The Bank of England's approach to innovation in money and payments

Discussion paper

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Content

Foreword

The concept at the heart of money is trust – a trust which is hard won but easily lost.

The Bank of England is tasked with preserving trust and confidence in the value of money. Doing so requires adapting to changing landscapes for both: the technologies which enable the exchange of money; and how money is used in an increasingly digital financial system.

Innovations in money and payments are therefore inseparable from the goals we seek to achieve as central banks. They pose opportunities and risks in meeting our monetary and financial stability objectives. Understanding these innovations, preparing for them, and supporting their adoption in a safe manner, are core to our goals.

The rapid pace of change in recent years makes this an opportune moment to take stock. The discussion paper we are publishing today sets out an approach for how we plan to engage with these changes to meet our objectives.

As part of this, we want to prompt wide-ranging engagement on the way ahead and seek input on a number of important issues. Our work in this space has been and will continue to be supported by both domestic and international discussions with other central banks, policymakers and industry.

In developing this discussion paper, we identified some principles to guide our approach to innovation:

- First, our approach is driven by economic analysis and policy outcomes that are consistent with our monetary and financial stability objectives.
- Second, our approach will have an eye to developments across the global financial system.
- Third, our approach will be geared towards ensuring the Bank is agile and responsive to developments in an inherently uncertain landscape.

The speed at which certain markets and activities become systemic may at times outpace the ability of policymakers to build infrastructures and frameworks to respond. Therefore, standing ready to face a range of eventualities – by exploring some of the innovations outlined in this discussion paper– will be critical to meeting the Bank's monetary and financial stability objectives.

Finally, this discussion paper does not seek to set out an approach that's timeless. Policymakers must have the humility to accept that the nature and pace of change and innovation is such that one's assessment of where we might stand years into the future may be outdated within weeks.

However, informed by your feedback we hope this discussion paper constitutes the start of a conversation that will continue into the future to shape and inform our priorities as developments unfold.

Andrew Bailey

Governor of the Bank of England

30 July 2024

Executive summary

Innovations in the payments landscape

Innovations in money and payments present risks and opportunities for central banks' monetary and financial stability objectives. Central banks must be quick to engage with them and prepare for their implications.

Internationally, innovations in retail payments mean that, in countries like Sweden, Brazil and India, interbank payment systems are used alongside cards to make retail payments in ways that do not currently happen in the UK. In some cases, these innovations allow payments to be made using only the recipient's mobile phone number or a QR code. This can offer convenience for customers and savings for businesses.

A further innovation is the use of programmable platforms, including those based on Distributed Ledger Technology (DLT). DLT allows for the creation of common shared ledgers which could be updated simultaneously across all parties to a financial transaction. This could reduce frictions and inefficiencies by removing the need for buyers and sellers manually to reconcile their ledgers with others involved in the transaction. This approach also allows for certain functions to be built into financial contracts through automation, such as making coupon payments on bonds.

To enable these platforms to be used in financial transactions, the assets and forms of money being exchanged may need to be represented in digital form on the platforms. This process is often called 'tokenisation'.

The extent to which programmable platforms could impact on our monetary and financial stability objectives will ultimately depend on the likelihood that financial markets take up these technologies at scale. The Bank's current assessment is that the likelihood of this remains uncertain. However, preparation for potential widespread adoption is important to ensure we continue to meet our objectives.

Our response to innovations in the payments landscape to date

Over the past few years, the Bank has undertaken a number of initiatives in response to innovations in the payments and settlement landscape:

- The Bank has enhanced our capability to supply wholesale central bank money for settlement. This has been through a multi-year programme to deliver a renewed RTGS service. As part of this, Omnibus Accounts now facilitate settlement backed in central bank money for tokenised asset transactions.

- The Bank has taken steps to ensure a ‘safe innovation’ regulatory environment for the development of tokenised assets. In partnership with the Financial Conduct Authority (FCA), the Bank has set up a Digital Securities Sandbox (DSS), enabling market participants to innovate by issuing and trading digital securities in a safe regulatory environment.
- We have set out our proposed approach to new forms of private digital money, such as tokenised deposits and stablecoins. Insofar as the latter is concerned, our focus has been on the use of stablecoins for retail purposes.
- We have carried out work to explore a retail central bank digital currency (CBDC), a banknote in digital form. A decision has not yet been taken on whether to issue a retail CBDC, and a retail CBDC would not replace cash. The Bank remains committed to continuing to provide cash for all those who want to use it. However, a retail CBDC would ensure that central bank money remains useful to households and businesses in an ever more digital economy. It would also provide a public platform for private-sector innovation, promoting further competition, efficiency and choice in payments.

Our proposed approach to innovations in the payments landscape going forward

In addition to the initiatives which the Bank has undertaken thus far, our response to these innovations must now develop further.

In setting out our proposed approach, we have considered the payments landscape in the round: retail and wholesale payments; central bank, commercial bank and other privately issued money; and domestic and international contexts.

First, we set out our financial stability risk appetite for wholesale settlement in central bank money:

- Confidence in the underlying technology used to transfer money is inseparable from confidence in money itself. If central bank money was unable to interact with new technologies, there could be a risk of settlement activity moving away from central bank money to private settlement assets that could interact with them. This outcome could weaken financial stability.
- The Bank has a low risk appetite for a significant shift away from settlement in central bank money towards private settlement assets. Accordingly, there is a strong case for policymakers to take steps to preserve the role of central bank money as an anchor for confidence in the financial system.
- Consistent with this risk appetite, the Bank is exploring options to enhance access to settlement in central bank money.
- The Bank’s initial analysis also notes that there are significant financial stability risks from the use of stablecoins for wholesale transactions.

Second, we set out our approach to exploring innovations in wholesale central bank money:

- As part of the Future Roadmap for our Real-Time Gross Settlement service,[1] the Bank is working closely with industry to design functionalities that support industry innovation. These functionalities include extending RTGS settlement hours and a synchronisation interface that would allow RTGS to connect to external ledgers, including those based on programmable platforms, and settle assets in central bank money.
- Central bank money could interact with programmable platforms through the use of so-called 'wholesale central bank digital currency' (wCBDC) technologies.
- Further work is required to consider the respective roles these innovations might play in the Bank's future toolkit.
- To inform this work, the Bank proposes a programme of experiments to test the use cases, functionalities and prospective designs of both wCBDC and synchronisation, and their relative merits.

Third, we set out the outcomes which we seek in the retail payments landscape, in order to deliver trust and confidence in money:

- In addition to being the supervisor of systemic payment systems, the Bank is: the authority responsible for the overall stability of the financial system; the operator of RTGS which ultimately settles all retail and wholesale electronic payments; and the provider of the sole risk-free asset that gives effect to settlement for payments.
- We seek a payments landscape which maintains the singleness of money and promotes sustained innovation, with infrastructure and a wider ecosystem that is resilient and has sustainable governance and funding models.
- The Bank judges that meeting the retail payments outcomes set out above will require clear and renewed leadership by the UK authorities in this space. The Bank will work closely with HM Treasury, the Payment Systems Regulator (PSR), the Financial Conduct Authority (FCA), and industry to deliver them.

HM Treasury has been considering its response to the 2023 Future of Payments Review, which provided recommendations to successfully deliver world-leading payments. The government has now confirmed its intention to take forward a National Payments Vision, and we will engage closely with HM Treasury to meet their ambitions for the UK payments landscape as a whole.

Fourth, as we move forward domestically, we will engage with international partners to consider how our respective payments landscapes can interoperate in a way that reduces frictions to cross-border payments, while managing the potential risks from this to international monetary and financial stability.

The Bank would welcome views on both the overall approach proposed in this discussion paper, as well as a specific number of areas which include:

1. Are there areas in which programmable platforms, including those enabled by DLT might bring significant benefits and risks in payments and settlement?
2. How likely are programmable platforms, including those enabled by DLT, to be taken up at scale by wholesale financial markets?
3. What are respondents' views on the pace of innovation in private money – in particular, commercial bank money – used in retail payments?
4. What are respondents' views on the wholesale infrastructure that might support retail payments innovations, including to ensure that singleness of money can be maintained across stablecoins and tokenised deposits?
5. What are the risks and benefits from the use of: a) tokenised deposits; and b) stablecoins for wholesale transactions?
6. Are there innovations that could support central bank money being equipped with the requisite functionality to ensure safe settlement in light of technological advances in financial markets?
7. What are respondents' views on potential functionalities of a wCBDC and how might these inform wCBDC design?
8. Will the proposed programme of experiments help to assess these potential functionalities for central bank money?
9. What are respondents' views on the outcomes that the Bank seeks in retail payments and how can they be reflected in practical questions currently facing policymakers and industry?

