

# Old dogs, new tricks



Adapting central bank balance sheets to a world of digital currencies. Andrew Hauser argues that we need to understand these impacts and build them into the design of CBDCs

**T**he explosion of interest in digital currencies poses deep and challenging policy questions on everything from monetary and financial stability, to privacy, competition, money laundering and social inclusion. Public authorities are evaluating the arguments for and against introducing their own Central Bank Digital Currencies (CBDCs)<sup>1</sup>. And in the private sector there's a lively debate about what it might take to make so-called 'stablecoins' genuinely stable.

Up to now, though, there's been less discussion about how central bank balance sheets might need to adjust to support the safe and effective provision of fiat-based digital currencies. I will focus my remarks around five main messages.

### **1. Retail CBDCs could be a big deal for central bank balance sheets**

Let's start with retail CBDC – a central bank liability, in digital form, held directly by individuals, and used to make day to day payments. Many of the raw ingredients of a CBDC are already familiar to central banks: individuals can already hold our liabilities, in the form of physical banknotes; and we already provide digital liabilities, albeit to only a few depositors (predominantly banks).

The new thing would be to combine those ingredients together, at scale. The question of whether to do so is complex, and beyond the scope of my remarks. The UK will publish a consultation on this issue later this year. But the implications for central bank balance sheets will also depend heavily on how any CBDC is designed: on who can hold it, where it can be used, how much can be held, and whether it is interest-bearing (Table 1).

Design choices that placed the economic features of CBDC close to today's banknotes might have relatively limited implications for central bank balance sheets, at least in normal economic conditions. Choices that positioned the economic features of CBDC closer to today's retail commercial bank deposits could have a more material impact.

**Table 1. Central bank balance sheet impact depends on key CBDC design choices**

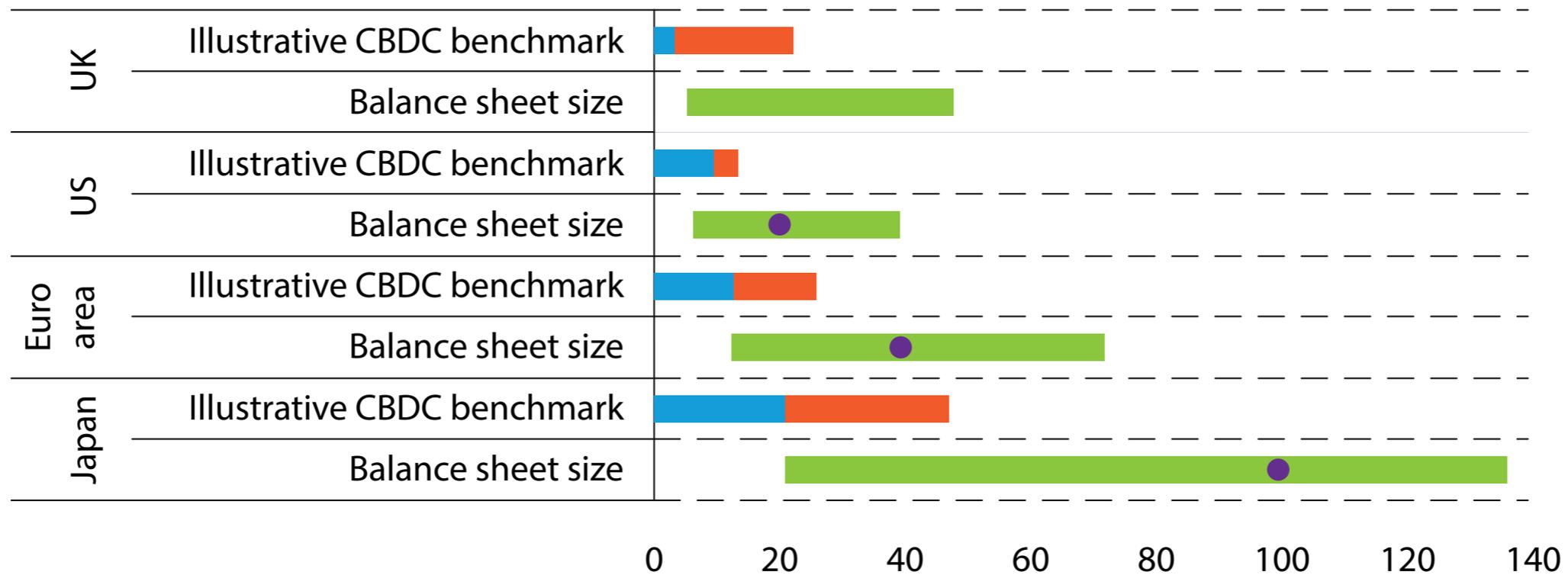
	Design feature	Banknotes	Retail CBDC	Retail commercial bank deposits	<i>Memo: central bank reserves</i>
Things we know	Form	Physical	Digital	Digital	<i>Digital</i>
	Access	Anyone, retail focussed	Anyone, retail focussed	Anyone meeting bank requirements	<i>Banks and other reserves holders only</i>
	Can be used to pay	Anyone, retail focussed	Anyone set to receive CBDC, retail focussed	Any bank account holder	<i>Banks and other reserves holders only</i>
Design choices	Remuneration	None	← Under → consideration	Commercial bank chooses rate	<i>Central bank chooses rate</i>
	Size limits on individual holdings	None, but large-scale use poses AML and physical challenges	← Under → consideration	May be limits for AML, deposit protection etc	<i>None, but aggregate set by central bank</i>
	Typical payment size	Small	← Under → consideration	Variable	<i>Large</i>
	Usable hours	24/7	← Under → consideration	Can be 24/7	<i>Weekday business hours</i>
Current size in UK		£80 billion	← Under → consideration	£2,200 billion	<i>£950 billion</i>

