Speech

The Economics of a Central Bank Digital Currency in Australia

RESERVE BANK OF AUSTRALIA

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17th Central Bank Conference on the Microstructure of Financial Markets
Sydney – 8 December 2022

It is a great pleasure to welcome you to this conference at what is an intensely interesting juncture for all things digital finance.

When the industrial revolution took root, it spurred growth in commercial exchange on a previously unimaginable scale. Money played a complementary role in facilitating this economic transformation, one that led to an unprecedented increase in living standards. A couple of centuries on, it is the digital revolution that is reshaping the economy and raising important questions over the future of money. The fundamental issue boils down to this: is our money fit-for-purpose in the digital age and, if not, how can we make it so?

There is no shortage of excitable commentary about the future of money in the digital era – how and by whom it might be created, what forms it might take, and what roles it might play. But sometimes lost in this excitement is a clear articulation of the economic problems that new forms of digital money might solve, particularly in countries like Australia with a modern, well-functioning payments system.

Today I will discuss where the case for a central bank digital currency (CBDC) in Australia fits into the wider international debate over the future of money. To anchor the discussion, I will begin by setting out some foundational features of today's two-tier monetary system that comprises public and private money and payment services. I will then turn to the arguments advanced for and against CBDCs internationally, and how they translate to an Australian context. Finally, I will provide an update on the CBDC pilot project the Reserve Bank is engaged in.

Throughout I will focus on a general purpose ('retail') CBDC – a digital claim on the Reserve Bank that is widely available to the public. This recognises that a wholesale CBDC would entail less change to the status quo, as financial institutions already hold digital claims ('Exchange Settlement balances') issued by the Bank. And to do justice to the economic and financial stability issues raised by CBDCs, I will leave others to weigh in on the many technological, legal and regulatory considerations.[1]

First principles: The foundations of our two-tier monetary system

It is not difficult to encounter wildly competing visions for the future of the monetary system. At one extreme is a view that a CBDC could crowd out all alternative forms of money – after all, it would be easier to hold in unlimited quantities than physical cash, and unlike commercial bank deposits it would be free of credit and liquidity risk. At another extreme is a view that private digital money will proliferate at the expense of central

bank money in response to growing distrust of public institutions, the move to a cashless society, and the inability or unwillingness of public entities to modernise the money and payment systems in a manner befitting the digital age. A myriad of other scenarios lie in between.

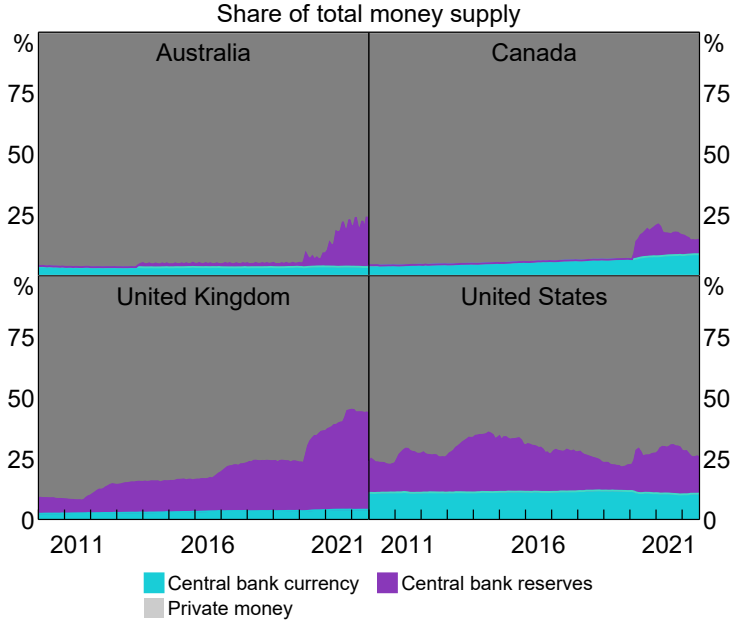
But as we try to imagine how our monetary arrangements could evolve, we might do well to first reflect on the underpinnings of today's two-tier monetary system where central bank and private money successfully co-exist. They do so in different forms and for different purposes. Underpinning this system is a symbiotic relationship and clear division of roles between public and private sector entities that, I will contend, is likely to remain as relevant as ever in the digital age.

