

Paul Fisher: Recent developments in the sterling monetary framework

Speech given by Mr Paul Fisher, Executive Director, Markets, and Member of the Monetary Policy Committee of the Bank of England, at the Manchester Economics Seminar, Manchester, 30 March 2011.

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Introduction

During the recent financial crisis and ensuing recession, the implementation of monetary policy has been the subject of intense debate. Most visibly, that debate focused on the Bank's use of large-scale asset purchases – otherwise known as “quantitative easing” (QE) – as a monetary policy tool. But other aspects of the mechanics of setting policy have also been of great interest. In this paper, I want to focus on two issues which go to the heart of central banking:

- (i) The first concerns how the Bank should seek to implement the Monetary Policy Committee's (MPC) decisions on the official interest rate (known as Bank Rate), so as to best deliver a flat money market yield curve between one MPC decision and the next.
- (ii) The second is about how best to provide liquidity insurance to the banking system as a whole, while also encouraging banks to manage their day-to-day liquidity needs, and subject to minimising the credit risk taken on the Bank's balance sheet.

Before explaining the Bank's thinking about these two issues, we need to lay out some basics about the Bank's objectives, and how it seeks to meet them using its balance sheet.

The Bank of England's objectives and its balance sheet

The Bank has two core purposes: maintaining monetary stability and contributing to the stability of the financial system. With some variations, these are the two cornerstones of policy for most central banks around the globe. Monetary policy is quite widely understood in a general sense – the Bank specifically defines it to mean price stability and confidence in the currency.¹ Financial stability is less well understood generally but it entails detecting and reducing threats to the financial system as a whole, in order to make it more resilient.²

One major reason why it is for the central bank to pursue both of these purposes is because it has a balance sheet that can be used both to implement monetary policy decisions and to carry out financial operations to support financial stability. A simplified time-series of the Bank's balance sheet is shown in Charts 1 and 2 below.³

¹ Bank of England, *Annual Report 2010*, page 1.

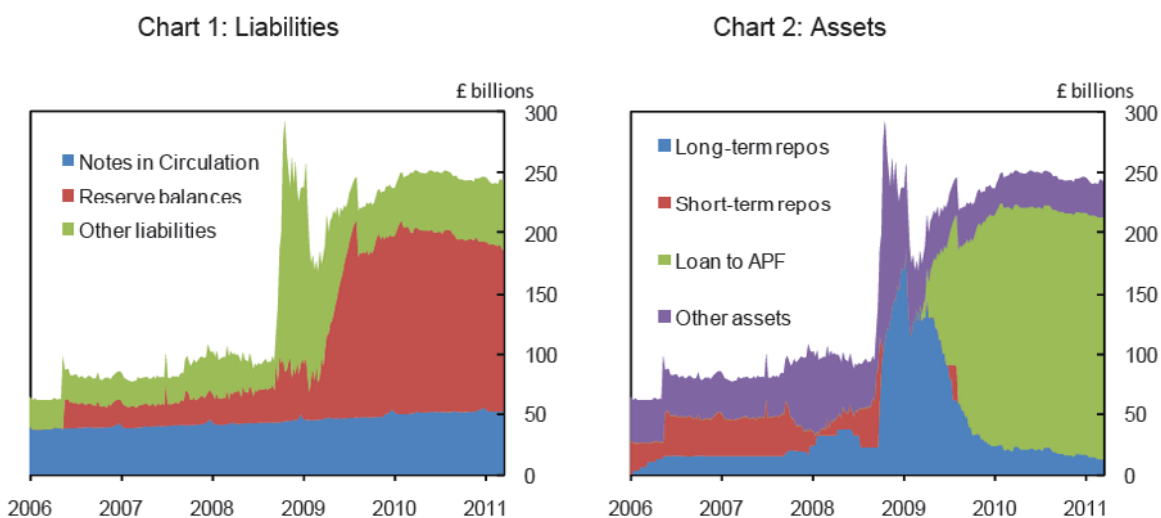
² See “*A New Approach to Regulation*”, HM Treasury consultation document Cm 8012.

³ The Special Liquidity Scheme and Asset Purchase Facility are off-balance sheet, so are not included in the charts.

The Bank's two main liabilities are banknotes in circulation (currently around £50billion) and the reserve balances held by commercial banks.⁴ You can think of these balances as the commercial banks' current accounts with the Bank of England. Together with banknotes, reserves balances are the most liquid, risk-free asset in the economy. The aggregate balance on reserves accounts stood at around £36billion before the start of the asset purchase programme in March 2009 and the current total stands at around £140billion.