The Bank invites views on the questions listed above. Respondents should provide answers by 31 October 2024. You can also respond by email to: ✉ **PaymentsInnovationDP@bankofengland.co.uk**

1: Introduction

1.1: Payment and settlement in public and private money

There are two forms of money in the UK:

- **Public money:** This is money issued by the Bank of England – also known as 'central bank money'. It currently takes two forms: banknotes, which are available to everyone; or deposits at the Bank of England, which are only available to commercial banks and financial institutions that meet certain criteria. Public money is backed by a promise of the state and is therefore the ultimate risk-free asset in the financial system.
- **Private money:** This mainly takes the form of money issued by commercial banks to their customers in the form of deposits – also known as 'commercial bank money'. Its value is preserved through a combination of strict regulation and commercial banks' access to public money in the form of deposits at the Bank of England. The vast majority of money is private money.

For money to function effectively, two criteria must be met:

The first is the principle of the 'singleness of money'. Under this principle, all different forms of money – whether we hold them in bank accounts, notes, or coins etc – must be exchangeable with each other at par value. In other words, the value of a pound in an individual's bank account must equal the pound coin in another individual's pocket. Singleness is crucial to monetary and financial stability for a number of reasons:

- First, households and businesses can be assured that all money in the economy has the same value at all times. This underpins trust and confidence in money.
- Second, there is an unambiguous unit of account that underpins all economic transactions in society.

The second is 'finality of settlement'. In addition to its roles as a store of value and a unit of account, money is a medium of exchange. Finality of settlement ensures that when we pay for something, we are assured that it actually has been paid for at par value. Settlement is a cornerstone of the financial system – it ensures that money can fulfil its critical role of acting as a medium of exchange.

Together, these ensure that money is able to serve its purpose of supporting economic activity.

Given the importance of singleness and settlement finality, the effective and safe operation of the payments and settlement system is critical to the Bank's monetary and financial stability objectives.

1.2: The Bank's roles and responsibilities in payments and settlement

In pursuit of our monetary and financial stability objectives, the Bank carries out a range of functions and policymaking roles in relation to payments and settlement, including:

- management of a balance sheet on which central bank money is created – the ultimate settlement asset for payments in the economy and the bedrock of confidence in financial markets;
- operation of the core infrastructure to transmit that money through the financial system and the economy more broadly, known as the Real Time Gross Settlement (RTGS) service and the CHAPS high-value payment system;
- acting as banker and settlement agent for securities trades in certain core financial markets that settle in central bank money;
- regulation and supervision of the financial market infrastructures in the system that give effect to payments and settlement; and
- regulation and supervision of the banking system – the primary source of private money in the form of bank deposits.

Across these functions, the Bank faces an increasingly complex landscape of challenges. These challenges are not always UK-specific. Some are cross-border in nature, and they could apply equally to the Bank as to other jurisdictions' central banks. These include:

- the renewal of RTGS systems, some of which have now been in operation for around 30 years;
- ongoing international efforts to enhance cross-border payments;
- innovations in central bank money and global discussions underway on 'wholesale CBDC';
- innovations in private money, whether in the form of tokenised commercial bank deposits or stablecoins; and
- the modernisation of the retail interbank payment systems.

Central banks cannot afford to address these challenges in isolation from each other. The approach taken to one of these challenges will inevitably have consequences for the approach to others. Accordingly, this discussion paper is an attempt to draw these strands together.

This discussion paper includes the following remaining sections:

- Section 2 sets out the innovations we face in the payments and settlement landscape.
- Section 3 sets out our response to these innovations to date.
- Section 4 sets out how our response will evolve going forward.

2: Innovations in the payments and settlement landscape

Innovations in money and payments present both risk and opportunities for central banks' monetary and financial stability objectives. Central banks must be fast to engage with them and prepare for their implications.

2.1: The use of programmable ledgers in financial markets

One such innovation is the use of programmable platforms, including those based on Distributed Ledger Technology (DLT). Box A sets out a brief explanation of how DLT might be applied in financial markets. In some cases, the benefits of DLT may be applied without necessarily applying DLT itself.

> **The Bank judges that the use of programmable platforms may bring significant benefits in the functioning of wholesale financial markets, amongst others.**

In a securities transaction, for example, one financial institution sells a bond to another financial institution. The transaction is usually settled on a 'Delivery vs Payment' ('DvP') basis,[2] where delivery of the asset to the buyer (the 'asset leg'), is conditional on transfer of money to the seller (the 'cash leg').

Under traditional financial architecture, we can simplify a securities transaction into two elements:[3]

- The first is execution – the decision between two parties to buy and sell – which is relatively fast and straightforward.
- The second is settlement, which relies on a longer and more complex post-trade process. In Europe and the UK, broadly speaking, most securities settlement currently takes place on a T+2 or T+3 basis (ie two or three days after execution). However, work is underway in the UK to explore the case for moving to a T+1 settlement cycle and how this could be implemented.

DLT could simplify these post-trade processes, as set out in Box A.

2.2: The likelihood of greater use of programmable ledgers in financial markets

Some of these changes may increase efficiency and enhance financial stability. For example:

- consolidation of functions can reduce back-office processes and the need for manual

reconciliation, reducing the cost of fees paid to intermediaries;

- greater standardisation, and the ability to hold fractions of high-value assets (such as units in investment funds or part of a real estate asset), could increase the pool of potential investors for those assets and hence their liquidity; and
- automation could also speed up settlement processes – facilitating same-day settlement. As a result, credit risk exposures between counterparties in these transactions would be lower. Collateral requirements would also fall as a result, freeing up assets for other uses.

> **However, there are reasons why these technologies may not be taken up at scale by financial markets.**

The liquidity benefits outlined above might be offset by other factors, such as the potential need for liquidity pre-positioning given shorter settlement cycles or liquidity fragmentation across a greater number of different systems.

Furthermore, the basic premise of technologies such as DLT is that they support trust between different parties in what might otherwise be a low trust environment.[4] However, the wholesale financial markets in which one might be seeking to apply DLT are relatively high-trust environments:

- Participants are often regulated institutions.
- Risk is often managed in centralised infrastructures, which are also regulated institutions.
- Assets are exchanged for money, which is also either highly regulated or issued by the central bank.

Central banks and market infrastructures would still be necessary to maintain trust and manage financial risk. This may, to some extent, limit gains from the use of these technologies in wholesale financial markets, and thus reduce take-up.

In addition, DLT involves the replication and independent verification of the authoritative ledger by multiple participants, which is often less scalable than a ledger held by a single entity. This could result in a lower throughput of transactions, potentially offsetting benefits from using DLT.

> **The potential benefits of DLT can only be realised if market participants issue tokenised financial assets ie assets which could be represented in digital form on programmable platforms.**

The issuance of tokenised bonds by corporates, public authorities and international financial institutions has increased significantly over the past two years. However, tokenised issuances remain a small proportion of total bonds issued over the same period. S&P estimated that in 2022, nearly $1.5 billion of digitally native bonds were issued in total compared to $7.3 trillion of traditional bonds – a share of 0.02%.[5]

The extent to which programmable platforms have an impact on the Bank's objectives ultimately depends on the likelihood that financial markets find it more attractive than traditional infrastructure, and therefore take it up at scale. Like others, the Bank's assessment at this juncture is that the likelihood of this remains uncertain. However, preparation for potential widespread adoption is important to ensure we continue to meet our objectives, and make it more likely that these technologies might become attractive to financial markets.

Moreover, yet to emerge DLT use cases may also affect take-up, so we must guard against a 'failure of imagination'. The use cases for many past innovations may have seemed inconceivable until shortly before they took off at scale.

2.3: The impact of DLT on new forms of private money

DLT-based transactions need a settlement asset that is compatible with DLT-based infrastructure.

The tokenisation of financial market instruments described above has taken place alongside innovations in money and money-like instruments like tokenised deposits and stablecoins. These new forms of making payments could support households and businesses by being faster, cheaper and more functional. They could be used in both wholesale and retail contexts.

2.3.1: Tokenised deposits

Some commercial banks have begun to issue tokenised deposits. These are deposit claims represented on programmable platforms that enable new techniques for making payments and settlement. Tokenised deposits could be either:

- non-transferable deposit claims which, like existing deposits, require settlement in central bank money upon transfer to a customer of another bank; or
- transferable deposit claims, where payments between individuals can lead to the recipient of the payment becoming a customer of the issuing bank, ie the claims are self-settling upon transfer.

