



BANK OF ENGLAND

August 2018

The Bank of England's future balance sheet and framework for controlling interest rates

A Discussion Paper

Foreword

In June 2018, the Monetary Policy Committee (MPC) updated its guidance on asset purchases. It noted that it 'intended not to reduce the stock of purchased assets until Bank Rate reached around 1.5%, compared to previous guidance of around 2%.' The MPC Minutes also confirmed that, as and when the stock of assets purchased via the Asset Purchase Facility (APF) is reduced, the Bank of England (the Bank) 'was minded to continue to use a variant of the current floor system to control short-term interest rates. This would mean that the Bank would meet banks' demand for central bank reserves in full at Bank Rate.'

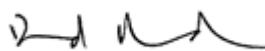
A consequence of this approach is that the size of the Bank's balance sheet in the future would depend in large part on the demand for reserves. However, following many years of change in the structure, regulation and behaviour of banks, the private sector's future demand for reserves is uncertain, both in the United Kingdom and globally. The Minutes of the MPC's June meeting noted that, 'Over time, the Bank expected to learn more about the demand for reserves, and hence the likely size of its balance sheet in the medium term, including through engagement with market participants.' Given the importance of these issues and of ensuring effective implementation of monetary policy, the Bank wishes to begin dialogue with the market well in advance of any change in the stock of purchased assets. That engagement is likely to take place over a period of time and will require continuing engagement with participants.

This paper starts a discussion on the future size of the Bank's balance sheet and the factors that are likely to determine it. The Bank intends to engage a wide range of market practitioners and experts in this dialogue, including, but not limited to, participants in the Sterling Monetary Framework (SMF participants). In doing so, the Bank expects to learn more about the demand for reserves over time and plans to update on the findings from this initial stage of work in publications and speeches. The questions on which the Bank will base its discussions are set out in this paper.

The work is being led by the Bank's executive and staff, rather than the MPC, reflecting their different responsibilities. The MPC has responsibility for formulating monetary policy. This includes decisions on the level of Bank Rate, asset purchases through Quantitative Easing (QE), as well as the timing and pace for unwinding QE. The Bank's executive implements those decisions and is responsible for ensuring that the operating framework keeps short-term interest rates aligned with Bank Rate, a critical part of the effective transmission of monetary policy.¹ Consistent with this, and as noted in the June MPC Minutes, the Committee had been briefed on potential operational changes to the SMF that could come into effect during any unwind of the APF, and have been briefed on the contents of this discussion paper. Reflecting these arrangements and responsibilities, this paper seeks to engage with market participants solely on the *operational* considerations that will arise from future MPC decisions relating to the unwind of the APF, and to do so well in advance of any such decisions.



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¹ For more detail, see the framework for engagement between the Bank of England's Executive and the MPC, updated in June 2018 (<https://www.bankofengland.co.uk/-/media/boe/files/about/mpc/the-mpc-and-the-banks-sterling-monetary-framework.pdf>).

Summary

The framework for controlling short-term interest rates during any future unwind of the APF

- Under the current floor system, the quantity of Bank of England reserves in circulation primarily reflects the amount injected to finance asset purchases for monetary policy purposes.
- Any decision to unwind the APF, and the pace at which it is unwound, will be made by the MPC. **Box 1** summarises the updated guidance on asset purchases provided by the MPC in the Minutes of their June 2018 meeting.
- At the start of any unwind of the APF, the quantity of reserves is expected to fall in line with reductions in asset purchases. As the unwind of the APF continues, the quantity of reserves is likely to fall to such a level that, if it were to reduce further, reserves would become scarce causing short-term interest rates to rise above Bank Rate.
- At that time, the Bank is minded to continue to use a variant of the current floor system to control short-term interest rates. It has been an effective framework for controlling interest rates since 2009, and is expected to remain so.
- The Bank would stand ready to meet demand for additional reserves through regular repo Open Market Operations (OMOs), lending reserves against high quality collateral at Bank Rate. The total value of OMOs outstanding will then respond regularly and automatically to changes in participants' demand for reserves.
- All reserves would continue to be remunerated at Bank Rate.
- This operating framework should keep short-term market rates closely aligned to Bank Rate.