The asset side of the balance sheet mainly comprises the Bank's lending to commercial banks (via both short and long-term OMOs) and latterly to the Asset Purchase Facility (APF).

Bank of England consolidated balance sheet ^(a)



(a) Weekly data to 16 March 2011.

The Sterling Monetary Framework: setting interest rates

The Bank's operations are designed to support both monetary and financial stability objectives. Together they make up the Sterling Monetary Framework (SMF) which is outlined in a document known as the "Red Book"⁵. In normal times, the SMF operates a system known as "reserves averaging". Under that system, commercial banks are required to hold an average level of reserves over the "maintenance period" running between one MPC decision and the next. Until the start of the financial crisis, similar reserves averaging mechanisms were employed at the US Federal Reserve, the European Central Bank and the Bank of Japan. But uniquely in the UK system, the target level of reserves for each bank is chosen by the individual firm. If they hit their target on average (and subject to a small tolerance range around that), they earn Bank Rate on their reserves balance. By contrast, any excess or deficiency incurs a significant charge and banks are thus incentivised to meet their chosen targets.

⁴ The Bank's other liabilities include various deposits (e.g. from other central banks) and debt instruments issued in the Bank's own name (e.g. to finance the Bank's foreign currency reserves). Various Government-related balances can also appear on either side of the balance sheet from time-to-time.

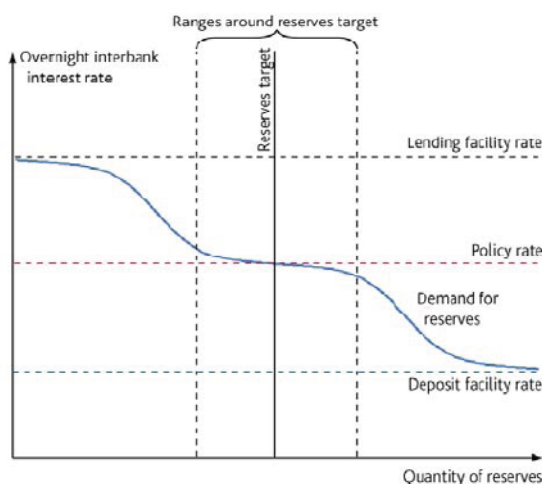
⁵ <http://www.bankofengland.co.uk/markets/money/publications/redbookdec10.pdf>.

In order that it is possible for every bank to hit its individual target – and hence for the system to hit the implied collective target – the Bank calculates the aggregate demand for reserves across the commercial banks and then ensures that the aggregate amount of sterling in the system is exactly consistent with that collective target. It does that by offering, via short-term Open Market Operations (OMOs), exactly the right amount of sterling lending (against high quality liquid collateral).⁶

Commercial banks can ensure they meet their *individual* reserves target by transacting with each other in the market. This should distribute the reserves around the system such that no bank falls short or exceeds its own target. Alternatively, in the event of an unexpected operational disruption or exceptional volatility in overnight market interest rates, SMF member banks can borrow from, or lend to the Bank of England via the Operational Standing Facilities (OSFs). The rates charged/paid on the OSF lending/deposit facility are less attractive than Bank Rate, so as to discourage regular usage. But they are more attractive than the penalty associated with missing a reserves target outright. As a result, the OSF deposit and lending rates should impose a corridor around Bank Rate. By providing a floor and cap, this corridor should ensure that reserve account holders never need to transact in the market at a rate very different from Bank Rate.

Chart 3 illustrates a stylised demand curve for reserves, and shows how the OSFs provide a corridor around Bank Rate. The demand curve is dictated by the scarcity value of reserves – if a bank is short reserves, it will bid in the money market to attract them. But it should not bid higher than the lending facility rate, which provides a cap on the market rate. As it gets closer to being within its tolerance range, a bank will be less willing to bid up to attract reserves. If a bank has excess reserves, it should be willing to lend in the interbank market at less than Bank Rate in order to shed them. But it will not lend below the deposit facility rate, which provides an effective market rate floor.

Chart 3: Stylised demand for reserves in the corridor system



Within the tolerance range around its reserves target, a bank has no incentive to pay more than Bank Rate for an additional unit of reserves, or to charge less than Bank Rate for lending an additional unit of reserves, and the demand curve is relatively flat. The length of the flat portion of the curve depends on the size of the tolerance range set by the Bank. If the tolerance range is very small, market interest rates will be relatively sensitive to variations in

⁶ If the system as a whole already has excess reserves (relative to the commercial banks' collective target), the Bank can drain reserves by issuing short-term Bank of England bills.