Some commercial banks have built DLT platforms where their deposits can be tokenised and transferred between their customers. Under these arrangements, financial institutions can join the bank's platform as wholesale customers to trade and settle tokenised assets. The tokenised asset transactions settle in the bank's tokenised deposits.

2.3.2: Stablecoins

Stablecoins are also private settlement assets which could be represented on a programmable ledger. They purport to maintain a stable value relative to a fiat currency by in turn holding other

assets (which may be of variable value) as backing.

As stablecoins operate today, they are mainly used as a settlement asset for transactions in crypto-asset markets. Current stablecoins do not meet the standards the Bank would expect were they to be used for payments more widely.

However, as stablecoins may offer advantages over current payment methods in terms of cost, convenience and functionality, households and businesses could quickly start to use them for everyday payments.

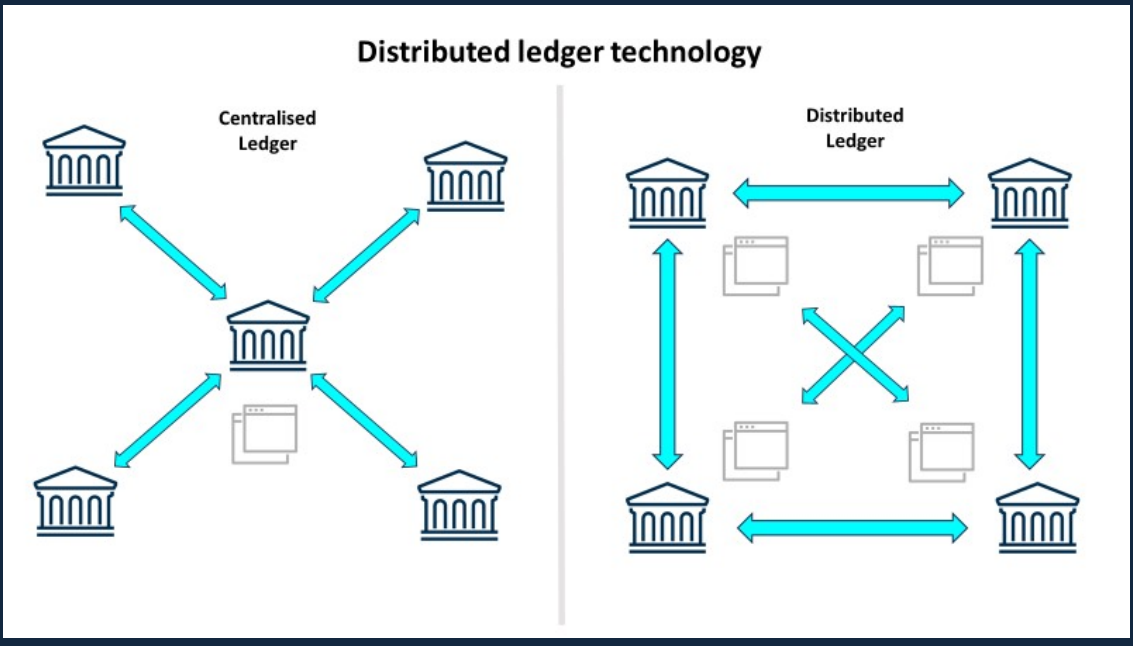
Box A: How might Distributed Ledger Technology change post-trade processes?

For money to exchange hands in electronic payment and settlement systems, information and instructions must be transmitted between financial institutions.

Currently, each financial institution records transaction information on its own ledger. A 'ledger' is a record of financial accounts. Historically it took the form of a book, but it might in modern terms be thought of as a spreadsheet or database. For example, the purchase or sale of a financial instrument would typically be recorded by the buyer and seller on their ledgers. A central securities depository (CSD) – which holds the ultimate ledger recording ownership of financial securities – validates and facilitates the asset transfer and would also record the transaction on its own centralised ledger.

By contrast, Distributed Ledger Technology (DLT) could enable participants to maintain timely and secure transaction records on a shared, programmable ledger without needing to defer to, or rely on, other participants or ledgers. This could reduce frictions and inefficiencies by removing some of the need for buyers and sellers to carry out both post-trade events such as the payment of coupons and manual reconciliation.[6]

Conventional ledgers versus a distributed ledger



In DLT systems, participants agree to a predefined set of rules, which act to verify that information is correct and agreed on by most participants.[7]

This approach also opens the possibility of automating certain actions by having them built into financial contracts, such as paying bond coupons in so-called ‘smart contracts’, and combining these contracts (known as composability) to enable greater functionality. This can reduce back-office transaction costs associated with securities trading. The process of representing an asset or forms of money on programmable platforms that enable smart contracts is often referred to as ‘tokenisation’.

Box B: What’s the difference between retail payments and wholesale payments?

The distinction between retail and wholesale payments is not always clear cut.

One approach could be to define them based on the parties to the transaction: payments between individuals and businesses are retail; and payments between financial institutions are wholesale. Another approach could be based on value thresholds: transactions below a certain value are retail; and above it they are wholesale.

However, broadly speaking, we would consider that:

- wholesale payments are high value and low volume; and
- retail payments are high volume and low value.

Under this approach, wholesale payments might include securities and equities transactions in capital markets. Retail payments might include day-to-day bank transfers including bills, salary and benefit payments, and purchases made using credit or debit cards.

3: Our response to innovation in the payments and settlement landscape to date

Over the past few years, the Bank has undertaken a number of initiatives in response to innovations in the payments and settlement landscape, including:

- our RTGS Renewal Programme and Future Roadmap for RTGS;
- our work with the FCA on the development of a Digital Securities Sandbox (DSS);
- our approach to new forms of private digital money such as tokenised deposits and stablecoins; and
- our exploration of a retail CBDC.

3.1: RTGS Renewal Programme

It is now nearly 30 years since central banks around the world first introduced Real Time Gross Settlement (RTGS) systems. This was a step-change in the history of money and central banking. RTGS replaced the previous practice of high-value transactions being settled on a deferred net basis at the end of the day. In doing so, it significantly reduced the financial stability risk of banks building up exposures between each other over the course of every day before settlement would take place across accounts at the central bank.

The Bank's RTGS service is at the heart of the UK payment and settlement landscape. RTGS allows commercial banks and certain other financial institutions to settle their obligations to each other electronically, immediately and using the ultimate risk-free asset – the deposits they hold with the Bank of England. As such, it is a critical part of the national infrastructure – its operations are vital to maintaining financial stability and confidence in money.

By hosting the reserve accounts of commercial banks, RTGS is also the mechanism through which the Bank provides liquidity to the financial system and implements Monetary Policy Committee (MPC) decisions on interest rates. It is crucial to delivering every part of the Bank's mission.

The Bank is nearing completion of a programme of work to deliver a renewed RTGS service, which includes a new core ledger and a range of new features and capabilities.

The renewed RTGS system will provide benefits for industry across four key areas: increased resilience; wider access; greater interoperability; and improved user functionality. The new RTGS core settlement engine, which will be introduced in the next few months, has been designed in a flexible and modular way. It will enable future changes to be faster and more efficient.

In 2017, the Bank was the first G7 central bank to offer settlement accounts to non-bank payment service providers (NBPSPs) to promote access, competition, and innovation. This was followed in 2021 by a new access policy for omnibus accounts, which will enable RTGS to interoperate with emerging technologies (such as DLT) and new business models.

The Bank has also improved international operability and reduced frictions to cross-border payments by implementing the ISO 20022 global messaging standard for CHAPS payments.

There are a number of further enhancements to RTGS, informed by engagement and working together with industry, which are also under consideration as part of the RTGS Future Roadmap.[8] In addition to the measures to further enhance resilience the Bank is working closely with the industry to design and prepare for delivering features such as:

- a synchronised settlement interface to RTGS, which would allow RTGS to interoperate with other ledgers (eg overseas RTGS and other assets such as land registries) and DLT; and
- extended RTGS settlement hours, which would serve as a catalyst for further innovation, for instance by facilitating integration of central bank money more seamlessly into ‘always-on’ payment solutions.