To give some sense of potential scale, Chart 1 compares two stylised benchmarks – the stock of banknotes; and 20% of retail commercial bank deposits<sup>2</sup> – to the size of central bank balance sheets between the period before the Global Financial Crisis and today. In the UK, the upper end of that benchmark range is nearly half the size of the Bank of England's balance sheet today, and six times that in 2007.

Those are big numbers. But they aren't unprecedented in the history of central banking. In the UK, even the top end of the range in Chart 1 would still leave the stock of publicly-provided means of payment at around the levels seen in the mid-20<sup>th</sup> century (Chart 2).

*... if digital currencies took off at scale, careful thought would be needed as to how best to structure such asset holdings to manage balance sheet risks, and minimise any unintentional interference with other policy uses of the balance sheet*

**Chart 1. Scaling CBDC relative to central bank balance sheets**



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Illustrative CBDC benchmarks = **currency in circulation** and **20% of retail deposits**, as of May 2022. **Balance sheet** bars show, at the lower end, the value of central bank balance sheets as of 2007 Q1, and at the upper ends as of today. The **purple markers** show 2019 Q1 values.

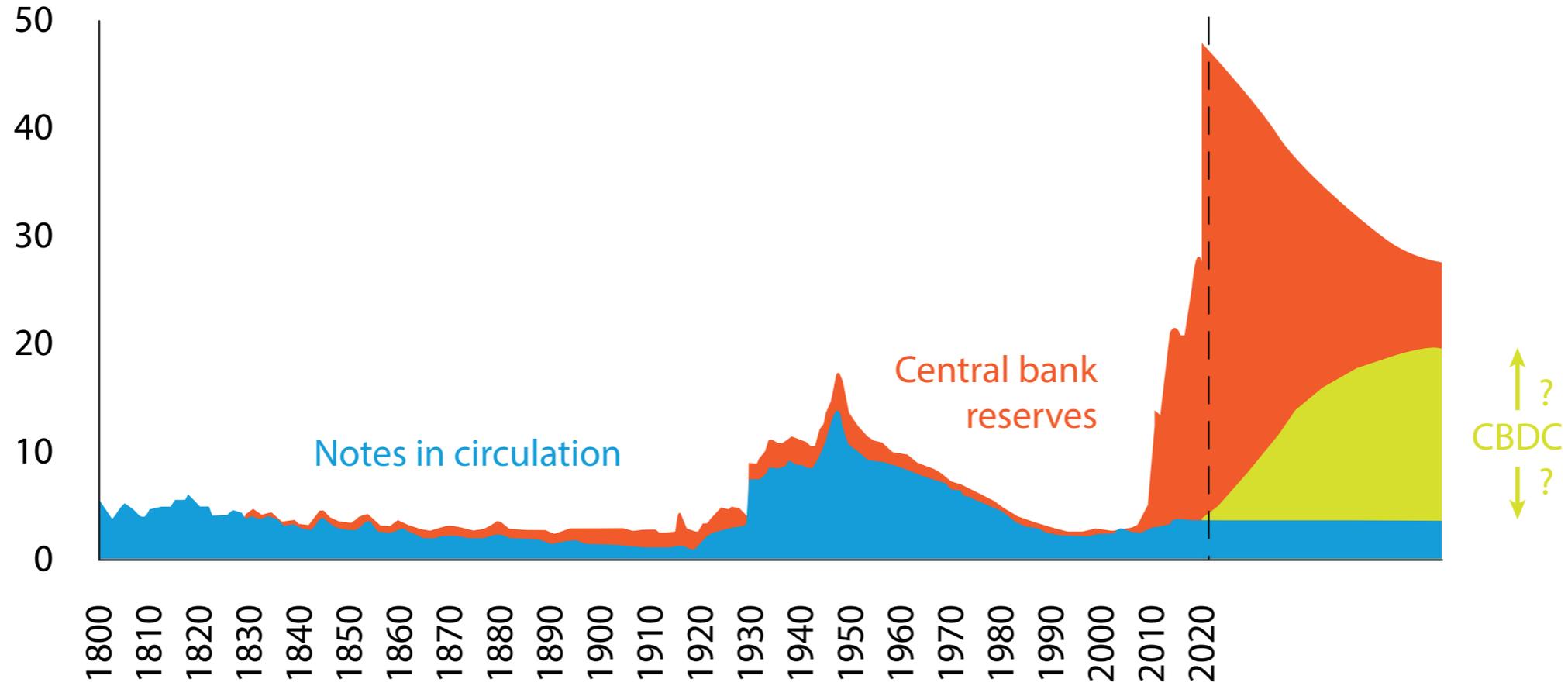
Sources: Individual central banks' published data, IMF, Bank calculations.