Take the co-existence of central bank and private money. Today, central bank money comprises banknotes issued to the general public, and digital deposits at the central bank issued to financial institutions and government agencies. But in Australia, as elsewhere, this is just a small fraction of the total value of money circulating in the economy; most money now consists of digital deposits issued to households and firms by regulated private institutions like banks (Graph 1). Alongside the belief that privately-issued deposits will be readily accepted in exchange for goods and services, what helps to underpin this arrangement is the expectation that privately-issued deposits can be redeemed at a fixed value (1:1) at any time into safe and liquid central bank money. That is, 10 digital dollars in a private bank account can be converted into a 10 dollar note issued by the central bank. But as with any fixed exchange rate regime, the prospect of convertibility has to be credible if the system is to hold.

Graph 1

Central Bank and Private Money

Share of total money supply



Sources: Bank of Canada; Bank of England; RBA; US Federal Reserve

More broadly, the role of central banks in this two-tier monetary system has evolved to include the provision of the following public goods:[2]

- First is the responsive and prudent supply of central bank money – banknotes to the general public and digital deposits to regulated financial institutions – consistent with the economic demands for it. These demands relate to the core functions of central bank money as a reliable medium of exchange, store of value and unit of account.[3]
- Second is the use of the central bank balance sheet and operational infrastructure to ensure the final and irrevocable settlement of payments between regulated financial intermediaries.[4]

- Third is to combine with other government agencies to underwrite confidence in the monetary system, including by forestalling stress in key financial institutions that could otherwise severely disrupt economic activity. This is achieved through an effective supervisory and regulatory regime, government insurance of customer deposits and the 'lender of last resort' powers of the central bank.

These public goods provide a foundational level of trust in monetary exchange – trust in the value of money, trust in the finality of settlement and trust in the stability of the wider financial system. This is not just of historical interest – the recent lived experience with private digital currencies has been that a system is more efficient and resilient when there is no fundamental trust deficit to solve.

This might then beg the question: why bother at all with private money and payment services? Why doesn't the central bank and government more broadly supply and administer the entire monetary system?

The reason is that the needs of the economy are best met when a diverse ecosystem of private entities are adapting business models, innovating, driving efficiencies, and offering households and firms choice as their money and payment preferences evolve. As I will return to later, central banks don't have a comparative advantage in providing customer-facing services directly to households and firms. But they can facilitate better economic outcomes by providing foundational public goods, safeguarding integrity in the system and levelling the playing field for the sort of competition in money and payment services that leads to more value at a reduced cost for households and firms. A payment stablecoin, fully backed by central bank money and government securities, issued by a regulated institution, and held in a digital wallet supplied by a non-bank payment service provider, is just one of many possible examples of the tiering of public and private money and payment services.

All of this is to say that whatever the functional forms that central bank and private money end up taking in the years ahead, there are good reasons to think they will reflect most – if not all – of the synergies inherent in today's two-tier system.