The future size of the Bank's balance sheet

- Under this framework, the demand for banknotes and reserves would become the primary influence on the size of the Bank's balance sheet.
- However, the future level of demand is uncertain. The purpose of this paper is to improve the Bank's understanding of the nature and importance of the factors that will determine the future size of its balance sheet.
- The Bank starts from the position that the demand for reserves is likely to be materially higher at any given level of Bank Rate than it was before the financial crisis. This reflects significant changes in prudential liquidity regulations as well as banks' own liquidity preferences, and a four-fold increase in the number of SMF participants compared to pre-crisis.

The remainder of this paper is structured as follows. Section 1 sets out how the Bank's operating framework will work during any unwind of the APF and invites views on the implementation of this framework. Section 2 discusses some of the issues in determining the future size of the Bank's balance sheet and then poses questions on the factors that might influence this.

Box 1 – Guidance provided by the MPC in the Minutes of its 20th June 2018 meeting²

Timing – ‘the MPC now intended not to reduce the stock of purchased assets until Bank Rate reached around 1.5%, compared to previous guidance of around 2%.’

Pace – ‘Any reductions in the stock of purchased assets would be conducted over a number of years at a gradual and predictable pace. The MPC continued to view sales and reinvestment decisions as equivalent from a monetary policy perspective.

‘The pace of any reductions would depend on economic and financial market conditions at the time, and would take account of the need to maintain the orderly functioning of the gilt and corporate bond markets. In calibrating this pace, the Committee would seek to learn from the experience of other central banks. While any reduction in the stock of purchased assets would be solely a decision for the MPC based on meeting its objectives, the Bank would liaise with the Debt Management Office ahead of implementing any change in its asset purchase programme.’

Operating framework – ‘The Bank was minded to continue to use a variant of the current floor system to control short-term interest rates. This would mean that the Bank would meet banks’ demand for central bank reserves in full at Bank Rate.’

Balance sheet size – ‘reflecting both a wider range of counterparties and changes to liquidity regulation, demand for reserves was likely to be materially higher at any given level of Bank Rate than before the financial crisis. Over time, the Bank expected to learn more about the demand for reserves, and hence the likely size of its balance sheet in the medium term, including through engagement with market participants.’

Balance sheet composition – ‘The Bank would also need to decide on the mix of assets to hold in the longer term to back its liabilities. The Bank could choose either to hold assets such as gilts, or repo operations, or some combination of the two. The Bank had made clear an intention prior to the crisis to back a portion of notes demand with gilts. More broadly, the size and composition of the Bank’s balance sheet would be determined by private demand for reserves under the floor system, what is needed to support efficient market functioning, and the forthcoming financial arrangement between the Bank and HM Treasury under the Memorandum of Understanding’.³

² <https://www.bankofengland.co.uk/-/media/boe/files/monetary-policy-summary-and-minutes/2018/june-2018.pdf>.

³ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/718481/The_Financial_Relationship_between_the_Treasury_and_the_Bank_of_England_-_MoU_web.pdf.

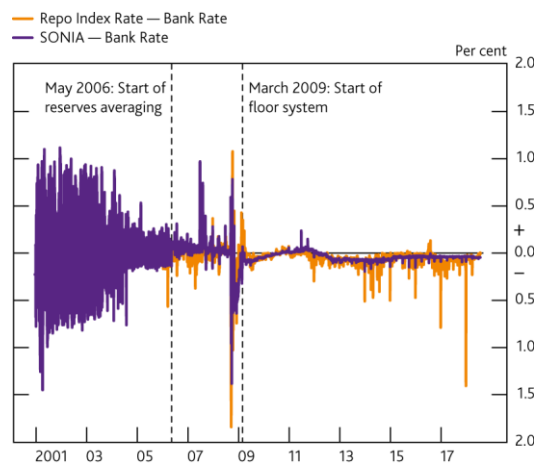
Section 1 – The framework for controlling short-term interest rates during any future unwind of the APF

The Bank's operations in the sterling money markets are known as the Sterling Monetary Framework (SMF). Details on all aspects of the SMF can be found in the Bank of England's 'Red Book'.⁴ A core element of the SMF is the operating framework for controlling short-term interest rates. The Bank has reviewed and adapted this framework over time, including to ensure it remains an effective means of implementing monetary policy by keeping short-term interest rates close to Bank Rate.