**Chart 2. Illustrative long-term changes in the BoE balance sheet**

Percentage of nominal GDP

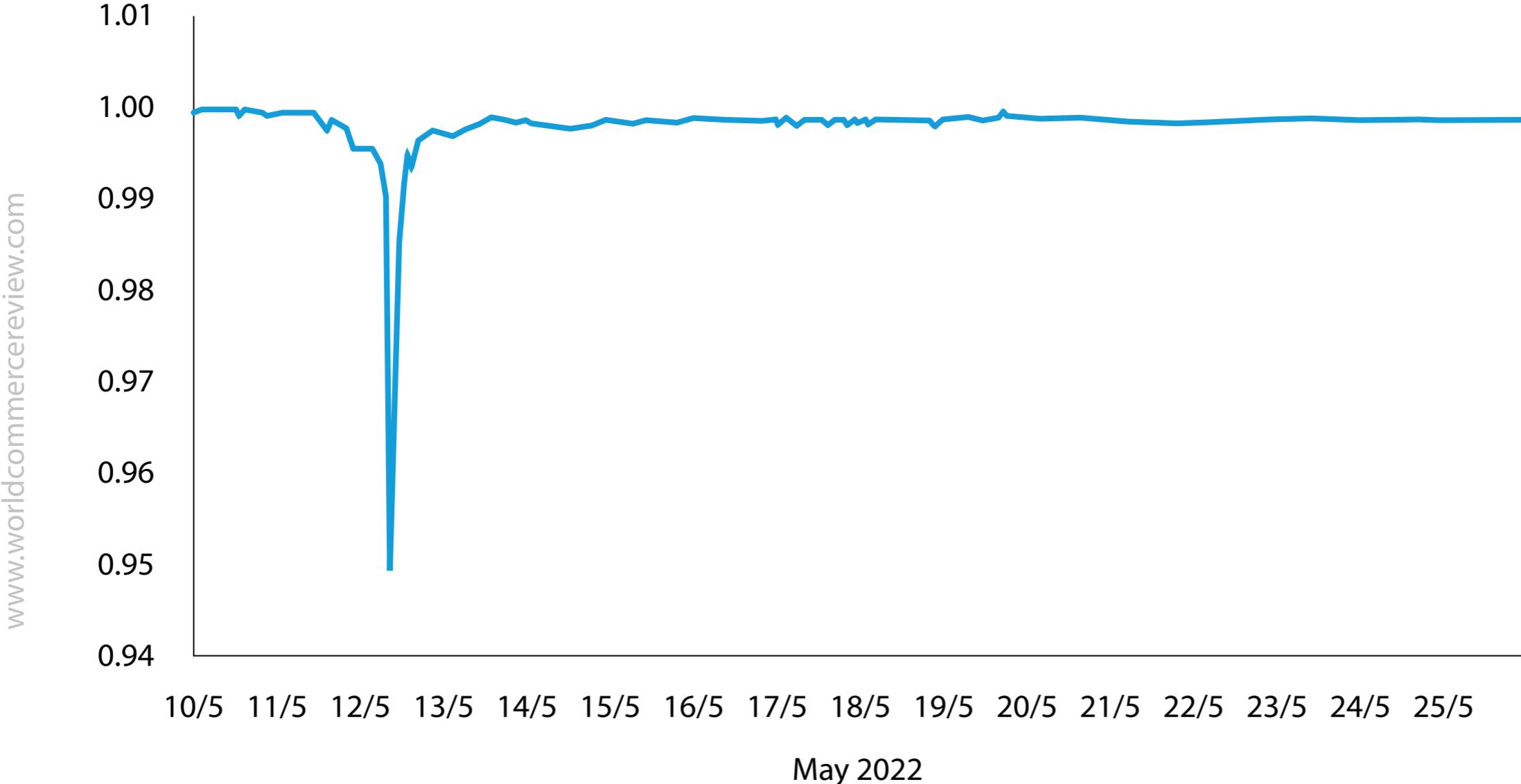
Future projections are illustrative only →

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Sources: Bank of England, IMF.

**Chart 3. Price of Tether (USDT) in \$US**



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Source: Bloomberg Finance LP Digital Asset Research, Inc.

This underscores the point that, while the technology for any future CBDC may be new, the use of the central bank balance sheet to provide state-backed transactional money would not be: indeed, it is one of the oldest functions of central banks.

## **2. Stablecoins that are truly stable may have much the same impact**

As public authorities reflect on the case for CBDCs, private sector providers have been developing so-called 'stablecoins', which claim to be pegged to the value of fiat currencies.

I say 'claim', because recent weeks have suggested such promises may be less than fully credible. The value of TerraUSD – once one of the larger 'stablecoins' by market capitalisation – fell to zero in just a few days. And Tether, sometimes asserted to be the backbone of the cryptocurrency ecosystem, lurched precariously below parity for a period (Chart 3).