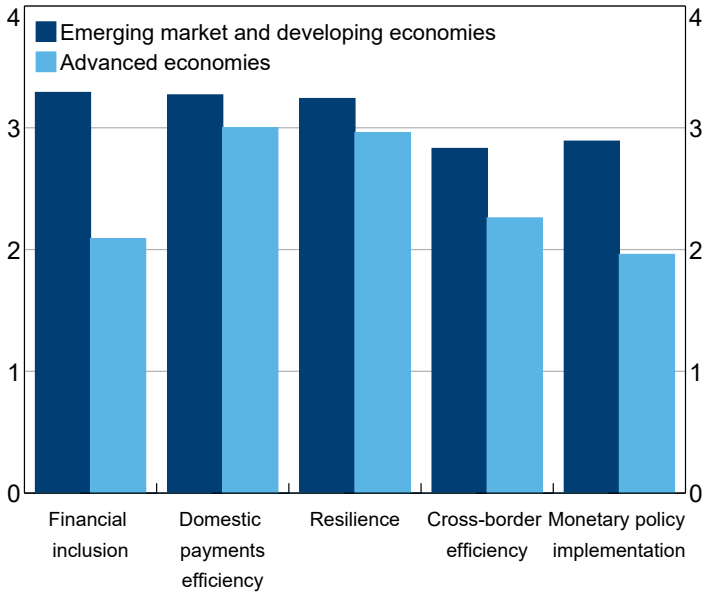
What problems would an Australian CBDC solve?

Internationally, there have been a range of motivations underlying interest in a retail CBDC; to date, central banks in emerging market economies have been more favourably disposed than those in advanced economies (Graph 2). I will now turn to how these arguments translate to an Australian context.

Graph 2

Motivations for Issuing a Retail CBDC*

Average importance**



* Results from the 2021 BIS central bank survey on CBDCs and digital tokens.

** (1) = Not so important; (2) = Somewhat important; (3) = Important; (4) = Very important.

Source: BIS (2022)

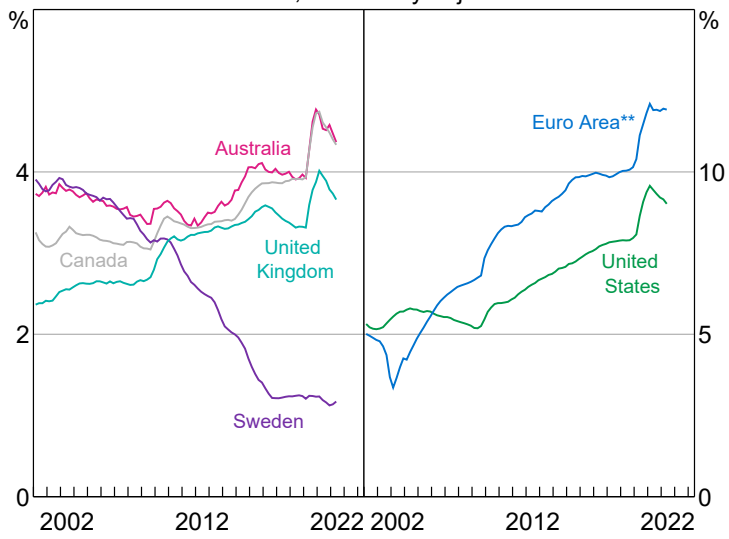
For some low-income countries where many households and small businesses are left unbanked because of constraints on the provision of services, a key motivation for issuing a CBDC has been to **strengthen financial inclusion**. But, in Australia, a very small proportion of households are without access to banking and payment services, and it is not obvious how a CBDC would bring them into the fold.

A related motivation in some countries has been to **support universal access to public money** where banknotes are hard to access or sparingly used. Sweden is one notable example. But physical cash in Australia remains accessible and still appears valued by households. Recent surveys indicate around 95 per cent of Australians live within 4 kilometres of a cash withdrawal point, and around 15 per cent make most of their payments using cash.[5] While transactional demand for banknotes in Australia is clearly in structural decline, the value of banknotes in circulation has risen over the past decade (Graph 3). This suggests that cash is still viewed as a useful backup for electronic payments and as a store of wealth in Australia.

Graph 3

Currency to GDP*

Nominal, seasonally adjusted



* Latest datapoint is Q2 2022.