3.1.1: Omnibus Accounts to facilitate wholesale DLT-based settlement

The introduction of ‘Omnibus Accounts’ in 2021 enabled banks to pool their money held at the Bank of England. In turn this money can be used to achieve DLT-based settlement fully funded by central bank money but taking place on a privately operated platform. It works as follows:

- A regulated financial market infrastructure (FMI), which could provide services using DLT, acts as the payment system operator.
- The FMI holds an Omnibus Account with the Bank.
- Banks who hold reserves accounts at the Bank can then transfer part of the balances in their reserves accounts into the FMI’s Omnibus Account at the Bank.
- The FMI then effectively creates an alternative digital representation of the money in the Omnibus Account which can be used as a settlement asset for transactions that take place on the FMI’s platform.

The Omnibus Account offers a number of benefits to both the FMI and its participants:

- The full funding of DLT-based transactions in central bank money provides participants reduced credit risk when holding funds and making payments via the FMI.
- Participants can adjust funds allocated to the payment system in real-time, improving flexibility to manage their funds intraday.
- The FMI can also operate outside RTGS operating hours, as long as sufficient funds have been pre-positioned in the account before RTGS closes.

- In principle, FMIs using the Omnibus Account could enable efficiencies in interbank payments, including Payment versus Payment (PvP)/Delivery versus Payment (DvP) settlement and potentially faster and cheaper cross-border payments.

3.2: Digital Securities Sandbox for tokenised assets

The Bank and the Financial Conduct Authority (FCA) have taken steps to set up a Digital Securities Sandbox (DSS). This initiative will ensure that market participants can innovate by issuing and trading digital assets in a safe regulatory environment.[9] The Bank and FCA have three overarching aims:

- facilitating innovation to promote a safe, sustainable and efficient financial system;
- protecting financial stability; and
- protecting market integrity and cleanliness.

The DSS will be open to a wide range of firms, including new FMI providers, and financial instruments. The DSS will modify existing regulations in the UK to enable financial market participants to use new technology – such as DLT – in the trading and settlement of digital securities such as shares and bonds. Successful applicants to the DSS will be able to provide securities depository and settlement services and operate a trading venue under those modified regulations. The trading and settlement of derivative contracts are not in the scope of the DSS.

The DSS represents a major step in exploring innovation in digital assets in the UK and could lead to faster and cheaper ways for these securities to trade, settle, and be used among financial market participants.

Digital securities issued through the DSS offer a test case for exploring forms of payment that can interact with programmable securities platforms. In due course, it could support new models of sterling central bank money settlement. UK FMIs operating globally and have non-UK entities that provide settlement services for digital assets might be able to leverage their wider groups' technologies to provide these kinds of settlement services in the UK.

3.3: The regulation of new forms of private money

For their benefits to be realised, stablecoins and tokenised deposits must be safe – trust and confidence in them will be fundamental to monetary and financial stability. The Bank is taking a number of steps to ensure this.

3.3.1: Regulation of tokenised deposits

The Prudential Regulation Authority (PRA) recently issued a 'Dear CEO' letter that highlighted risks around banks' innovations in digital money, including the tokenisation of deposits. The letter set out how the PRA expects banks to address these risks.

Where tokenisation does not change the underlying economics and fundamental nature of a depositor's claim, the PRA's prudential regulatory framework will treat a 'tokenised' deposit similarly to a 'traditional' deposit. Where banks intend to take tokenised deposits from retail customers, the PRA expects this to be done in a way that meets the PRA's rules for eligibility for depositor protection under the FSCS. More generally, all innovations in the use of digital money may pose novel challenges. The PRA expects banks to consider these challenges at a senior level within their organisations and to keep supervisors informed of their innovation plans for digital money.

3.3.2: Regulation of stablecoins

The Bank issued a discussion paper in November 2023 proposing a regulatory regime for the use of stablecoins in systemic payment systems.[10] The proposed regime focuses on sterling-denominated stablecoins used at a systemic scale for retail payments, though no such stablecoins are used in the UK at present.

The Bank is considering the wide range of feedback received on the discussion paper before consulting on final proposals. The **discussion paper** proposed the following requirements for stablecoin issuers:

- 1:1 backing in central bank money: Systemic stablecoin issuers would need to hold £1 in Bank of England deposits for every £1 of coins issued. This would ensure stablecoins maintain their value, in combination with other regulatory protections.
- No remuneration: Central bank deposits held as backing assets by systemic stablecoins issuers should not be remunerated. This is because stablecoins are expected to play a very limited role in the transmission of monetary policy – as they would not engage in lending or be significant participants in money markets.
- Limits: Limits would be needed on holdings of stablecoins used in systemic payment systems, to mitigate financial stability risks stemming from large and rapid outflows of deposits from the banking sector which could threaten the singleness of money. Following responses to the discussion paper, the Bank is assessing the technical and operational practicalities of such limits (including entity-specific limits).
- Safeguarding regime: Given the absence of deposit protection, a safeguarding regime helps to ensure that stablecoins are fully backed and the backing assets are duly protected and available to satisfy coin-holders' redemption requests.
- Capital requirements: Stablecoins should hold additional capital against risks that may result in a shortfall in the backing assets or that can threaten the firm's ability to operate as a going concern.

3.4: Retail CBDC

While cash remains available to all – and the Bank of England remains committed to continuing to provide it for those who want to use it – its use in transactions is declining.

Given this, the Bank and HM Treasury, alongside public authorities in many other countries, are exploring the concept of retail CBDC. In the UK this would be 'the digital pound', issued by the Bank. It would complement physical cash and other payment mechanisms as a new form of digital money for use by households and businesses for their everyday payment needs.

A digital pound could help to ensure that central bank money remains available and useful in an ever more digital economy, continuing to support UK monetary and financial stability. It could also provide a public platform for private sector innovation, promoting further competition, efficiency and choice in payments.

No decision has been taken on whether or not to issue a retail CBDC. However, the Bank continues to carry out preparatory work to ensure the option to issue is available if needed. The Bank will ensure that there is a robust and objective assessment of potential benefits and costs of a retail CBDC, including operational and technical feasibility.

As set out in the Bank's consultation paper in February 2023[11], the primary motivations for why a retail CBDC may be needed are:

- to support the singleness of money by ensuring that the public always has the option to hold central bank money that can be used in their everyday lives; and
- to promote innovation choice and efficiency in payments as our payments habits and economy become more digital.

Any decision on whether or not to proceed to build a retail CBDC will depend on how trends in money and payments evolve.

As such, a key input into decisions in relation to a retail CBDC will be evolution of the wider payments landscape. This discussion paper sets out an approach to wider innovation which will inform and provide important context for future decisions on whether a retail CBDC is needed.

Specifically, the Bank will consider the pace of innovation in other forms of private money, in particular commercial bank money used in retail payments, as well as how our own wholesale infrastructure might support retail innovations.

In line with its retail payments outcomes set out in Section 4.3.1, the Bank considers that commercial bank money needs to keep pace with the needs of consumers and so carry functionalities to deliver safe and sustainable innovation in payments. Absent such innovation, central banks may be left as the only game in town insofar as retail payments innovation is concerned.

4: Our response to the changing payments and settlement landscape going forward

In addition to the initiatives which the Bank has undertaken thus far to respond to the changing payments and settlement landscape, our response must now develop further.

This section sets out the components of how the Bank proposes to achieve this:

- first, the Bank's financial stability risk appetite for settlement in central bank money;
- second, the Bank's approach to pursuing innovations in wholesale central bank money;
- third, the overall outcomes the Bank seeks to pursue in retail payments; and
- fourth, the areas we seek to engage on in our dialogue with international partners.

4.1: The role of settlement in financial stability

Both public money (issued by central banks) and private money (which, for now, is mainly issued by commercial banks) can be used to settle transactions:

- **Commercial bank money settlement** takes place on a commercial bank's balance sheet through the transfer of money from one customer's account to another customer's account. Commercial bank money bears low risk as a settlement asset.
- **Central bank money settlement** takes place on the Bank of England's balance sheet through the transfer of money between accounts in RTGS. Central bank money bears no risk as a settlement asset. It therefore plays an anchoring role for commercial bank money.

Given the critical role of settlement in the financial system, the appropriate balance between the use of central bank money and private money in settlement is a fundamental financial stability judgement.

Central bank money and commercial bank money should coexist to support efficient and competitive financial markets. Private money usage enables competition, innovation, and – uniquely and crucially in respect of commercial bank money – credit creation which underpins the real economy. Alongside this, public money usage underpins trust and stability, allowing safe innovation to take place. Accordingly, public and private money – and an optimal mix between them – can play complementary and mutually supporting roles.

4.1.1: The use of central bank money as a settlement asset

Given central bank money is backed by a promise of the state, it is the ultimate risk-free asset in

the financial system and near-universally accepted. Over the past three decades, its role as a settlement asset in financial market transactions has grown. This trend has been the result of both:

- organic factors such as institutional and historical conventions which informed market structures; and
- a more conscious choice on the part of public authorities, particularly since the financial crisis.