These gyrations have multiple causes. But 'stable' they are not. And the lack of complete, real time, information on the assets backing the promise of convertibility<sup>3</sup>, means that holders of such coins must accept at least the possibility of finding themselves badly out of pocket.

Such 'buyer beware' warnings may be sufficient for coins that are only in niche use. But they cannot be enough for any that reach systemic scale. And that is why the Bank of England's Financial Policy Committee has recommended that, in the UK, any stablecoin that reaches systemic size should also meet standards equivalent to those expected of commercial bank money<sup>4</sup>.

In practice that is likely to mean being issued by a bank, or by a non-bank that: is subject to rigorous central bank regulation and supervision<sup>5</sup>; provides coinholders with a robust legal claim; is insolvency remote; and transparently backs its coins with a precisely defined set of high quality and liquid assets.

It's too soon to say what those assets should be. But, to take one example proposed by some, if a systemic stablecoin were required to be fully backed by deposits at the central bank, the implications for central bank balance sheets could be very similar to CBDC (Chart 4).

This would also be the case if a 'narrow bank' chose to issue its own tokenised deposits and put all the proceeds into holdings at the central bank. Indeed, arguably any stablecoin with a credible link to fiat currency relies ultimately on settlement in central bank money.

Of course, that does not mean that it is central bank money: even fully-backed, regulated stablecoins would remain the liabilities of private sector companies, and hence pose a range of risks not associated with CBDCs.

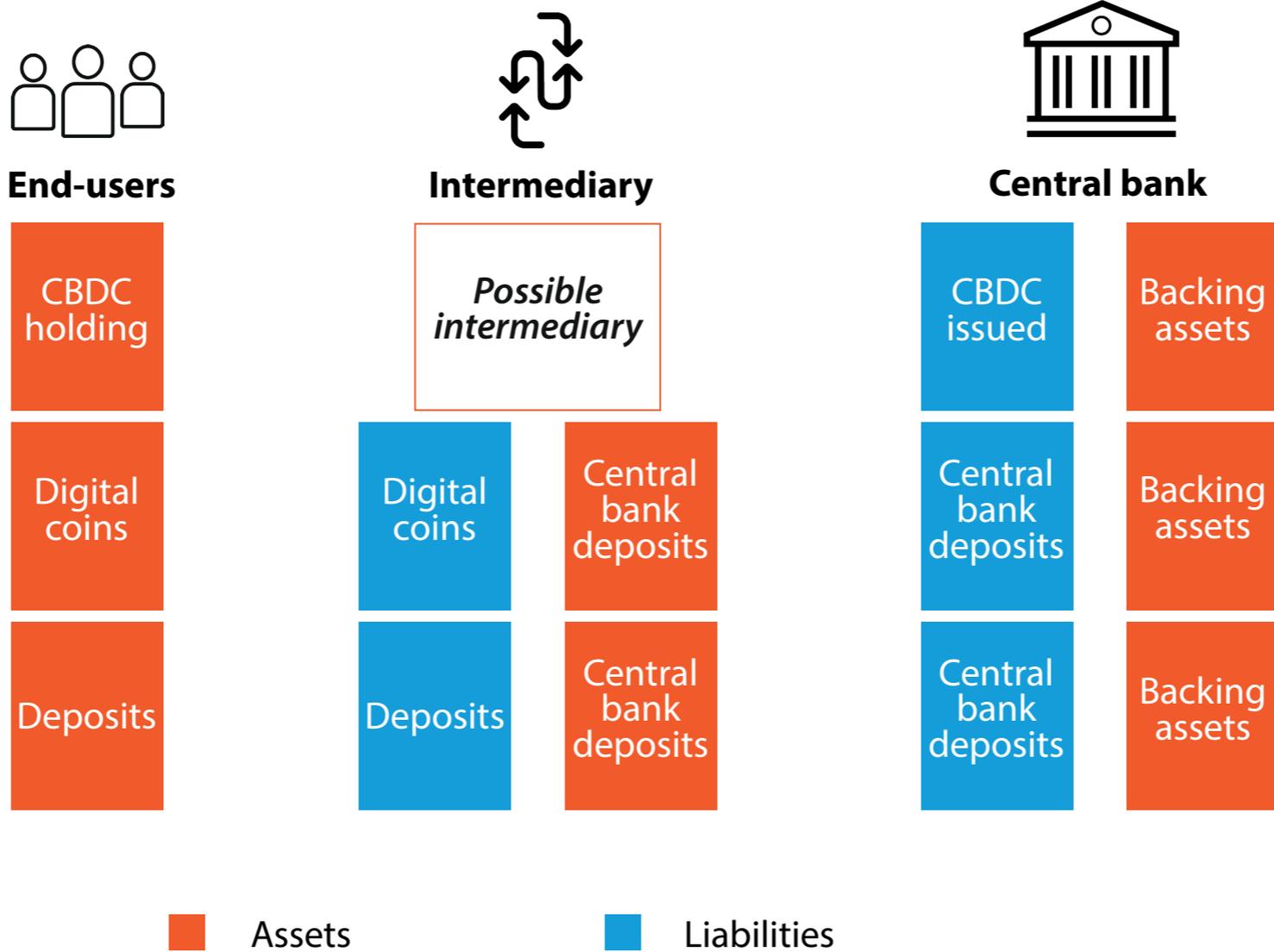
### **3. Digital currencies may alter the transmission mechanism for monetary policy**

A key unknown in assessing the impact of digital currencies lies in judging the extent to which they may affect the flow, and pricing, of money and credit in the economy – which in turn has implications for the transmission mechanism for monetary policy.