The operating framework prior to 2006 involved SMF participants holding minimal, unremunerated reserve balances, primarily used for managing sterling payments. The Bank operated in the market several times a day to supply the reserves that participants needed to meet their obligations. But market participants could be subject to unexpected liquidity flows late in the day, which in turn could result in considerable volatility in overnight interest rates (**Chart 1**).

This was a key reason for moving, in 2006, to a system in which the Bank remunerated reserves, and supplied enough to meet banks' demand. The system led to a significant reduction in interest rate variability (**Chart 1**). But the requirement that banks managed their reserves position to a target,⁵ an approach referred to as 'reserves averaging', proved challenging at the onset of the financial crisis, as banks stepped back from providing liquidity to one another. This led to an increase in interest rate volatility, despite steps taken by the Bank at the time to increase the flexibility of the system.⁶

Chart 1 – Short-term interest rates and Bank Rate



Source: NEX data and Bank calculations

⁴ <https://www.bankofengland.co.uk/-/media/boe/files/markets/sterling-monetary-framework/red-book>.

⁵ Under this system SMF participants set their own targets, and were able to change their targets at the start of each maintenance period (a maintenance period is the period between two MPC meetings), see **Box 2** for further details.

⁶ This included widening the range around reserves targets in which reserves were remunerated, providing term liquidity and increased use of fine-tune OMOs to control the aggregate supply of reserves (including draining reserves by issuing Bank of England bills). For more detail of the actions taken see: <https://www.bankofengland.co.uk/-/media/boe/files/quarterly-bulletin/2008/markets-and-operations-2008-q4.pdf>.

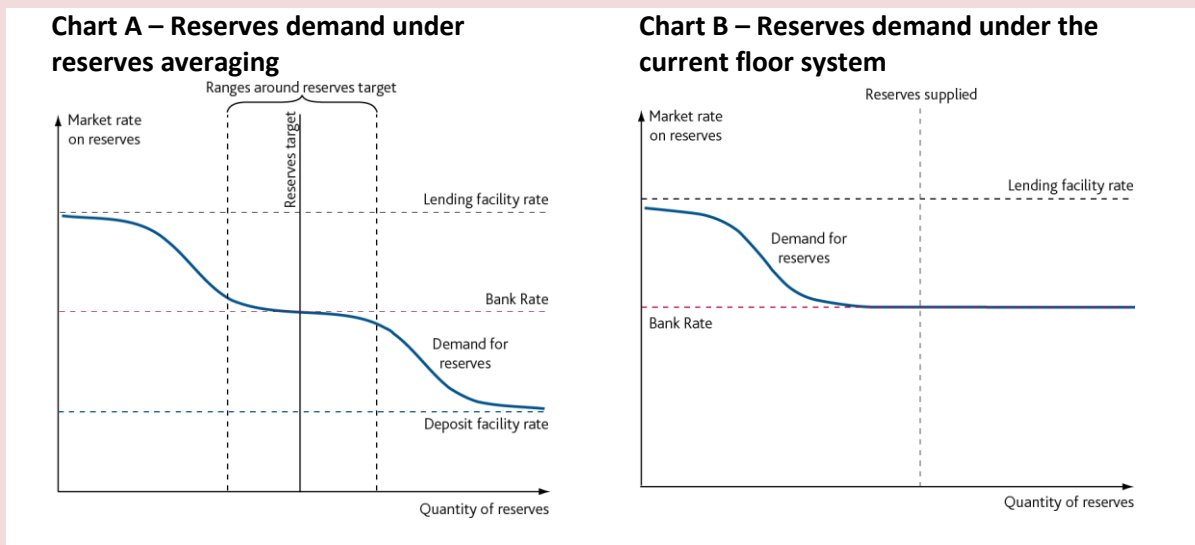
Since QE was introduced in 2009, the level of reserves has been determined primarily by injections due to the MPC's asset purchases and lending under the Term Funding Scheme (TFS), both conducted via the APF.⁷ During this period, the Bank has maintained control of short-term interest rates by remunerating all reserves at Bank Rate – implementing what is known as a floor system. Due to the large quantity of reserves injected through the APF, short-term market interest rates have tended to trade very close to Bank Rate.⁸ **Box 2**, below, explains the Bank's pre- and post-crisis frameworks for controlling interest rates.

Box 2 - The Bank's frameworks for controlling interest rates

In March 2009 the Bank's implementation of monetary policy changed from a 'reserves averaging, corridor' system to a 'floor system', partly as a result of the introduction of QE. **Charts A and B** illustrate the two frameworks.