Box C sets out in further detail the possible drivers of the trend towards greater use of central bank money.

4.1.2: The Bank's financial stability risk appetite for wholesale settlement in central bank money

> **The Bank has a low risk appetite for a significant shift away from settlement in central bank money towards commercial bank money and other forms of private money as innovation in money and payments progresses. We judge that there is strong financial stability case for policymakers to preserve the role of central bank money as a vital anchor for confidence in the financial system.**

Even though the risks of using commercial bank money as a settlement asset have reduced, the test of its credibility would be how market participants perceive it during a systemic stress. In such a scenario, confidence can quickly be lost and take longer to regain than to lose.

This loss of confidence in commercial bank money could have broader consequences for monetary and financial stability, by calling into question the singleness of money and amplifying dysfunction in any financial markets that use commercial bank money as a settlement asset.

Moreover, any such loss of confidence is most likely to take place in a period of stress when banks and non-bank financial institutions (NBFIs) would already be facing liquidity pressures. Taken together, these two effects could reinforce each other. Were this to impact core financial markets, it would make a spillover into the broader financial system and businesses and households in the real economy highly likely.

4.1.3: Policies to increase access to central bank money

> **Consistent with our financial stability risk appetite set out above, the Bank is exploring ways to expand access to central bank money as a settlement asset. Further detail is set out in our discussion paper on reviewing access arrangements to RTGS.**

While the commercial banks that are direct participants in CHAPS settle transactions in central bank money, those banks in turn settle transactions for other financial institutions, known as indirect participants. This arrangement is known as 'tiering'. Given CHAPS has 38 direct participants which settle transactions for several thousand other financial institutions, it represents

a highly tiered system.

> **Tiering could pose financial stability risks if confidence in commercial bank money reduced in a stress. This could increase counterparty, credit, and liquidity risks between direct and indirect participants. Increasing direct participation in CHAPS can reduce financial stability risk. The risk of contagion across the banking system would be lower if a settlement bank came under stress. Increasing direct participation would bring the UK in line with other countries.**

Research by Bank staff found that in past instances where the extent of CHAPS tiering was reduced, there was a material impact in reducing credit risk such that the average intraday exposures between first and second-tier banks dropped by anywhere between £0.3 billion and £1.5 billion per bank. In addition to the financial stability benefits, this research also demonstrates benefits to banks and their business models. The cost of insuring against losses arising from these exposures outlined above dropped by about £4 million to £19 million per bank, per year.[12]

Since 2013 any indirect participant settling payments worth at least 2% of total CHAPS flows has been expected to become a CHAPS direct participant. As a result, six new firms became CHAPS direct participants. The Bank is currently reviewing whether to lower the 2% threshold to further increase participation.

In addition to this, in 2017, the Bank widened RTGS access to non-bank payment service providers, and the renewed RTGS service is being built to accommodate a substantial increase in the number of account holders. The Bank has also sought to make direct access to CHAPS easier and cheaper, such as by adopting the ISO 20022 messaging standard and permitting participants to use cloud systems and aggregators.

4.1.4: The use of stablecoins as a wholesale settlement asset

While this discussion paper has so far focused on the use of commercial bank money as a private settlement asset, the Bank has also put forward proposals for a regulatory regime for stablecoins as another form of private money. Those proposals focus on sterling-denominated stablecoins used for retail payments.

> **The Bank considers that there are significant financial stability risks from the use of stablecoins for wholesale transactions.**

We judge that these risks are an order of magnitude greater than the risks posed by retail use cases. Absent holding limits, were the financial system to come under stress, stablecoins used for wholesale transactions could become an option which market participants could run to, leading to sudden bank disintermediation. This could take place at scale given the high values of wholesale transactions and could further destabilise the financial system, with potential disruptions to banks and NBFIs such as money market funds.

In the UK, stablecoins are yet to have been taken up as a settlement asset for high value capital markets transactions, and the holding limits proposed in our retail regime would constrain wholesale use of stablecoins at systemic scale.

The Bank will continue to explore the potential financial stability implications of the use of stablecoins for wholesale transactions, including the extent to which the risks outlined above might be mitigated.

4.2: Innovations in the provision of central bank money

If DLT usage increased in financial markets, but central bank money was unable to interact with DLT platforms, settlement could shift from central bank money to private money, such as tokenised deposits or stablecoins.

The Bank has a low financial stability risk appetite for this outcome. Central bank money must therefore keep pace with technological advances in financial markets such as tokenisation. Accordingly, the Bank is considering innovations in wholesale central bank money to ensure it continues to play its critical role as an anchor for confidence in the financial system.

4.2.1: Synchronisation approaches

One way central bank money could interact with DLT platforms is known as ‘synchronisation’. This refers to a range of approaches where an asset is transferred from one party to another on an external platform (including potentially one based on DLT), but the cash leg of the transaction takes place on the existing RTGS ledger. Under a synchronisation model, the two legs of the transaction are mutually conditional or ‘atomic’ – the asset is only transferred if the cash is and vice versa.

> **The Bank is working closely with the industry to assess business cases and define a high-level design for a synchronisation functionality. Among other uses, this functionality would allow RTGS to support safe settlement of digital asset transactions which could in part take place on DLT platforms.**

This process would be orchestrated by a ‘synchronisation operator’, whose role is to facilitate communication between the asset ledger (eg a DLT platform) and RTGS. Box D sets out further detail on how this process would operate under the Bank’s proposals.

Synchronisation has been tested in experiments. The Bank of England and the BIS Innovation Hub London Centre developed the Meridian prototype, which demonstrated how to orchestrate synchronised settlement in central bank money using housing transactions as an exploratory use case. The house was represented by a digital deed on a DLT platform, and the cash settlement leg took place in RTGS. A follow-up project, Meridian FX, building on the findings of this project

will consider the usability of synchronisation for FX transactions, together with the Eurosystem.

While the above approach represents the Bank's proposals, other central banks are developing their own approaches to facilitate settlement in central bank money of wholesale financial transactions involving tokenised assets. Two approaches seek similar outcomes in terms of linking central bank money settlement to external ledgers:

- The Bundesbank has developed an approach known as the 'trigger solution' where DLT infrastructure acts as a technical bridge between the Eurosystem RTGS system (TARGET service T2) and market DLT platforms. The trigger solution is similar to the Bank's work on synchronisation but differs slightly in terms of how funds in RTGS are earmarked.
- The Banca d'Italia has developed an approach known as the 'TIPS Hash-Link'. Assets are transferred on a market DLT platform while central bank money is transferred on a platform similar to the TARGET Instant Payment System (TIPS) – the Eurosystem's instant payments platform. TIPS Hash-Link uses an application programming interface gateway to bridge the two platforms.

4.2.2: Wholesale central bank digital currency approaches

Another way central bank money could interact with DLT platforms is through the use of so-called 'wholesale central bank digital currency' (wCBDC) technologies. In the case of a securities transaction, this approach would allow both the tokenised asset and the tokenised central bank money to be exchanged on DLT rails. Like synchronisation, this too achieves atomic settlement. Box E sets out further background on global developments on wCBDCs.

For the purposes of this discussion paper, we use the term wCBDC to mean a new platform for the distribution of wholesale central bank money which unlocks separate functionalities or efficiencies to those enabled by RTGS systems. That said, there is no settled definition of wCBDC among central banks.

Central banks have provided wholesale central bank money to commercial banks for several decades in digital form through RTGS accounts. Given this, our starting point is that wCBDC and the central bank money created by RTGS systems should be indistinguishable in their core economic characteristics. Deviation between these two means of payment would undermine the singleness of money and result in the emergence of a twin-tracked monetary system.

The greater functionalities which wCBDC might enable would ultimately depend on the design of wCBDC. The Bank welcomes views from respondents to this discussion paper on what these functionalities might ideally include, and how they might inform wCBDC design.

Current programmes of central bank experiments around the world test a range of designs and use cases for wCBDC. Box F sets out three different models of provision for wCBDCs, as

identified by the Banque de France.[13]

One commonality in the experiments carried out by individual central banks to date has been that the 'minting' of wCBDC tokens has not been 'digitally native'. The units of central bank money existed in RTGS ahead of being converted into tokenised form so that they can be exchanged on a DLT platform.