** Equivalent currencies prior to the 2002 introduction of the Euro banknotes and coins.

Sources: Central Banks; OECD; RBA

Another reason for interest in CBDC is that it could yield **privacy benefits**, including better control of personal data, and so encourage more commercial exchange. The argument here is that consumers might forgo transactions in private digital money for fear of leaving a digital trail that private organisations (and nefarious actors) could readily exploit; by contrast, central banks don't have an incentive to exploit personal data on transactions in CBDC for commercial gain.[6] However, it is unclear that 'digital exchange rationing' of this sort is a first-order issue in Australia. Even if it was, a CBDC will give rise to other privacy and security trade-offs, and central banks are not seeking to replicate the anonymity features of physical cash that can leave it vulnerable to theft and use in illicit activity (issues that cryptocurrency have not addressed). Whether held as a token-based bearer instrument or in account-based form, a CBDC would still generate a digital footprint, over which the central bank, law enforcement agencies and private service providers would need differing degrees of oversight.[7]

A different proposition is that a CBDC could help to **safeguard monetary sovereignty.** The concern here is that a stablecoin or foreign CBDC could fill the vacuum in the domestic monetary system in the event that the public had no access to a domestic CBDC and banknotes issued by the central bank no longer freely circulated. This would amount to a form of currency substitution, which would complicate the conduct of monetary policy and the safeguarding of financial stability. The authorities in China and the euro area have been particularly wary of the risk that large and unregulated ('walled-garden') tech companies could exploit network effects and dominate the monetary and payments landscape in the absence of a domestic CBDC. Other countries have expressed concerns over the geopolitical implications of a foreign CBDC circulating at home.

However, the history of currency substitution indicates it is more likely to occur in economies where institutions and the rule of law are weak, and residents (and foreign investors) have good reason to question the integrity of the domestic currency – conditions not apparent in Australia. It is also worth noting that lawmakers and central bankers in the United States generally remain unconvinced about the case for a CBDC; it is certainly the case that the underlying reasons for the ongoing predominance of the U.S. dollar in international trade and finance have little to do with its technical form.[8] And quite aside from the legal issues involved, I find it next to impossible to conceive of a world where say a digital Chinese yuan, Swedish krona or euro (as early movers) emerged as the digital currency of choice for Australians.

If the arguments I have listed so far fail to offer compelling support for a CBDC in Australia, let me now turn to others that potentially hold more promise.

One is that a CBDC could enhance the **resilience** of the money and payments system. The risk of physical disruptions in money and payment services is most pressing for low-income countries with limited capacity and that are prone to natural disasters. That said, recent extreme weather events in Australia have reminded us that existing electronic and physical cash distribution networks can also be severely disrupted on occasion. And cyber-induced disruptions represent a universal risk from which Australia is not immune. More generally, if a CBDC expanded the universe of widely accepted money, it could provide an additional source of redundancy, including when electronic communication and power networks are disrupted. This could include supporting government payments and peer-to-peer transfers in an offline environment, with programmability features – including value or time limits and restrictions on double spending – to safeguard their use.

A CBDC might also strengthen financial system resilience in other ways. One could be by increasing liquidity in markets for real and financial assets, where small-scale fractional ownership is facilitated by trade in digital tokens. Another is by reducing settlement risk, just as credit and liquidity risk is eliminated when interbank payments are settled across the Reserve Bank balance sheet via Exchange Settlement balances. Resilience and efficiency benefits might be largest for transactions in high-value unlisted assets where lengthy settlement times are common, such as real estate. One possibility here is that the cumbersome operation of private money exchange via escrow accounts could give way to 'atomic' (instantaneous and final) settlement in CBDC, executed through programmable smart contracts. As with the example of offline payments, this concept is being examined further in the Reserve Bank's pilot program. Of course, other types of money, like reserve-backed payment stablecoins, might also achieve a similar ends.

