *Monetary Theory and Practice: The UK experience*, by C.A.E. Goodhart, The Macmillan Press Ltd., pp 91-116.

Miles, D., (2012), 'Winding and unwinding extraordinary monetary policy', Bank of England speech, see <http://www.bankofengland.co.uk/publications/Documents/speeches/2012/speech598.pdf>, September 11.

Taylor, J.B., (1993), 'Discretion versus policy rules in practice', *Carnegie-Rochester Conference Series on Public Policy* 39, pp 195-214.

Taylor, J.B., ed., (1999), *Monetary Policy Rules*, University of Chicago Press.

Woodford, M., (2012), 'Methods of Policy Accommodation at the Interest-Rate Lower Bound', presented at the Federal Reserve Bank of Kansas City Symposium on 'The Changing Policy Landscape', Jackson Hole, Wyoming, August 31.