Another core design question for wCBDC may relate to the DLT platform on which wCBDC units are exchanged – specifically whether this is an infrastructure provided and controlled by the central bank or another entity. Some central banks have minted wCBDC units for exchange on third-party platforms – creating a dependency on the operational resilience of such platforms.

4.2.3: Further work to explore innovations in central bank money

> **The Bank judges further work is required to explore the role of these innovations in the provision of central bank money might play in the Bank's future toolkit. To inform this work, the Bank proposes a programme of experiments to test the innovations outlined above.**

Our programme of experiments would be grounded in a set of policy outcomes which we seek from innovations in wholesale central bank money. The programme would cover both wCBDC and synchronisation, as well as the relative merits of these two approaches.

This discussion paper sets out a broad design for such a programme of experiments and would welcome responses on its objectives and approach.

4.2.4: Policy outcomes we seek from innovations to central bank money

While our monetary and financial stability objectives are timeless, within these we have identified a set of specific policy outcomes for wholesale central bank money provision. Since we published our **RTGS Renewal blueprint** in 2017, a number of developments have unfolded:

- **First, the financial services industry has shifted towards a more developed set of DLT use cases.** These include a rationalisation of post-trade processes in capital markets transactions which would boost efficiency and market liquidity. This has been tested through digital issuances of live securities in several jurisdictions as well as through proofs of concept and experiments on asset and liability tokenisation.
- **Second, several other jurisdictions' have started wCBDC development.** Some have moved from experiments/proofs of concept towards more advanced pilots.

Taking these developments into account, we consider that wholesale central bank money provision should target the following policy outcomes:

- **Outcome 1: Central bank money must keep pace with technological advances in financial markets.** It must be equipped with the requisite functionality support central bank money settlement of tokenised wholesale transactions. This will meet our financial stability risk appetite for settlement in central bank money so that innovations in financial markets do not lead to a significant increase in the use of private settlement assets.
- **Outcome 2: Innovations in financial markets must be harnessed in a way that supports our financial stability and monetary policy objectives.** If tokenisation increases the efficiency and speed of post-trade processes, this could release liquidity and reduce settlement risk and cost in wholesale financial markets. It may also enhance cross-border payments.
- **Outcome 3: The UK's financial market infrastructure must remain at the forefront of developments in finance, which will help to support innovation and growth.** It is vital that UK infrastructure maintains an appropriate level of interoperability with new DLT-based infrastructure.

4.2.5: Achieving singleness in the context of stablecoins and tokenised deposits

The emergence of stablecoins and transferable tokenised deposit claims as new means of making payments underscores the importance of these innovations meeting the singleness of money.

Absent stablecoins and transferable tokenised deposit claims, all commercial bank money in the form of different banks' deposits are exchangeable with each other at par. A number of mechanisms achieve this, including:

- the prudential regulation of banks;
- the resolution and deposit insurance frameworks; and
- the role of settlement arrangements (including wholesale central bank money) as an anchor for exchanges using commercial bank money.

In light of these mechanisms, interbank retail payment systems' rules also ensure parity – no individual bank's deposits are worth more than any other bank's deposits.

Tokenisation may facilitate direct bilateral exchange between depositors, ie avoiding a payment system acting as the intermediary which enforces parity through its rules.

To realise any potential benefits from transferable tokenised deposit claims and stablecoin arrangements, the Bank is currently considering approaches to ensure singleness can be maintained across both of these innovations. One approach would be for the Bank to develop its wholesale central bank money infrastructure. This could support singleness by enabling settlement in central bank money to be compatible with bilateral exchanges across stablecoins and tokenised deposits.

Box G sets out how the Monetary Authority of Singapore has been exploring wCBDC infrastructure and how that might support tokenisation in retail payments.

4.2.6: Proposals for a programme of experiments

The experiments would be phased and increase in complexity: we would start with simple use cases and progress, so that each stage can inform the next.

Broadly, the experiments would fall under three categories:

- enabling DvP securities transactions ('Delivery versus Payment' is where delivery of the asset to the buyer is conditional on transfer of money to the seller);
- enabling PvP foreign exchange transactions ('Payment versus Payment' is where payment to the buyer in the form of one currency is conditional on payment to the seller in the form of the other currency); and
- interoperability with global ledger initiatives.

We could test these transactions under both RTGS functionality and tokenised wCBDC where applicable. This would enable relative assessment of the differences and interoperability between the technologies.

This programme of experiments will not delay or divert from work which is already underway between the Bank and the industry on the development of synchronisation as part of the RTGS Future Roadmap.[14]

We already know that both wCBDC and synchronisation can achieve atomicity of settlement for tokenised asset transactions. Given this, for the experiments to add value, we would need to explore all steps across an entire financial market transaction (not just at the point of settlement). These steps might include, for example, information exchange, reconciliations, middle office functions post-trade and coupon payments.

The experiments would ideally assess the relative operational risk and complexity involved in using the two technologies. In addition, an important step would be to assess how different types of financial asset can best be represented on a digital ledger. This would help identify important ledger design considerations and inform later work around interoperability. The experiments should also allow us to assess the scalability of the different approaches.

We set out below an initial set of indicative use cases which we could consider as part of the programme:

- **DvP1:** This experiment could seek to settle a primary market transaction in a tokenised unsecured zero-coupon bond. It could build on Project Meridian which tested central bank

money settlement using synchronisation for a housing transaction.

- **DvP2:** This could build on DvP1 to explore settlement of a secondary market transaction in a tokenised bond with coupons.
- **DvP3:** This could build on the first two DvP experiments. It could seek to settle a tokenised security transaction between two parties, which also includes onward payment for exchange using tokenised private money.
- **PvP1:** This experiment could seek to settle a PvP FX transaction involving RTGS systems in different jurisdictions. Through the BIS Innovation Hub's Meridian FX project, we are already conducting this experiment using synchronisation and the Banque de France is testing this using a wCBDC system. The Bank could conduct a similar experiment using sterling wCBDC.
- **Interoperability with global ledger initiatives:** This could test the exchange of assets and central bank money in multiple currencies on a single platform. We could conduct this experiment as part of the recently announced BIS Project Agora where we and six other central banks will work with private banks to explore a unified global ledger on which multi-currency tokenised commercial bank deposits and central bank money can be exchanged on a single platform.

The Bank welcomes feedback from respondents on the initial set of indicative use cases outlined above, including:

- **whether respondents have any other proposed use cases and which they would prioritise; and**
- **what the Bank's overall experimentation priorities should be.**

The Bank intends to commence the programme within the next six months.

4.3: Retail payments

Wholesale payments are generally high value and low volume, while retail payments are high volume and low value.

The Bank plays several important roles in digital retail payments. In addition to being the supervisor of systemic retail payment systems, the Bank is the authority responsible for the overall stability of the financial system, the operator of RTGS which ultimately settles all retail electronic payments, and the provider of the sole risk-free asset that gives effect to settlement for all retail payments.

There have been innovations in the past few decades that have transformed the way we use money to make payments. Recent technological developments are likely to transform this even further, including in increased demand for account-to-account payments at the point of sale.

Today, there are examples of interbank retail payment systems in countries like Sweden, Brazil and India, that are used alongside cards to make retail payments in ways that do not currently happen in the UK. In some cases, these innovations allow payments to be made using only the recipient's mobile phone number or a QR code. This can offer convenience for customers and savings for businesses.

The UK's retail payments ecosystem must remain fit for purpose to ensure safe innovation can take place in support of monetary and financial stability. This discussion paper outlines a set of policy outcomes that the Bank seeks in retail payments. The Bank will work closely with HM Treasury, the Payment Systems Regulator and the Financial Conduct Authority to achieve these outcomes.

4.3.1: The Bank's policy outcomes in retail payments

The Bank's policy outcomes in retail payments are geared towards the goal of delivering trust and confidence in money.

The UK's retail payments ecosystem must remain fit for purpose to ensure safe innovation can take place in support of monetary and financial stability. This discussion paper outlines a set of policy outcomes that the Bank seeks in retail payments. The Bank will work closely with HM Treasury, the PSR and the FCA to achieve these outcomes.

These outcomes are geared towards the Bank's statutory objectives of monetary and financial stability. Accordingly, they are focused on the goal of delivering trust and confidence in money.

More broadly, HM Treasury has communicated that it will in due course publish a National Payments Vision, which will set out the government's overall ambition for UK payments. The National Payments Vision will necessarily reflect a broader set of public policy objectives than those relating solely to the Bank's mandate. The Bank will continue to work with HM Treasury to take forward the government's ambitions for the UK payments landscape as a whole.