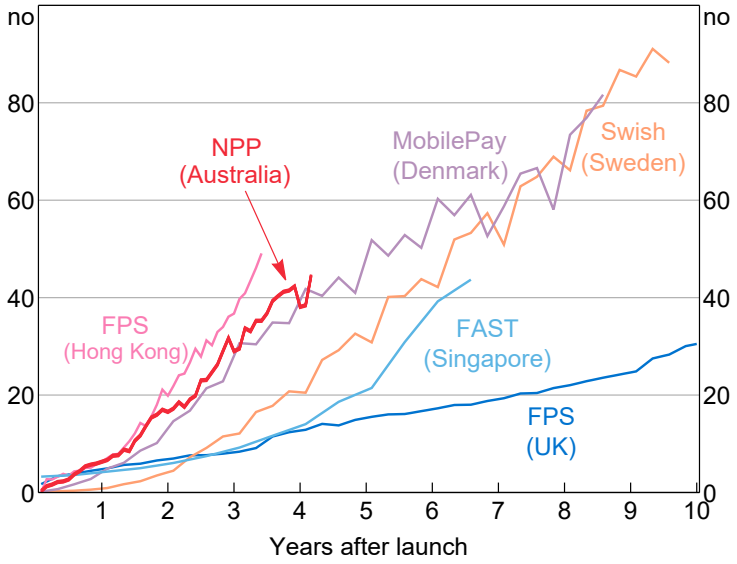
A final key reason behind the international interest in CBDC is that it could **increase competition and efficiency in the payments system while reducing user costs**. A CBDC might increase competition directly, by competing with existing payment methods, and indirectly, by serving as a platform that lowers the barriers to entry for firms (especially non-banks) offering new services.[9] This would be particularly welcome by small merchants, who continue to face significant costs in accepting electronic payments.[10] And cross-border payments seem particularly ripe for disruption – in Australia, as in many advanced economies, cross-border retail money transfers conducted via banks can routinely cost 5 per cent or more (well above the G20 target of 1 per cent) and take up to two business days to settle. This is clearly unsatisfactory and explains why cross-border payments are an area of intense focus for policymakers.[11] Even in the absence of an interoperable CBDC, non-bank money transfer operators in Australia have started to drive down costs and speed up settlement times in cross-border payments.

On the broader issue of efficiency, it is worth noting, however, that Australians already enjoy access to a real-time payments system – the New Payments Platform (NPP). The NPP was launched in 2018 through Reserve Bank and industry collaboration to enable households, businesses and government agencies to make payments with rich remittance information and real-time funds availability on a 24/7 basis. Take up of the NPP has compared favourably to other countries (Graph 4), and a number of initiatives are underway (including on cross-border payments) to further enhance its functionality. It remains an open question as to whether these efforts end up producing efficiency outcomes similar to those that could be offered by a CBDC.

Graph 4

Use of Fast Payments Systems

Transactions per capita, annualised



Sources: FPSL; Getswish; HKICL; MAS; MobilePay; National statistics agencies; NPPA

From potential benefits to potential costs: Should we worry about a CBDC?

While the prospect of CBDC issuance has aroused considerable international interest, so too has it raised concerns. Among these, two are most relevant to Australian circumstances given the significant role of banks in our financial system:

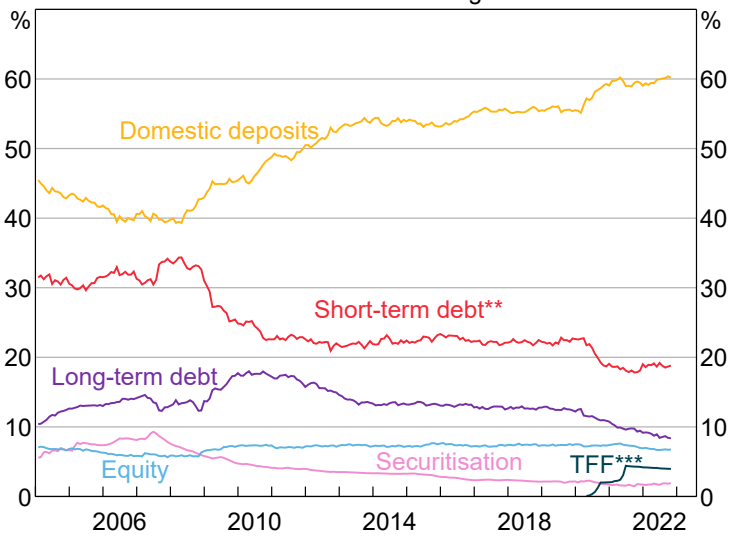
1. the potential to disrupt bank intermediation and monetary policy transmission in normal times
2. the potential to give rise to bank runs in stressed conditions.[12]