When a bank creates a new loan, it must retain or attract sufficient deposits to fund it<sup>6</sup>. Digital currencies do not fund credit creation, but they do increase the competition for, and hence the cost of, deposits, with knock-on implications for the price and availability of credit.

The size of these effects will depend heavily on the eventual design of any systemic digital currencies, their attractiveness relative to bank deposits, the availability and price of alternative funding sources for banks, and borrowers' ability to substitute between types of credit.

**Chart 4. Similar balance sheet impact for CBDC and CB-backed systemic stablecoins**



It is not a foregone conclusion that these effects will necessarily be large. Indeed, an illustrative scenario published by the Bank of England in 2021 suggested that the steady state impact could be quite modest, with lending rates rising only slightly, and credit provision falling by a little over 1% – though varying the assumptions can generate somewhat larger results (Chart 5).

More serious disruption to credit supply could occur if deposits transferred into digital currencies in an unexpectedly rapid or disorderly way, for example during a stress event. But a range of design choices, including potential holding limits, could in principle be deployed to deal with such situations.

And banks suffering sudden deposit outflows may also, as now, draw on market-wide central bank liquidity insurance facilities<sup>7</sup> – though the pricing of such facilities, and their implications for encumbrance, make them less well suited to providing long-term structural support.

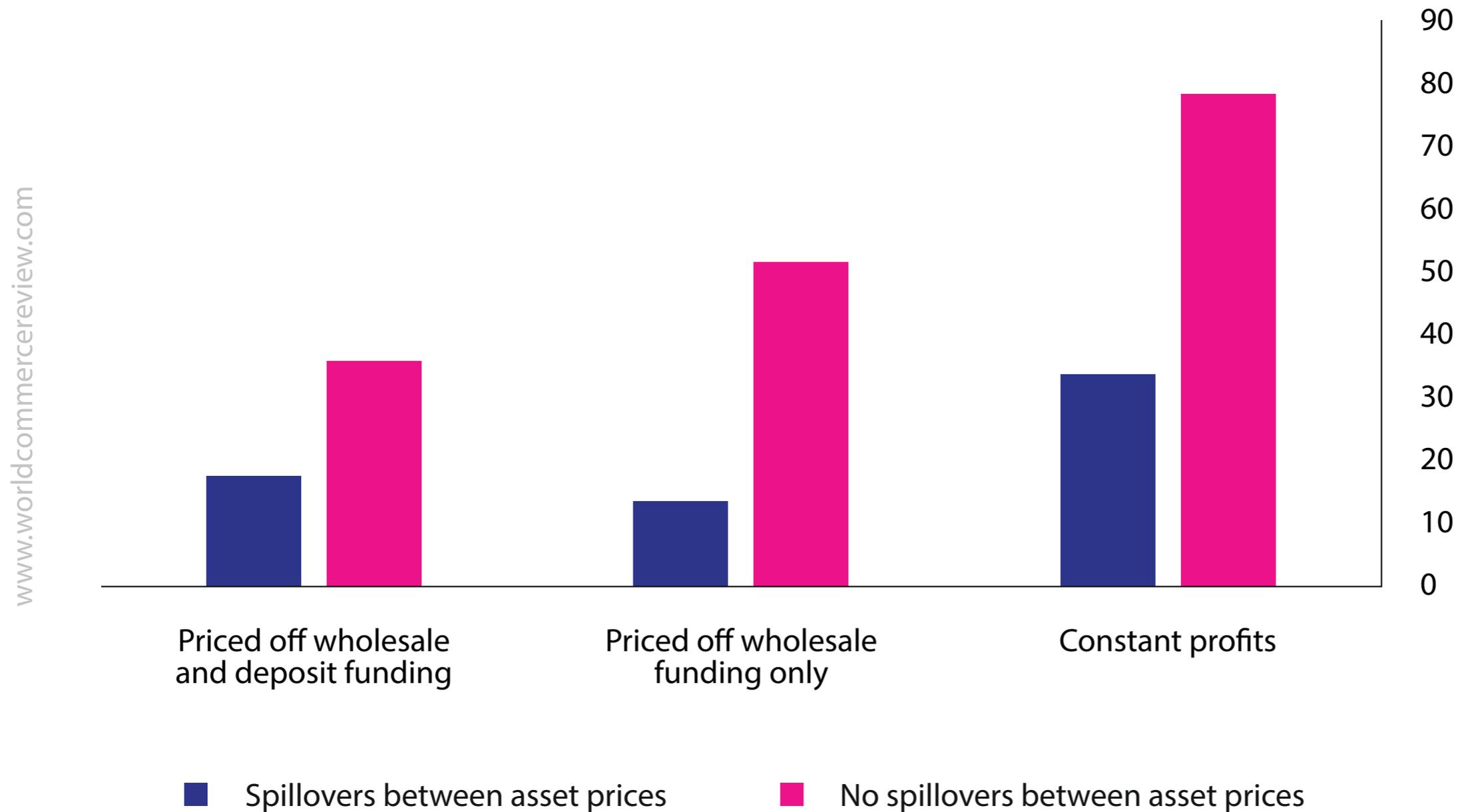
A particularly sensitive question is whether central banks may seek to use CBDCs, or other forms of digital currency, to enhance monetary policy implementation – eg. by overcoming the effective lower bound to interest rates, or injecting liquidity directly into the retail sector<sup>8</sup>.