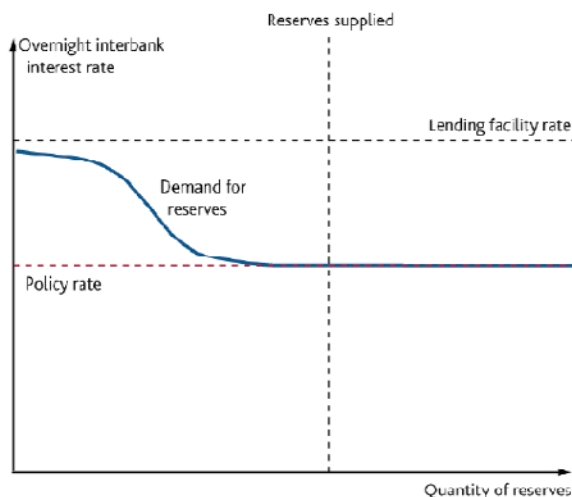
the supply of reserves. That is because small variations in supply could potentially move banks into using the deposit or lending facility. If the tolerance range is very wide then banks have little or no incentive to distribute reserves around the market to meet their targets precisely.

Alternative frameworks for setting interest rates

This system of reserves targets is just one of a number of systems that would be used to implement the policy rate. Indeed, as a system for influencing market rates, these arrangements could be seen as overly complicated. Since March 2009, when the Bank embarked on its asset purchase program known as QE, we have been implementing Bank Rate in a rather simpler fashion. The Bank's asset purchases were financed by creating additional central bank reserves. As a consequence, the stock of reserves increased and exceeded the level the banks would have needed to hit the targets they would have chosen voluntarily. Because banks then had no control over the rate of expansion of reserves, the system of reserves averaging was suspended. Banks were instead remunerated at Bank Rate on any level of reserves.⁷ That means that there is no incentive for any commercial bank to lend in the market at less than Bank Rate. As a result, the current system should set a "floor" on money market rates, at Bank Rate (Chart 4). Similar mechanisms are currently employed by the Federal Reserve in the US, and the Swedish Riksbank.

In principle, banks could have continued to set monthly targets and – to the extent that the MPC's asset purchases supplied reserves in excess of these targets – the Bank could have borrowed them back through OMOs. But the Bank judged it better not to borrow reserves in increasingly large quantities at the same time as the purchase programme grew.

Chart 4: Stylised demand for reserves in the floor system



While this is an easy and effective way of implementing monetary policy at the moment, there are drawbacks to this "floor" system. For example, in order to ensure overnight rates settle at Bank Rate, the Bank's supply curve needs to intersect the commercial banks' demand curve where it is infinitely elastic. That means that the Bank has to supply excess reserves to the system in aggregate, such that no firm has any incentive to pay more than

⁷ And the OSF Deposit Facility rate was set to zero.

Bank Rate for the marginal unit of reserves. In that world, banks' incentives to trade with one another in the overnight markets are largely diminished.

A third model for implementing monetary policy is the "zero corridor" system. In this case there would be no reserves targets and banks could both lend to and borrow from the Bank in unlimited amounts at Bank Rate every day. Although short term market interest rates should always equal Bank Rate precisely, this system has several drawbacks. First, banks would never *need* to transact with each other; they simply transact with the central bank via the OSFs: there would be little or no commercial overnight interbank money market. That would be unwelcome. For example, the information the Bank deduces from movements in overnight market interest rates would be lost. It might also disrupt functioning of longer-term money markets, given implicit links to the overnight market. Second, if the Bank can always be relied upon to meet daily liquidity needs, then commercial banks have less incentive to actively manage their liquidity. And the Bank would be unable to distinguish between banks using the OSFs to manage their day-to-day liquidity buffers, and those facing more fundamental shocks. Finally, by offering to borrow and lend overnight automatically, the Bank would relinquish day-to-day control over its balance sheet and the degree of risk associated with that.

To summarise, there are different models for implementing the policy rate, each of which has its own merits and disadvantages. These reflect both monetary policy and financial stability considerations. A deeper exposition of the arguments can be found in Clews, Salmon and Weeken (2010).⁸ The Bank has carefully considered the differing systems and expects to return to a reserves averaging system in due course. Presumptively, that would be after increasing Bank Rate and before asset sales began – although the timing and sequencing will depend on the circumstances at the time. In the next section of this paper we explore more deeply some of the financial stability aspects of the Bank's operations.