Under reserves averaging (**Chart A**) SMF participants specified a voluntary target level for reserves holdings between MPC decision dates known as a 'maintenance period'. Participants could vary reserves holdings from day to day, but were incentivised to keep average holdings close to target over the course of the maintenance period. Reserve levels maintained within a specified range (normally 1%) around the target were remunerated at Bank Rate; average reserve levels outside of this range would attract a charge.

SMF participants were able to maintain their reserve levels on target during each maintenance period either by dealing in the market or by making use of the Bank's operational standing facilities (OSFs). OSFs are collateralised, overnight, bilateral facilities that enable SMF participants to borrow and deposit reserves at a fixed spread above or below Bank Rate, respectively. Participants could use OSFs to maintain balances close to target when they were left unexpectedly short or long of reserves at the end of the day. OSF rates therefore acted as a ceiling and a floor, forming an interest rate corridor for the rates at which SMF participants should be willing to deal in the market.



⁷ The Bank of England Asset Purchase Facility Fund Limited was incorporated in 2009 to conduct asset purchases. It is a wholly-owned subsidiary of the Bank, is indemnified by HM Treasury and is funded by a loan from the Bank (financed by the creation of reserves).

⁸ Exceptions to this have occurred around quarter ends in recent years, particularly in secured markets. This is a global rather than a UK market phenomenon that reflects some market participants' reduced willingness to accept deposits over these dates.

The Bank undertook to supply in aggregate the reserves that SMF participants needed to meet their reserves targets, against collateral, via weekly short-term and lower frequency but longer-maturity OMOs.

Following the start of QE in 2009, the Bank moved to a floor system (**Chart B**). Short-term OMOs were suspended and the supply of reserves has been primarily determined by the level of reserves injected via asset purchases and the TFS. The Bank's other operations and activities, such as the Indexed Long-Term Repo (ILTR), have also affected the supply of reserves, but to a much lesser extent.

SMF participants therefore have a more limited ability to influence the aggregate level of reserves, although they can vary the balance on their own accounts. Balances are fully remunerated at Bank Rate, and OSFs remain available to institutions that need to borrow reserves in order to meet frictional payments shocks.

It is the Bank's intention to implement monetary policy using a variant of the current floor system during any future unwind of the APF. In reaching this view, the Bank places weight on three factors:

- First, the current framework has proved effective at maintaining market rates in line with Bank Rate. That is achieved by supplying a large quantity of reserves and remunerating them all at the policy rate.⁹
- Second, maintaining key elements of the current floor system provides operational continuity and simplicity both for SMF participants and the Bank.
- Third, the proposed variant of the floor system is robust to a wide range of future economic scenarios, potentially more so than the previous corridor system. In particular, it would remain effective should there be policy-related increases in the supply of reserves in the future, whether due to future asset purchases or via the Bank's liquidity insurance facilities.

Given the large quantity of reserves created by asset purchases, the Bank expects to continue to operate the current floor system to control short-term interest rates, as and when the MPC decides to start the unwind of the APF.

Over time, as the APF reduces in size the supply of reserves is likely to decline to a level such that if it were to fall any further, short-term interest rates would rise above Bank Rate. Therefore, the Bank will stand ready to meet SMF participants' demand for additional reserves through regular repo OMOs.¹⁰ In practice, this means that the Bank intends to regularly offer to lend reserves through OMOs against high quality (Level A)¹¹ collateral at Bank Rate.¹² The demand for reserves will become the primary influence on the size of the Bank's balance sheet, rather than the size of asset purchases and the TFS. And all reserves would continue to be remunerated at Bank Rate.

⁹ In addition, the Bank has tools available to it, such as Bank of England Sterling Bills, to prevent short-term rates falling below Bank Rate, see: <https://www.bankofengland.co.uk/-/media/boe/files/speech/2015/remarks-by-chris-salmon-on-the-smf-annual-report>.

¹⁰ Legally, OMOs are not repo transactions but rather collateralised loans; however, the term is used for expositional convenience.

¹¹ For reference, see the Red Book: <https://www.bankofengland.co.uk/-/media/boe/files/markets/sterling-monetary-framework/red-book>.

¹² From this point onwards, the quantity of reserves and the size of the Bank's balance sheet would no longer continue to decline in line with the ongoing unwind of the APF.