But there is no sign that central banks are thinking of digital currencies in this way. The Bank of England, for example, has stressed that any CBDC would complement, not substitute for, physical cash<sup>9</sup>.

#### **4. Digital currencies may affect the way central banks deliver monetary control**

Over and above any impact that digital currencies may have on the transmission mechanism, they could also have implications for how central banks achieve ‘monetary control’: ie. ensuring that short term market rates are aligned with official rates chosen by policy makers<sup>10</sup>.

**Chart 5. Changes in the lending rates associated with introduction of new forms of money under different bank pricing and asset spillover assumptions**



Source: Bank of England Discussion Paper: "New Forms of Digital Money"

Today, most central banks achieve this control by ensuring they at least meet banks' demand for central bank reserves, and remunerate those reserves such that market rates trade near or at the official rate. Other things equal, flows into digital currencies issued or backed by the central bank, will drain reserves from the system. That could complicate monetary control if it causes banks to bid up for reserves, pushing up on short term market rates relative to official levels.

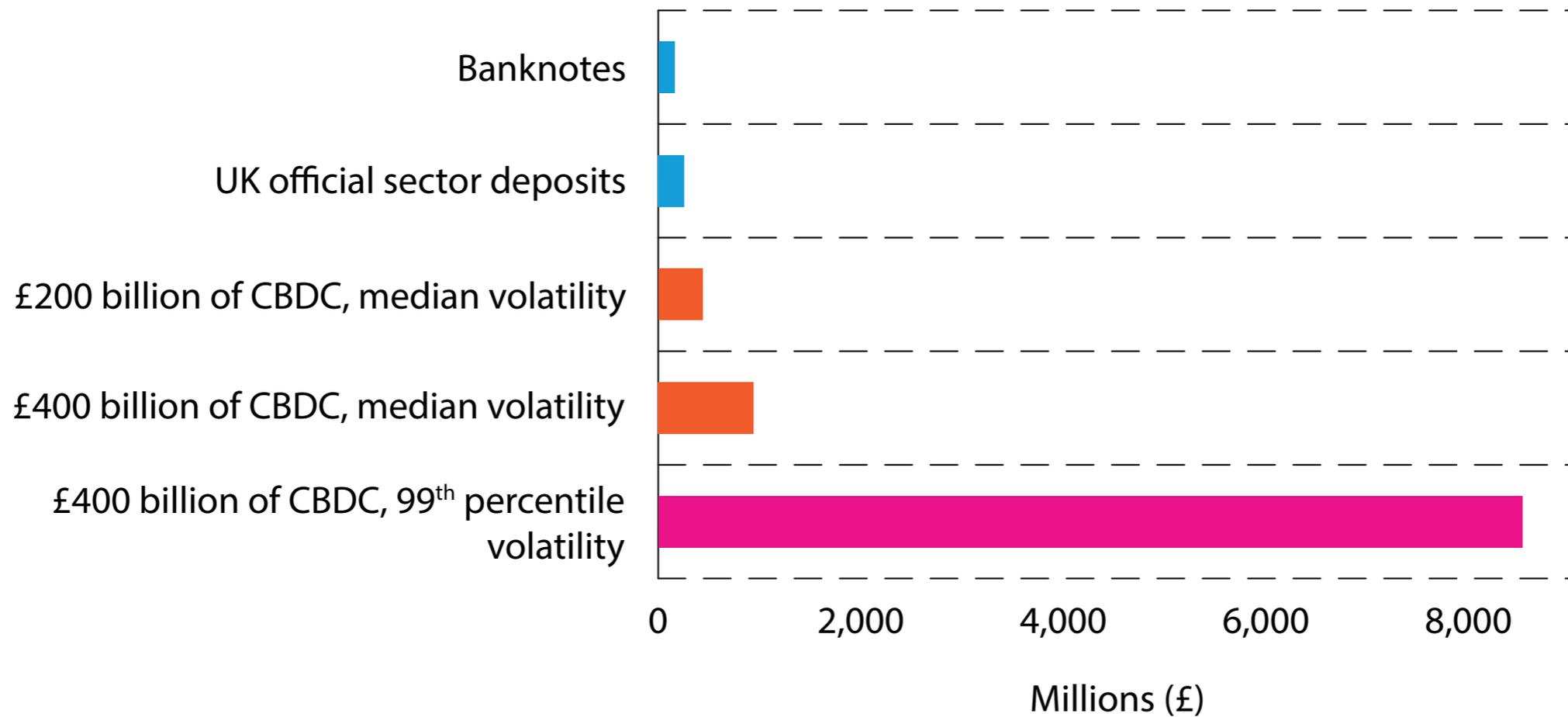
Such effects – ingloriously known as 'autonomous factors' in central banking jargon – are nothing new. Increases in physical banknotes or government deposits, for example, also drain reserves – and scaling that historical variation by the sort of estimates for CBDC size shown in Chart 2 suggests that day to day variation in CBDC demand would not pose materially greater uncertainty (the orange bars in Chart 6).