The Sterling Monetary Framework: providing liquidity insurance

Banks inherently engage in "maturity transformation" – borrowing on a short-term basis but lending on a long-term basis (eg taking deposits which can be withdrawn at short notice, and lending for mortgages). As a result, banks take liquidity risk – and even a well-run bank could suffer an unexpected shortage of liquidity.

As part of their liquidity management, banks hold stocks of liquid assets that can be used to generate cash or make payments directly. Some assets are expected to retain their liquidity in all but the most extreme circumstances. But the liquidity of other assets is less assured, and banks can suffer problems if the liquidity of their assets dries up. That could cause financial instability. The Bank of England can provide liquidity insurance to individual, credit-worthy institutions and to the banking system as a whole, by accepting those less liquid assets as collateral, for a fee, in exchange for more liquid assets, including reserves.⁹ But such liquidity insurance must be provided in a way that takes account of the potential for "moral hazard" – the incentive for individual banks to undertake riskier activities because of the presence of a central bank backstop. The Bank's operations must not undermine the incentives of private sector firms to manage their liquidity needs safely in the market, rather than turn to the Bank routinely. Moreover, although the Bank's operations are collateralised, the value of the securities delivered to the Bank is always uncertain. We would never be able to protect ourselves perfectly against credit risk.

⁸ "The Bank's money market framework", Bank of England *Quarterly Bulletin*, 2010 Q4.

⁹ The Bank also stands ready to provide gilts via its permanent Discount Window Facility, introduced in October 2008. This facility is available to provide bilateral liquidity support to solvent and viable institutions, against a wide pool of collateral.

As well as implementing the policy rate, the SMF is also used to provide that liquidity insurance. As we have already discussed, the first component of the insurance aspect of the framework is the reserves averaging mechanism itself, which permits banks, within reason and without penalty, to vary their reserves account balances day-to-day in the face of small and/or short-lived liquidity shocks – provided they hit their reserves target on average over the maintenance period. The second component is the OSFs which allow banks to cope with larger, expected (frictional) payments shocks day-by-day. A third component comes through longer-term OMOs to which we now turn.

Longer-term Open Market Operations

The most routine method for ensuring there is the correct amount of sterling in the system, consistent with reserves targets, is via short-term OMOs. Prior to the start of QE, the Bank carried out weekly short-term reverse repo operations (STRs) against a pool of “narrow” collateral comprising highly liquid sovereign or near-sovereign bonds from a small selection of countries. At that frequency, the scale of the operations could be judged fairly precisely so as to offset any autonomous factors which affected the net supply of sterling to the market. But relying solely on short term OMOs could have meant carrying out very large repo operations every week.

To avoid that degree of churn, some longer term reverse repos (LTRs) were also used pre-crisis – at maturities from 3 to 12 months. Those operations could be backed by either narrow or “wider” collateral, which comprises high quality, but less liquid collateral, including private sector securities.¹⁰ The LTRs effectively reduced the quantity of lending needed via the routine weekly OMOs.

But during the crisis, the demand for liquidity rose significantly, owing to the combination of a reduction in the supply of longer-term interbank finance, and a reduction in the liquidity of various asset-backed securities. The Bank responded by expanding the range of collateral it would accept in its operations in order to provide sufficient sterling liquidity to the UK banking system. As a result, the stock of LTRs rose from £15bn to £180bn by early 2009 (the blue area in Chart 2).¹¹

The Bank also widened the ranges around the commercial banks’ targets, so that they could hold additional reserves (within the maintenance period) without penalty. The Bank was concerned that the banks would collectively not increase their targets enough from one maintenance period to the next. Widening the ranges around these targets, permitting a larger liquidity injection at the Bank’s discretion, also addressed that problem.

The temporary expansion of LTR lending during the crisis was very successful in its main objective of providing liquidity to the banking system. But it also raised a number of important operational policy questions for the Bank:

- (i) It was very difficult to decide exactly how large these lending operations should be.
- (ii) It was also difficult to decide the appropriate spread to charge for lending against wider relative to narrow collateral, to mitigate adverse selection and the moral hazard risk. A minimum 50 basis point spread was applied for wider collateral.
- (iii) Those long-term repos exposed the Bank and the commercial banks to significant interest rate risk. That is because commercial banks’ reserves balances were being remunerated at Bank Rate but the minimum bid rate in the LTRs was the fixed

¹⁰ The narrow and wider collateral sets were redefined in February 2011. The changes will take effect from 1 July 2011. See <http://www.bankofengland.co.uk/markets/marketnotice110211.pdf> for more details.