A key advantage of this system is that it is robust to uncertainty over the level of reserves demand. The Bank would stand ready to begin running these operations when it judged there was likely to be demand for them. This judgement would be formed based on internal estimates of demand that will be refined over time – supported by the process initiated by this discussion paper. As a matter of course, the Bank expects to draw on its regular Market Intelligence (MI) discussions, the demand for reserves observed in the Bank's other liquidity operations, as well as using the Bank's granular money market datasets. Once the operations have been launched, the total value of OMOs outstanding should respond regularly and automatically to changes in participants' demand for reserves.

The Bank expects to continue to make reserves available to SMF participants via its existing liquidity facilities, including during any unwind of the APF. These operations are set out in the Red Book and include the monthly Indexed Long-Term Repo, which offers to lend reserves for six months against a broad range of collateral, and both its size and pricing are responsive to market conditions.¹³

The Bank will keep the effectiveness of its arrangements for controlling interest rates and the supply of reserves under review and seeks views on the approach outlined here. The Bank is particularly interested in receiving views on the operational and market impacts of the approach it proposes to take.

Question 1 – Are there operational or other considerations that affect the level of Bank of England reserves that could be supplied via OMOs? How will the new programme of OMOs affect demand for the Bank's existing liquidity facilities (such as the ILTR)?

Question 2 – How will the operating framework described here impact on day-to-day management of SMF participants' reserves positions?

Question 3 – How will the operating framework described here impact on inter-bank and other money market activity and pricing relative to the current floor system?

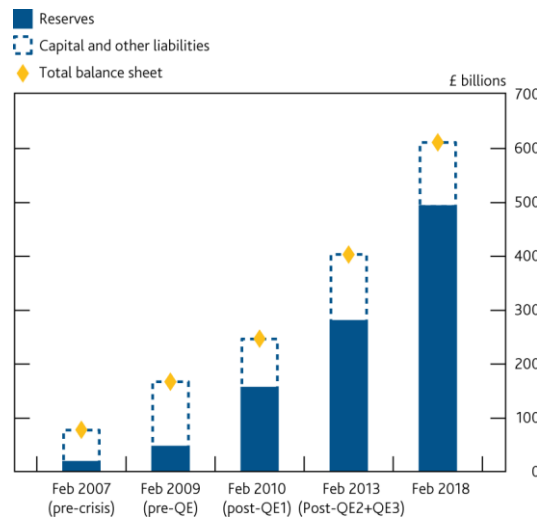
¹³ Therefore, depending on demand, firms wishing to borrow reserves against level A collateral for longer maturities may need to pay more than Bank Rate.

Section 2 – What factors are likely to affect the future size of the Bank's balance sheet?

This section explores possible determinants of the demand for reserves and the size of the Bank's balance sheet, and how this may vary over time depending on the state of the economy and the financial system. Following many years of change in the structure, regulation and behaviour of banks, the future demand for reserves is uncertain, both in the UK and globally. The Bank intends to engage with market participants and interested experts to improve understanding of these issues.

Over the past decade, the Bank of England's balance sheet has expanded to roughly eight times its size prior to the global financial crisis, driven primarily by the APF.¹⁴ Prior to the crisis, the Bank's balance sheet stood at £78bn,¹⁵ mainly driven by aggregate demand for the Bank's two primary liabilities: banknotes and central bank reserves. As the financial crisis intensified in late 2008, the Bank responded to the increase in demand for safe, liquid assets and reserves by increasing the size and scope of its liquidity insurance operations. The MPC subsequently launched QE in March 2009, supplying additional reserves to the system through four rounds of QE. Through the APF, the Bank has purchased a stock of £435bn of gilts, £10bn of corporate bonds, and lent £127bn to banks and building societies via the TFS, financed by the creation of central bank reserves (see **Chart 2** below).¹⁶ The Bank's combined balance sheet stood at £611bn, as of end-February 2018.¹⁷ The assets on the Bank's combined balance sheet are largely driven by APF purchases,¹⁸ while the liabilities continue to be primarily made up of reserves and banknotes.