Sharper and less predictable inflows, eg. during a period of stress – proxied in the purple bar in Chart 6 using the extreme tail of existing autonomous flows – could however drive rather larger volatility.

Whether this matters for monetary control depends on the level of reserves at the point digital currencies are introduced, and the type of monetary control regime being operated. As of today, most major central banks use so-called 'floor' systems, with a level of reserves (injected via QE) that far exceeds most estimates of aggregate demand from the banking system. With such abundant reserves, even quite large unexpected variations in reserves holdings need not threaten monetary control ('Zone A' in Chart 7).

That may change as central banks unwind their QE holdings<sup>11</sup>. As the aggregate level of reserves falls, the chances of a sudden reserves drain pushing up on market rates increase ('Zone B' in Chart 7). Of course, no-one knows with any certainty where this inflection point lies. So central banks must either aim to stop asset unwind well before that point is reached (the approach announced by the FOMC), or have tools in place ready to allow banks to replace the

**Chart 6. Potential volatility in autonomous factors (gross weekly flows)**



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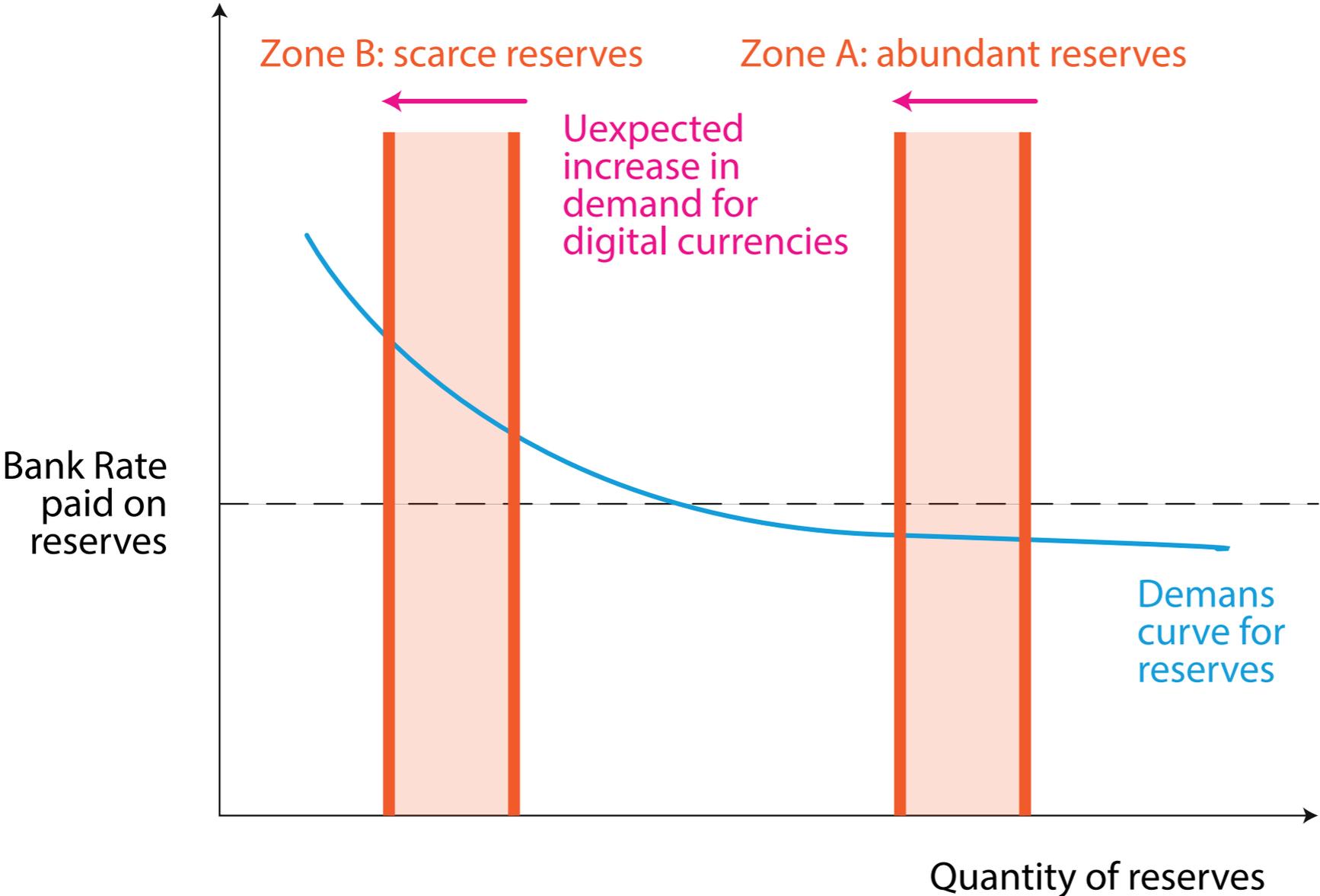
Median gross weekly flows over past 10 years, illustrative example of possible 'business as usual' CBDC volatility using scaled median weekly banknote flows as a proxy; illustrative example of possible sharp inflow into CBDC using 99<sup>th</sup> percentile weekly banknote flows as a proxy

Source: Bank of England, Bank calculations.