¹¹ For more information about changes in the Bank’s balance sheet in response to the crisis, see Cross and Fisher, “The Bank’s balance sheet during the crisis”, Bank of England *Quarterly Bulletin*, 2010 Q1.

3-month market (OIS) rate at the time of the operation (plus the spread for wider collateral). So when Bank Rate was cut much more rapidly than was anticipated by the market during Autumn 2008, the Bank recorded a large, unintentional surplus (and the banks a corresponding loss).¹²

In order to try to resolve these issues, the Bank enlisted the help of Paul Klemperer from Nuffield College, Oxford, an expert in auction theory, to help re-design its long-term operations. The fruits of that labour were revealed in the summer of 2010, when the Bank replaced the extended LTRs with its new permanent Indexed Long-Term Repo (ILTR) operations.

In the ILTR auctions, counterparties can submit bids against narrow collateral, wider collateral or both. The Bank then allocates a proportion of the funds on offer to the bids against wider collateral, where that proportion depends on the spreads offered.

These new auctions solve the problems of the old LTRs. For example, expressing the bids as spreads to Bank Rate (with a minimum spread of zero) eliminates the interest rate risk arising from unexpected movements in the spread of market rates to Bank Rate. Moreover, the price of liquidity against wider collateral is determined within the auction – as the market becomes more stressed, counterparties are willing to pay more to borrow against wider collateral. So the Bank no longer has to make a judgment about the appropriate spread to charge counterparties.

The most innovative aspect of ILTRs is that is that, as the degree of market stress increases (as the clearing spread on wider collateral rises relative to that on narrow collateral) the Bank automatically, within the auction, lends a greater proportion against wider collateral. And it gets a signal about the need to expand the overall size or frequency of the operations in future. As far as we know, the new format represents a global first for a public auction in any field. The rest of this paper goes through the new auction structure in more detail.

The ILTR demand curve

During the auction, counterparties submit their bids for reserves.¹³ Some bid against the narrow collateral set, others against the wider set and some against both (using a so-called “paired bid”).¹⁴ One could think of bids against each collateral set as separate. The auctions are uniform price so that all counterparties pay the lowest accepted rate (on each collateral set) regardless of their bids.¹⁵ In theory, this should mean that there is no incentive for banks to try to “game” the auctions, nor is there a need to speculate on other bidders’ behaviour. Instead, bids should reflect the true demand for reserves since, if their bids are accepted, they will either pay the rate they bid, or a lower one.

¹² See Bank of England, *Annual Report*, 2009. This issue doesn’t arise in the short-term OMOs, as the term of the repo runs from one MPC decision to the next, so the difference between the rate we received in the OMO and that which we pay on reserves is fixed.

¹³ The Bank places no restriction on the number of bids submitted but places restrictions on the total value of bids received from a single participant. Participants may choose to submit multiple bids against either collateral set.

¹⁴ A paired bid consists of a single nominal amount and two spreads at which the counterparty is willing to borrow against the delivery of narrow and wider collateral respectively. This provides participants with two opportunities to raise a specific quantity of funds whilst avoiding any risk of over allotment that might otherwise occur if two single bids for the same nominal amount were submitted. If both parts of a paired bid are above their respective clearing spreads, and therefore eligible to be accepted, the participant will be allotted against the bid which offers them better value (the bid with the highest spread relative to the clearing spread for that collateral type).

¹⁵ As opposed to the old LTRs which were run on a discriminatory price basis.

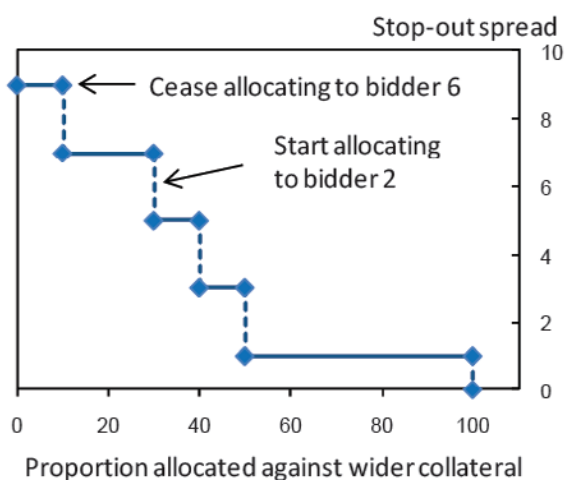
The mechanics of the allocation mechanism are relatively complicated. In a normal auction there will be one price at which the auction will clear. But in the ILTRs there are two clearing prices, one for each of the two types of collateral. And there will be pairs of clearing rates which ensure that the total amount lent in the operation equals the amount on offer. These pairs of possible clearing rates can be derived from the bids, and the resulting “frontier” can be converted into a “demand schedule” mapping the difference between the two clearing rates (known as the stop-out spread) against the proportion of the auction that would be allocated to wider collateral (and hence by implication, narrow collateral) in each case.