Chart 2 – The Bank of England's balance sheet



Source: Bank calculations

Therefore, during the operation of QE the size of the Bank's balance sheet has primarily been determined by the scale of asset purchases and lending under the TFS – in other words, by the supply of assets. Any future

¹⁴ Similar changes are evident on other central banks' balance sheets. The US Federal Reserve and the Bank of Japan both currently have balance sheets approximately five times their pre-crisis size; the Eurosystem consolidated balance sheet is four times its pre-crisis size.

¹⁵ As at 28 February 2007 (<https://www.bankofengland.co.uk/annual-report/2007>).

¹⁶ The precise level of holdings varies slightly over time and up-to-date information can be obtained from the Bank's website.

¹⁷ As at 28 February 2018 (<https://www.bankofengland.co.uk/annual-report/2018>).

¹⁸ The principal asset on the Bank's current balance sheet is a loan to the Bank of England Asset Purchase Facility Fund Limited that provides funding for asset purchases and lending under the TFS.

unwind of the stock of asset purchases, as well as repayment or maturity of TFS loans, will initially reduce the size of the Bank's balance sheet and the quantity of central bank reserves. As the unwind of the APF proceeds, the Bank expects the size of its balance sheet to be determined by the level of reserves that SMF participants wish to hold and the amount of banknotes in circulation. In other words, it will be driven by demand for the Bank's liabilities.

While uncertain, the size of the balance sheet is likely to be materially larger than it was prior to the financial crisis. There is likely to have been a structural increase in the aggregate level of demand for reserves since the financial crisis, and the quantity of notes in issue has grown by an average annual rate of around 5% over the past ten years and currently stands at around £75bn.

There are a number of reasons for thinking that there has been a structural increase in the aggregate level of demand for reserves.

Firms now hold substantially larger liquid asset buffers than they did prior to the financial crisis. This reflects both the introduction of new prudential liquidity regulations in the years following the financial crisis, as well as firms' own desire to self-insure for liquidity risks. Most significantly, the Basel III Liquidity Coverage Ratio (LCR) has led to nearly all SMF participants¹⁹ pre-insuring against a variety of liquidity risks by holding high-quality liquid assets (HQLA) to cover modelled outflows over a 30-day horizon.²⁰ This has had a transformative impact on treasury functions' funding and liquid asset profiles (**Chart 3**).

Central bank reserves are among the most liquid assets available to banks²¹ and typically make up a substantial proportion of participants' HQLA. In the UK that partly reflects the current abundant level of reserves supplied through MPC asset purchases. However it also reflects the role of Bank of England reserves as the ultimate means of settlement in sterling. In addition, the Bank has promoted wider participation in the SMF since the crisis.²² Therefore the number of firms with reserve accounts has increased from 43 in 2008 to 194 today. New SMF participants since the crisis include not only banks and building societies, but also designated investment firms and central counterparties (CCPs), and in aggregate new participants currently hold approximately one third of outstanding reserve balances.

Consequently, the Bank views the likely increase in the desired level of reserves as independent of the MPC's asset purchases even though they occurred at around the same time.

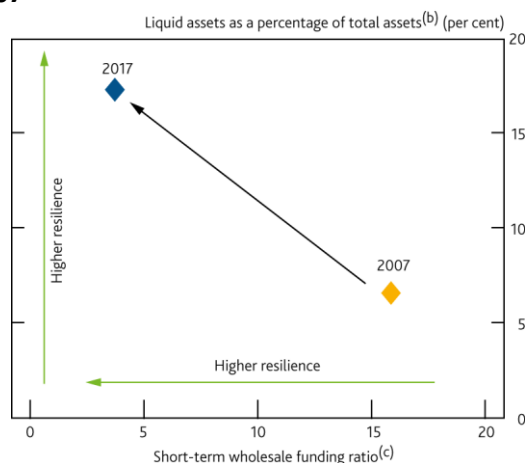
¹⁹ Currently the majority of SMF participants operate under the LCR – although a key exception to this is the CCPs. In the UK, the LCR was preceded by Individual Liquidity Guidance (ILG) set under BIPRU 12 – a set of rules added to the FSA's prudential handbook following the financing crisis. ILG set out a comparable requirement that came into force in 2009. Given that the majority of SMF participants (by reserve account balances) are UK-regulated firms, the structural shift described in the text can be attributed to the UK regulations that have since been superseded by the EU implementation of the Basel III standards.

²⁰ In the UK, the LCR standard is extended by Pillar 2 standards relating to risks not captured by the international standards (<https://www.bankofengland.co.uk/-/media/boe/files/prudential-regulation/policy-statement/2018/february/ps218.pdf>).