Outcome 1: Singleness of money

- The design, operation and supervision of retail payment systems must support confidence in the one-for-one exchange between central bank money and private money – whether commercial bank money or stablecoins. Put another way, all different forms of money must be exchangeable with each other at par value.
- Any new retail payment systems, whether using commercial bank money or stablecoins, must be interoperable with RTGS as the UK's core payments and settlement infrastructure, so that settlement can ultimately take place in central bank money and so support the singleness of money.

Outcome 2: Innovation

- The retail payments ecosystem and the regulatory environment must support safe and sustainable innovation in payments, consistent with the UK retaining its place within a competitive global financial system while also reducing the potential for disruption.
- Retail payment methods must be responsive to consumer choice and needs. They should be quick, easy, secure, cost effective and widely available to support financial inclusion.
- This should include access to a diverse landscape such that there are alternative forms of payment to those currently in existence (such as credit and debit cards), including the ability to make account-to-account payments to businesses at the point of sale in a broad range of uses cases.
- Payments made on programmable platforms should be available to consumers.
- As part of this, payments infrastructure should enable new entrants to provide payment services without those entities having to issue money.
- UK retail payments systems should have the functionality to be able to communicate and interoperate with overseas equivalents in cross-border payments. Efficiency in this space must be achieved through common standards, including in messaging and the tackling of legal and regulatory barriers. UK payment systems need to upgrade to the latest messaging standards that support interlinking with other countries' faster payments systems.

Outcome 3: Resilience of infrastructure and the wider ecosystem

- There must be end-to-end resilience across the payments chain for retail payments. This includes the need for agile risk management frameworks that enable providers to respond to emerging threats.
- Policymakers must also have the tools to address single points of failure arising from concentration in service provision at critical points in the chain, for instance through expanding the Bank of England's regulatory payments perimeter.

Outcome 4: Effective governance and funding

- Payment systems must have governance frameworks that reflect the views of direct and indirect users of the infrastructure and enable effective supervision.
- Regulations and FMI rulebooks must keep pace with a changing consumer landscape to maintain public confidence in payment systems. This includes tackling authorised push payment (APP) scams through better prevention and detection as well as appropriate consumer protection arrangements.
- Infrastructure providers must have sustainable and coherent funding and revenue models to ensure they can invest in their resilience and modernisation.

4.3.2: The future of the interbank retail payment systems

The outcomes set out above are particularly relevant to the future of the UK's interbank retail

payment systems.

As well as the global card networks (Visa and Mastercard),[15] interbank retail payments in the UK predominantly[16] take place on two payment systems:

- The Faster Payment System (FPS) allows households and businesses to make account-to-account payments in real time 24/7, 365 days a year. Payments can be initiated online, by mobile or via telephone banking. Almost all internet and telephone banking payments in the UK (including standing orders) are now processed via FPS.
- Bacs is used for two types of electronic payments. The first is Direct Debits, which automates bill payments. The second is Direct Credits, which are used to pay employee salaries, benefits, dividends and other payments directly into bank accounts.

At its launch in 2008, FPS was one of the first instant payment systems in the world. It supports the customers of its participant financial institutions being able to make payments to customers of another. Payments between participants are settled three times each working day on a net basis in central bank money using their RTGS accounts. Pay.UK, which is the operator and standards body for FPS and Bacs, has proposed potential upgrades to these two payment systems.

As the supervisor of the UK's systemic interbank retail payment systems, the Bank remains committed to ensuring that our retail payment outcomes are met insofar as the operation of UK payment systems is concerned, including FPS and Bacs.

The Bank judges that meeting the retail payments policy outcomes set out above will require clear and renewed leadership by the UK authorities in this space.

Following publication of HM Treasury's National Payments Vision, the Bank will work closely with HM Treasury, the PSR, the FCA and the industry to deliver the outcomes identified in this discussion paper and the National Payments Vision.

4.4: Innovation and the global financial system

> **As we move forward domestically, we will continue to work with other central banks and international partners to consider how our respective payments landscapes can best interoperate in a way that reduces frictions to cross-border payments, while managing the potential risks from this to international monetary and financial stability.**

The UK is highly integrated into the global trade and financial systems. This openness means that events happening overseas can have a substantial impact on the UK economy. Monitoring such foreign developments and maintaining the 'safe openness' of the UK economy and financial system underpins the Bank of England's monetary and financial stability objectives.

Achieving safe openness may depend on how we and other central banks around the world

engage with a number of questions on payments and settlement:

- In light of innovation and new forms of money, how should our jurisdictions' domestic payments landscapes respond and evolve?
- How might our domestic landscapes interact with each other, and what are the risks and financial stability consequences of fragmentation in global liquidity pools?
- What might be the implications of our choices for capital flows, trade, openness and global growth?

While this discussion paper has mostly engaged with the first question insofar as the UK is concerned, the remainder of Section 4.4 considers the second and third.

This discussion paper has been drawn together with an eye to developments beyond our borders and across the global financial system. It has been informed by, and is a step towards continuing, dialogue with our international partners on these questions.

4.4.1: How our domestic payments landscapes interact with each other

> **As we consider our domestic landscapes, central banks will need to look beyond their respective borders, and avoid the risks of developing their approaches in domestic silos.**

Payment systems should support open and resilient flows of funds, trade, commerce and remittances across our economies. If jurisdictions develop payments strategies abstracting entirely from one another, this could prompt fragmentation in liquidity pools in financial markets, as well as fragmentation in global trade and investment. These economic outcomes may prove difficult to reverse and, in extremis, could threaten financial stability. There are two key policy challenges to consider in this space.

First, there is an interoperability challenge. Different jurisdictions could create new systems that cannot interact effectively. A key question is how to achieve the optimal level of interoperability to support the circulation of money, without disrupting competition between intermediaries, the existing global financial market infrastructures, or the security of transactions.

Some jurisdictions are exploring ways of linking their instant payment systems to support cross-border payments. Most banks in a jurisdiction will be members of these systems or have reliable access through a tiered participation arrangement. Interlinking these systems means we can connect one jurisdiction's retail banks with another jurisdiction's retail banks without needing to go through long chains of intermediaries.

Central banks are also exploring linking up domestic tokenised payments infrastructures. In the BIS Innovation Hub's Project Agora, seven central banks, including the Bank of England, will take part in an experiment to test exchanging

tokenised commercial bank deposits and central bank money in multiple currencies on a single platform.

Second, there's a regulatory coherence challenge. International standards must continue to play a crucial role in building common approaches to the risks associated with new forms of digital money given the global nature of digital asset markets.

4.4.2: Impact of payments on capital flows, trade, openness and global growth

Greater innovation and interoperability, may reduce frictions in cross-border payments and holding multiple currencies. However, central banks will also need to consider the extent to which such innovations may create new sources of macro-financial risk and fragility. If it is easier to move capital across borders, large currency runs might become more likely in a stress, which could amplify and hasten contagion effects between economies.

In September 2023, the International Monetary Fund (IMF) and Financial Stability Board (FSB) considered the possibly macro consequences if so-called crypto-assets reduce frictions in cross-border payments. Much of their analysis is also relevant to other forms of innovation that make it easier to transfer money internationally. If it becomes easier and cheaper to transfer money across borders, this could drive greater cross-border capital allocation and increase the size and volatility of gross capital flows. This could have several implications:

- greater potential for cross-border herding behaviour, which could drive rapid capital flight (or reversals);
- larger gross foreign asset positions leading to higher leverage and greater valuation effects, increasing balance of payments vulnerabilities;
- increased capital outflows reducing domestic savings or diverting foreign capital that could have been invested domestically;
- faster and stronger transmission of global financial conditions;
- some economic activity taking place in other currencies rather than the domestic currency if this enables more frictionless cross-border transactions.

The Bank considers that these questions remain crucial in discussions with our international partners, including the IMF and the FSB. This discussion paper is a step towards continuing those discussions, and will inform the Bank's further engagement with other regulators, central banks and international organisations.

Box C: Possible drivers of the trend towards greater use of central bank money

The drivers of the trend towards greater use of central bank money might include:

First, international standards: The development of international standards for payment systems included requirements to settle in central bank money to support resilience. The Bank for International Settlements' Committee on Payments and Market Infrastructure (CPMI), and the International Organization of Securities Commissions (IOSCO) issued the Principles for Financial Market Infrastructures (PFMIs). Principle 9 of the PFMIs requires that an 'FMI should conduct its money settlements in central bank money where practical and available'.[17]

Second, the modernisation of RTGS systems around the world: Some RTGS systems have operated for in the region of 30 years. Central banks have been embarking on modernising them to leverage new technologies. Depending on central banks' preferences, RTGS renewal programmes could make settling in central bank money easier, more available and safer.