This concept is best understood using a simple example. Consider Table 1 below, which shows hypothetical bids from six counterparties. Three of the bids are against the narrow collateral set (N) and the remaining three are against the wider set (W). At the end of the auction, the bids within each set are ranked from those with the highest spread to those with the lowest spread, as shown. For simplicity of exposition, assume that there are no paired bids, and that the Bank has committed to supply £100mn in this operation.

Table 1: Hypothetical ILTR bids

Bidder	Type	Amount	Spread
1	Wider	30	19
2	Wider	20	17
3	Wider	50	15
4	Narrow	60	14
5	Narrow	30	12
6	Narrow	10	10

Chart 5: Demand schedule based on bids in Table 1



The most systematic way to construct the demand curve is to start at the top left corner solution where all the funds are allocated against narrow collateral (bidders 4, 5 and 6 all have their bids filled). The clearing spread would be the lowest accepted bid on the narrow collateral: 10bps and that would dictate the uniform price.¹⁶ Now assume that 99% is allocated to narrow (conveniently 1% is equal to £1mn in this example), and 1% to wider collateral. The clearing spread for the narrow set would remain 10bps (bidder 6, as the cheapest narrow bidder, would be allotted only £9mn against his bid for £10mn). The clearing spread for wider collateral would be 19bps (£1mn would be allocated to bidder 1). That results in a stop-out spread (the difference between the clearing spreads for wider and narrow collateral) of 9bps.

The stop out spread remains at 9bps until the point at which £10mn is allocated to the wider set. At that point, bidder 6 is no longer filled, and the clearing spread on the narrow set rises to 12bps. Bidder 1 receives £10mn out of the £30mn he has bid, and so the clearing spread remains at 19bps on wider. But the stop out spread is then 7bps (Chart 5). At the point where £31mn is allocated to wider, the clearing spread on narrow is still 12bps (bidder 6 is unfilled, and bidder 5 gets £9mn against a bid of £30mn), but the clearing spread on wider falls to

¹⁶ Strictly, the stop-out spread is not defined if the allocation is 100% to one type of collateral.

17bps (bidder 1 is fully allocated and bidder 2 gets £1mn). The stop out spread falls to 5bps (Chart 5). Continuing this process, and tracing out the spectrum of stop out spreads and the associated proportions of the funds allocated to wider collateral, results in the auction demand curve.

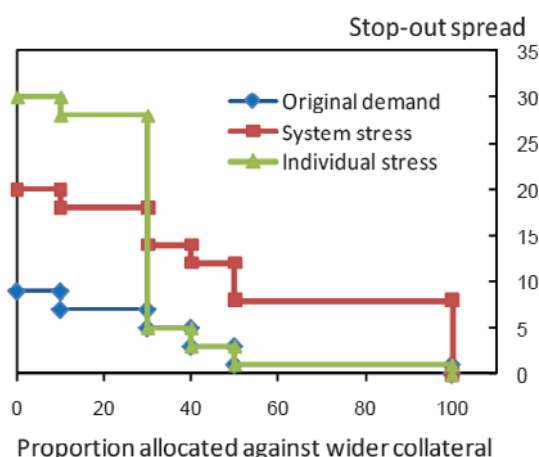
Note that the resulting demand curve will be downwards sloping (strictly, in steps), as the share of funds allocated against wider collateral rises, the stop out spread falls. If market conditions deteriorate such that the value attached to borrowing against wider collateral relative to borrowing against narrow rises, this demand curve will shift higher. Because bids in the auctions should provide accurate information on individual banks' demand for liquidity and the prices they are willing to pay for it, the Bank can use the pattern of bids in each auction to assess the extent of stress either in the market as a whole, or at individual institutions. In turn, it can use that information to inform its decisions on the size and maturity of future operations, or to engage individual institutions in a dialogue to understand their funding needs and plans.

For example, consider two variants on our example laid out in Table 1. In the first, an exogenous shock hits the market, reducing interbank lending volumes and impairing the mechanism by which banks transfer liquidity amongst themselves. The result is that banks, individually, bid more aggressively for funds (Table 2 and Chart 6 show an illustrative example). That pattern results in an upwards shift in the aggregate demand curve, leading to a rise in the share of funds allocated against wider collateral, and hence providing liquidity insurance to the banking system.