²¹ This is reflected in in the Basel III liquidity standards where reserves are treated as Level 1 HQLA.

²² See, for example: <https://www.bankofengland.co.uk/speech/2013/the-uk-at-the-heart-of-a-renewed-globalisation>.

Chart 3^(a) – Liquid asset and funding profiles since 2007



Sources: PRA regulatory returns, published accounts and Bank calculations.

(a) Sample includes Barclays, HSBC, Lloyds Banking Group (including HBOS in 2007), Nationwide, RBS.

(b) The estimate of liquid assets in 2007 is based on: cash and balances with central banks; and highly liquid securities. Liquid assets in 2017 comprise LCR Level 1 high quality liquid assets excluding covered bonds.

(c) Share of total funding (including capital) accounted for by wholesale funding with residual maturity of under three months other than repo funding. Wholesale funding comprises deposits by banks, debt securities and subordinated liabilities. Funding is proxied by total liabilities excluding derivatives and liabilities to customers under investment contracts. Estimates have been used in the underlying data where published data is not available.

The aggregate demand for reserves may vary over time and is likely to be closely related to firms' evolving demand for liquid assets more broadly. The structural factors underlying the demand for liquid assets are likely to include SMF participants' risk appetites, perceptions of the likelihood, size and nature of liquidity shocks, and any future developments in relevant financial sector regulations. Firms' preferences for Bank of England reserves relative to other forms of liquid assets are likely to vary amongst SMF participants. The Bank assumes that these preferences will be determined – to varying degrees – by constraints due to their business models and their balance sheet profiles, as well as the risk appetites of their management. For some firms, particularly larger firms, the Bank expects that variations in the perceived market liquidity of different types of HQLA, and the relative financial returns available from holding the assets, to be a material driver of demand. For example, the shape of the UK yield curve is likely to influence firms' preferences for holding Bank reserves as part of their sterling-denominated HQLA.

It is also possible that the means by which the Bank supplies reserves to SMF participants will have an impact on demand. The APF engages in outright asset purchases; Bank reserves generated via OMOs have a repo-like structure. These transactions are different, and incur different accounting treatments and prudential requirements. For example, while obtaining reserves via OMOs offers participants flexibility in how they source and manage their liquidity, the transactions are subject to haircuts, which lower the value of reserves lent relative to the collateral used in the transaction.²³ These factors may affect SMF participants' demand for reserves obtained via OMOs.

²³ Therefore, exchanging government bonds for reserves via an OMO may reduce a firm's LCR, as the Bank of England applies a haircut to the transaction.

Consequently, in order to understand the likely future size of its balance sheet, the Bank is interested in views on any factors that are expected to have a material bearing on the demand for reserves as the APF is unwound and thereafter. In this area, the Bank invites responses to the following questions:

Question 4 – What will be the drivers of demand for Bank of England reserves and what will be their relative importance?

Question 4a – How does the management of day-to-day liquidity needs affect the demand for reserves?

Question 4b – How does prudential regulation affect the demand for reserves?

Question 4c – How is the demand for reserves affected by the relative returns available on other assets?

Question 4d – What are the structural factors that can be expected to drive demand for reserves over the longer term?

Question 5 – How will the supply of reserves via OMOs affect their demand relative to the current framework where supply is primarily via asset purchases?

Question 6 – What approach(es) could be taken to estimate the expected aggregate demand for reserves?

The Bank has an active interest in discussing the factors underlying the demand for all of its liabilities. No questions are included in this paper with respect to the demand for banknotes given the recent call for evidence published by HM Treasury.²⁴

²⁴https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/689234/Cash_and_digital_payments_in_the_new_economy.pdf.

Commenting on this paper

The questions set out in this discussion paper will form the basis of the Bank's engagement with market participants and other interested experts on the design of the SMF and the size of its balance sheet. It is envisaged that much of this engagement will take place as part of the Bank's regular Market Intelligence activities but the Bank may choose to engage in other ways, for example via surveys. This will be supplemented by discussions with academics and peers in the central banking community. The Bank intends to provide further information in publications and speeches as its thinking in these areas develops.

In addition, the Bank would value comments from interested experts and the broader public. Comments should be sent to balancesheetDP@bankofengland.co.uk by 31st October 2018.