# Chart 7. Monetary control in a floor system with digital currencies

Short-term market interest rates

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Zone B: scarce reserves

Zone A: abundant reserves

Unexpected increase in demand for digital currencies

Bank Rate paid on reserves

Demand curve for reserves

Quantity of reserves

reserves depleted by asset sales/redemptions as and when they need to (the approach we expect to take in the UK)<sup>12</sup>.

None of this fundamentally changes the nature of the challenges facing central banks in maintaining monetary control. But it does underscore the importance of reflecting operational needs in the design of potential future digital currency frameworks<sup>13</sup>.

### **5. Digital currencies may alter the size and composition of central bank assets**

Most of my remarks today have focused on the potential implications of digital currencies for central bank liabilities. But of course, for every liability, there also has to be an asset.

Whether those assets are, in total, any larger than today depends, in part, on whether new digital currencies cause a net increase in demand for central bank liabilities, or simply substitute for reserves or banknotes.

A narrow digital currency that largely cannibalised banknote demand, for example, might have little or no impact. By contrast, a broad digital currency with many attractive payments features could materially increase the demand for central bank liabilities.

The impact of any increase in demand on the size and composition of central bank assets depends on whether, and how, central banks choose to accommodate that demand. I've already noted that, in systems like the UK's, digital currencies may cause some banks whose deposit bases have been partially disintermediated to increase their borrowing from market-wide facilities.

A more interesting case could arise if the central bank chooses instead to back persistently higher demand with more long-lasting assets, for example to reduce rollover risk. At modest size, that may look little different to today's banknote programmes.

But if digital currencies took off at scale, careful thought would be needed as to how best to structure such asset holdings to manage balance sheet risks, and minimise any unintentional interference with other policy uses of the balance sheet<sup>14</sup>.

### **Conclusion**

CBDCs, if adopted, would be the first new type of central bank liability for centuries. They could have important implications for the size, composition and risk profile of our balance sheets; for the monetary policy transmission mechanism, and for monetary control. We need to understand these effects, and build them into the design of CBDCs and our operational toolkits.

But, by themselves, balance sheet considerations do not obviously present any 'redline' arguments against CBDC adoption, if that is the chosen way forward.

Indeed, while the technologies for such currencies would be new, the use of the central bank balance sheet to provide state-backed transactional money is one of our most longstanding functions. The dog may be old, but it can still perform new tricks! ■

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## Endnotes

1. The Bank of England's work in this area is available at: [UK central bank digital currency](#).
2. This is the assumption used in the illustrative scenario in Section 3 of the Bank's 2021 discussion paper [New forms of digital money](#), and reflects the share of UK deposits that is non-interest bearing.
3. See eg. [Crypto industry shaken as Tether's dollar peg snaps](#); 'We're Not Revealing Our Secret Recipe', [Tether's CTO Says](#); and [Whereabouts of Terra's Bitcoin Reserve a Mystery After Transfers](#).
4. See [Record of the Financial Policy Committee](#) and <https://www.bankofengland.co.uk/financial-policy-summary-and-record/2022/march-2022>
5. As [proposed](#) by the UK Treasury.
6. See for example, 'Money creation in the modern economy'.
7. The Bank's Index Linked Term Repo facility, for example, operates weekly, and allows all eligible counterparties to bid for six month liquidity against the full range of eligible collateral (see [Bank of England Market Operations Guide](#)).
8. See, for example [Securing macroeconomic and monetary stability with a Federal Reserve-backed digital currency](#)
9. See for instance [Innovation to serve the public interest](#) - speech by Andrew Bailey.
10. This issue, and others discussed in my remarks, are also well covered in this 2018 report by the Bank for International Settlements' Committees on Markets and Payment and Market Infrastructures: [Central bank digital currencies](#).
11. In the UK, the Bank's Monetary Policy Committee (MPC) voted to begin balance sheet unwind in February 2022 – see [Monetary Policy Report - February 2022](#) – and gave further detail on its approach in its May Report: [Monetary Policy Report - May 2022](#).
12. See [Waiting for the exit: QT and the Bank of England's long-term balance sheet](#) - speech by Andrew Hauser.
13. It is worth noting that, if digital currencies are not limited to primarily retail use, they could provide a conduit for wholesale market participants to disintermediate money markets, driving rather more profound changes in market functioning and bank funding.

14. *This is just one aspect of a much wider set of questions about how to manage the touchpoints between the much wider set of uses to which our future balance sheets will be put that central banks will face in the years ahead, as discussed in: [Bigger, broader, faster, stronger? How much should tomorrow's central bank balance sheets do](#) - speech by Andrew Hauser.*

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