Table 2: Hypothetical bidding patterns

Bidder	Type	Baseline		System wide shock		Individual counterparty shock	
		Amount	Spread	Amount	Spread	Amount	Spread
1	Wider	30	19	30	30	30	40
2	Wider	20	17	20	26	20	17
3	Wider	50	15	50	22	50	15
4	Narrow	60	14	60	14	60	14
5	Narrow	30	12	30	12	30	12
6	Narrow	10	10	10	10	10	10

Chart 6: Stylised demand curves under the baseline, system-wide stress and individual counterparty stress scenarios



In an alternative example, assume that an individual counterparty suffers a liquidity shock. That counterparty bids more aggressively for funds – something that is immediately observable from the pattern of bids (Table 2 and Chart 6).

These examples highlight how the new ILTRs can provide an “early warning indicator” of stresses in the market, at both an individual and aggregate level. That information can be used to determine the size of and frequency of subsequent ILTRs (hence solving one important problem with the old LTRs).

The ILTR supply curve

The Bank’s supply curve is pinned down by its preferences – namely to provide liquidity insurance to the banking system at a price that doesn’t undermine the incentive to prudently manage liquidity. The Bank summarises its preferences using a Relative Supply Schedule (RSS). The RSS dictates how the proportion of each auction allocated to the wider collateral set responds to changes in the bids submitted, and specifically the difference between the clearing spreads on the narrow and the wider collateral set (known as the stop out spread). Chart 7 below shows some illustrative examples of an RSS. A larger stop out spread increases the proportion of the auction allocated to the wider collateral set, so the Bank’s “supply schedule” is upward sloping.

Consider two simple examples. With a perfectly inelastic RSS, the Bank essentially pins down the quantity of funds it would provide against wider collateral, regardless of the bids submitted. With a perfectly elastic supply curve, the bank would, once a certain price threshold is exceeded, be prepared to allocate against all the wider collateral bids.

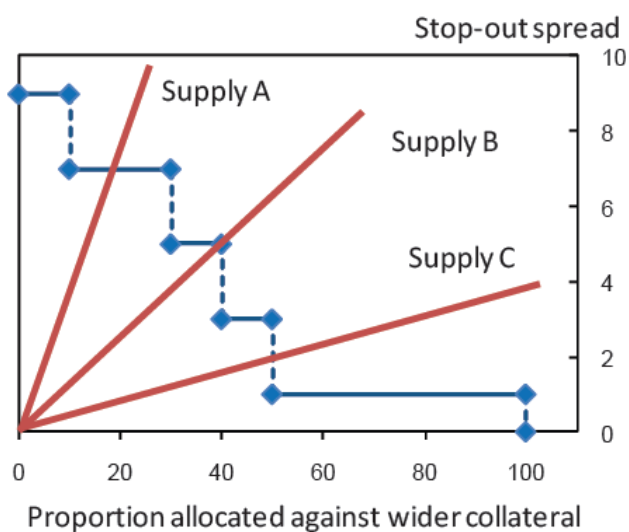
These two examples are of course extremely simplistic, and are not realistic parameterisations of the Bank’s actual RSS. In broad terms, the elasticity of the Bank’s RSS is pinned down by three broad considerations. First, the Bank sees merit in allocating some funds regularly against wider collateral, to ensure counterparties remain familiar with the auction structure and continue to participate. Second, the Bank should not undermine the incentives to manage liquidity prudently. And third, the auctions should permit an increased allocation against wider collateral to the system in the face of adverse liquidity shocks and the associated heightened demand for liquidity.

While the principles underlying the Bank’s RSS are clear, the precise configuration of the RSS is not revealed to the market, so reducing the scope for firms to game the Bank, and encouraging them to bid according to need. The Bank’s supply curve should be continuous but otherwise need not be linear. In particular the Bank can use the results from each operation to determine the degree of stress in the market and hence adjust the scale of the operations accordingly.

Equilibrium

The equilibrium point, which pins down the clearing spreads and the share of funds allocated to the two collateral sets, is determined by the intersection of the observed demand curve, and the Bank’s RSS. Chart 7 illustrates that using our hypothetical auction bids from Table 1 above, and three hypothetical linear RSS schedules. In case of intersections such as those given by curves A and B, a unique equilibrium is well defined.