Third, central banks expanding access to 'de-tier' payment systems: Historically, joining central bank operated payment systems has been complex, either because of the technology required or participation thresholds. As a result, these systems can become 'tiered', with larger commercial banks maintaining direct access, and smaller institutions relying on relationships with direct participants to settle in central bank money. This introduces credit, liquidity and operational risk between the indirect participant and the settlement bank. To reduce this risk, some central banks have sought to increase the number of direct participants in their payment systems.

Box D: How would synchronisation work?

To achieve synchronisation, the cash leg on RTGS and the external asset ledger need to be able to speak to each other, and the movement of assets and funds need to be coordinated. This is the synchronisation operator's (SO) role.

The key functionalities that SOs would provide are to:

- send messages between the two ledgers, including translating those messages into a form that each ledger can understand;
- earmark the funds in RTGS and assets on the external asset ledger; and
- synchronise the release of the earmarks thereby ensuring the conditional settlement of funds upon transfer of the asset.

In practice, SOs may well provide a range of services as part of their business model, but cross-ledger coordination and earmarking are the critical functionalities required for synchronisation to enable atomic settlement in central bank money against a wide set of asset classes.

A SO could operate as follows:

- The SO would receive the transaction instruction.
- The SO would check that the correct funds were positioned in the buying participant's account in RTGS and that the asset was owned by the selling participant on the external ledger.
- After confirming this, it would earmark the funds in RTGS and the asset on the external ledger, stopping them from being moved. It would then release the funds and asset such that one moves if and only if the other also moves. Finally, it would send a confirmation of transaction.
- The SO would not hold funds at any point during the transaction and would not hold an account in RTGS.

Synchronisation could allow a broader ecosystem of payment infrastructures to provide different types of DvP/PvP settlement services in central bank money. A SO undertakes essential functions to achieve atomic settlement by enabling programmability in central bank money, using a generic interface which will be introduced into RTGS.

Given this, SOs would play a key role in the settlement process and would constitute a new form of market infrastructure, and as such the Bank is working to understand what kind of supervision and oversight should be applied to them.

Box E: Global developments in wCBDCs

A 2021 BIS survey found that 86% of central banks are actively researching the potential for wCBDC use as a settlement asset; 60% were experimenting with DLT and related technologies; and 14% were deploying pilot projects.[18] Examples of experiments in this space include the following:

- The Swiss National Bank (SNB) has undertaken experiments with large commercial banks to test cross-border trading and settlement of wCBDC between financial institutions. This included testing 'bridges' to transfer wCBDCs between different DLT platforms in different countries.
- The Banque de France (BdF) has undertaken a range of wCBDC experiments, including settling wholesale transactions in a wCBDC that operates on a Eurosystem-owned DLT platform. The BdF has also successfully launched a wCBDC on a DLT platform, facilitating cross-border transactions.
- The Monetary Authority of Singapore (MAS) has tested domestic wCBDC settlement of a securities transaction on DLT; and has undertaken various collaborations including with the Bank of Canada and the New York Federal Reserve to test wCBDC settlement of cross-currency transactions.
- The SNB, BdF and MAS were part of a joint experiment for wholesale settlement in wCBDC using an existing public DLT platform.

A key initiative going forward is the BIS' Project Agora. Seven central banks, including the Bank of England, will take part in an experiment to test exchanging tokenised commercial bank deposits and central bank money in multiple currencies on a single platform.

Box F: Banque de France models for wCBDCs

Integration model: A central bank mints central bank money tokens onto a DLT platform that it operates. That platform is made available for other assets to be tokenised onto, so that both can be exchanged on this platform.

Distribution model: A central bank mints central bank money tokens onto its own DLT platform, but no other assets are hosted on that platform. Instead, the central bank uses a 'bridge' to connect its DLT platform to another DLT platform, run by a third party. Other participants, also use 'bridges' to connect their own DLT platforms (including the platforms on which assets are issued) to the single shared one.

Interoperability model: A central bank mints central bank money tokens onto its own DLT platform; eligible institutions are participants of this platform, but it's only used for central bank money settlement: assets are tokenised onto other platforms. An 'interoperability mechanism' allows the central bank platform to speak to other asset ledgers to enable settlement. Unlike the integration and distribution models, transactions still occur in two legs on two platforms, rather than on a single platform.

Box G: Technology infrastructure for enabling innovations in digital money – Monetary Authority of Singapore pilot

Some jurisdictions are exploring how new technology infrastructure might support tokenisation in retail payments. The Monetary Authority of Singapore (MAS) is running pilots and proofs of concept to explore technology that supports safe and innovative means of interbank settlement and transfer of tokenised assets. This is part of MAS' Orchid Blueprint which sets out the technology infrastructure that would be required to facilitate digital money transactions in the future.

The MAS pilots will build on previous experiments to test infrastructure that could support using wCBDC as a common settlement asset for tokenised interbank payments. It tests the kind of environment in which: (1) banks could issue tokenised deposits that represent claims on their balance sheet by their retail customers; (2) retail customers could use these tokenised bank liabilities in their day-to-day transactions with merchants, who can in turn credit these tokenised bank liabilities with their respective banks; and (3) interbank obligations could be settled via an automatic transfer of wCBDC.[19]

This infrastructure could help facilitate singleness of money through safe settlement in central bank money.

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1. Bank of England (2023), **Roadmap for the Real-Time Gross Settlement service beyond 2024**.
2. This would take place in a central securities depository (CSD).
3. Separating a trade into execution, clearing and settlement slightly simplifies for effect. For example, there may also potentially be collateralisation of trades. There is also messaging and communication surrounding each step in trade execution, clearing and settlement.
4. International Monetary Fund (2022), **Blockchain Consensus Mechanisms: A Primer for Supervisors**.
5. S&P Global (2023), **Digital Bonds: The Disruption is Underway**.
6. While the distributed model ledger removes the need for reconciliation across separate individual ledgers, securities settlement is a highly regulated activity which involves a financial market infrastructure setting and enforcing rules that govern the activities of participants in the settlement system.
7. International Monetary Fund (2023), **Blockchain Consensus Mechanisms: A Primer For Supervisors.**
8. Bank of England (2023), **Roadmap for the Real-Time Gross Settlement service beyond 2024**.
9. In April 2024 the Bank and FCA issued a joint consultation and draft guidance on the **Digital Securities Sandbox**.
10. The FCA has also published a discussion paper on the proposed regime for stablecoin issuers, custodians and the

use of stablecoins as means of payment. The FCA's regime will aim to address the risks of stablecoins that claim to maintain a stable value relative to a fiat currency by holding assets denominated in that currency, when used as money-like instruments, ie for payments (and other uses) at a non-systemic scale. They will regulate, for prudential and conduct purposes, all non-systemic UK-based issuers of stablecoins.

11. In February 2023, The Bank of England and HM Treasury published a consultation **paper** that set out our assessment of the case for a retail central bank digital currency.

12. Bank of England (2017), **The impact of de-tiering in the United Kingdom's large-value payment system**.

13. **Wholesale Central Bank Digital Currency Experiments with the Banque de France: New insights and key takeaways**, July 2023.

14. Bank of England (2023), **Roadmap for the Real-Time Gross Settlement service beyond 2024**.

15. Visa and Mastercard carry the largest transactional volumes in the UK. These networks facilitate the use of credit and debit cards at the point of sale and settle card transactions in 24-hour cycles.

16. There are also two other systems which are used with less frequency. First, the Image Clearing System (ICS), which allows digital images of cheques (and bank giros) to be exchanged between UK banks for clearing and settlement. It provides an alternative to previous paper-based systems, and has significantly increased the speed and efficiency of the cheque-clearing process: funds are typically available by midnight the day after a cheque is paid in. Second, LINK is the interbank payment system connecting the UK's network of ATMs. It supports banks and building societies offering their customers access to cash in the UK. All the UK's main debit and ATM card issuers are LINK Members. It allows households and businesses to draw cash from their bank accounts using cards.

17. Bank for International Settlements and Technical Committee of the International Organization of Securities Commissions (2012), **Principles for financial market infrastructures**.

18. Bank for International Settlements (2022), **Gaining momentum – Results of the 2021 BIS survey on central bank digital currencies**.

19. **Orchid Blueprint: Infrastructure for safe and innovative use of digital money in Singapore**, **MAS Lays Foundation for Safe and Innovative Use of Digital Money in Singapore**.