Chart 7: Intersection points



In the case of supply curve C, there is no intersection between the RSS and the demand curve. We then face a decision about where to allocate. To date, we have chosen to allocate at the bid closest to the RSS, rather than allocating at the intersection of the RSS and the discontinuity in the demand schedule. There are pros and cons to that approach. For example, the current practice lacks transparency in that counterparties can observe significant variance in the auction clearing spreads, and might take false signals about the RSS as a result. Set against that, allocating at the RSS could mean providing liquidity to counterparties at a rate lower than any of the bids in the auction.

Review to date

Following their launch in June 2010, the Bank is reviewing how the ILTRs have functioned (Table 3 provides the key auction statistics to date). That work is still going on, but so far the operations have worked well. A few key points of interest are:

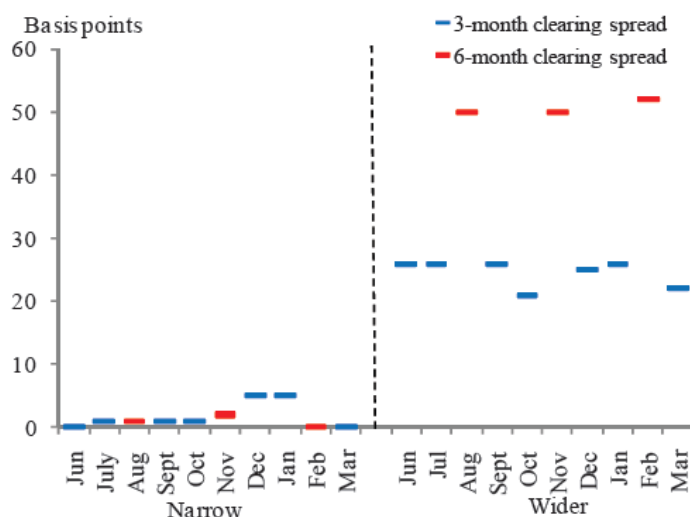
- Participation levels have been lower than in the extended-collateral LTRs at the peak of the crisis, but broadly in line with the long-run/pre-crisis average.
- Although the sample is small, the 6 month auctions appear to have generated greater demand relative to the amount on offer (higher cover) than the 3 month operations. Anecdote from counterparties suggests that reflects the attractiveness of securing longer-term liquidity and the relative scarcity of market sources of 6-month funding.
- The majority of bids, both by number and size, have been against narrow collateral.
- Clearing *spreads* against both narrow and wider collateral have been similar across operations of the same maturity (Chart 8). 6 month auctions for wider collateral have commanded a significant premium compared to the 3 month auctions.

Table 3: Summary of average ILTR auction results¹

	Maturity			
	3-month	6-month		
Number of operations	7	3		
Amount offered (£mns)	£5,000	£2,500		
Total bids received (£mns)	£6,403	£4,179		
Cover ratio	1.28	1.67		
Stop-out spread (bp)	23	50		
	Collateral set summary			
	Narrow	Wider	Narrow	Wider
Total bids received (£mns)	£5,202	£1,201	£3,138	£1,041
Amount allotted (£mns)	£4,106	£680	£1,520	£693
% Allotted	82	14	61	28
Cover ratio	1.04	0.24	1.25	0.42
Clearing spread (bps)	2	25	1	51

¹ Figures shown are averages of operations held between June 2010 and March 2011.

Chart 8: Clearing spreads (to Bank Rate) on narrow and wider collateral



- The January and February auctions were uncovered – that is, the amount bid (against either collateral set) was less than the amount on offer. There are two points to note about uncovered auctions. First, even if there is insufficient demand, the auction mechanism functions. Second, irrespective of the cover ratio, the allocation depends on where the bids are relative to the RSS. So while an uncovered auction will mean that the Bank allocates less than it had offered, a similar outcome could still occur if the auction was covered (but the bids were below the RSS).

Concluding remarks

During the past five years, the Bank has totally re-shaped its operations. Many of the changes arose as a direct consequence of the financial crisis, and the new demands for liquidity insurance that it engendered. As a result, the Bank has now installed permanent

facilities to provide liquidity insurance, without compromising its ability to meet its monetary policy implementation objective.

The academic profession can make a significant contribution to the field of central bank operations. In this paper I have highlighted one example in particular where our thinking has benefitted considerably from such insights. And there is room for much more involvement going forward: although the Bank has rebuilt all of its sterling operations in the past five years, it is unlikely to have reached the end of the development process. As experience grows with both reserves averaging and the new auctions, we will undoubtedly learn more and adjust the operations accordingly. I hope that the presentation of this paper will provoke interest and questions, that it will nurture further academic study of central bank operations and that it will encourage wider participation in developing the future agenda.