To be clear, neither risk is unique to Australia. But it bears mentioning that the Australian banking system sources 60 per cent of its funding from relatively low-cost deposits (mostly 'at call'), a 20 percentage point increase since the global financial crisis (Graph 5; Graph 6). Small and regional banks are even more reliant on deposit funding as they have limited, if any, access to wholesale market funding.

Graph 5

Funding Composition of Banks in Australia*

Share of total funding



* Adjusted for movements in foreign exchange rates; tenor of debt is estimated on a residual maturity basis.

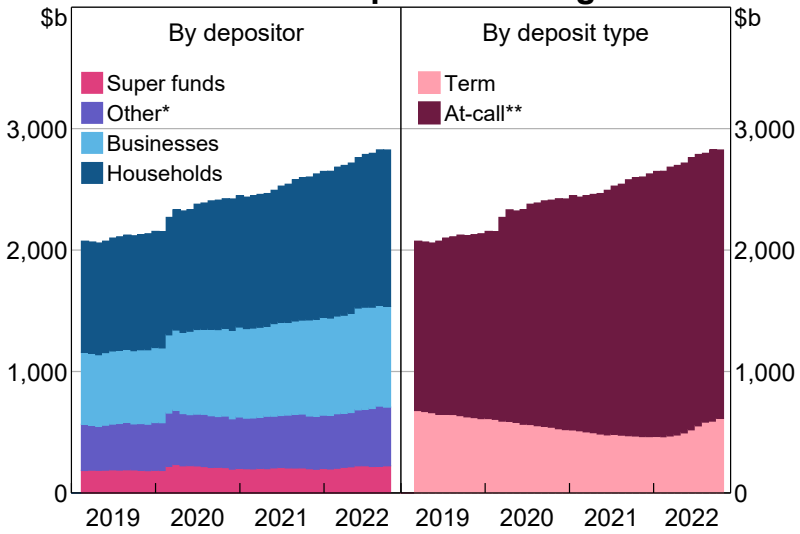
** Includes deposits and intragroup funding from non-residents.

*** Term Funding Facility.

Sources: ABS; APRA; Bloomberg; RBA; Refinitiv; Standard & Poor's

Graph 6

Banks' Deposit Funding



* Includes deposits from the government and financial institutions that are not superannuation funds.

** Includes deposits in housing loan offset accounts and non-interest-bearing deposits.

Sources: APRA; RBA

The first of these concerns relates to the potential for a CBDC to become the preferred source of liquidity holdings for households in normal times, at the expense of commercial bank deposits. Central banks could find themselves awash in household deposits they don't need and can't usefully invest; control over the size of central bank balance sheets would be ceded in the process. Meanwhile, commercial banks, which do need deposits to finance their operations, could have their funding and lending channels significantly affected, disrupting monetary policy transmission in the process. For any given policy rate, banks might have to offer higher deposit rates than otherwise, or raise more funding from higher cost and/or more volatile sources. All else equal, this

could dampen their ability or incentive to lend, and impede their ability to build capital buffers.[13] At a minimum, careful consideration would need to be given to the transition risks associated with new bank funding and lending models resulting from the introduction of a CBDC.

I should acknowledge here that some researchers have proposed possible workarounds, but none are straightforward. For instance, banks might opt to compete harder for low-cost deposits on safety grounds, by providing loans only to the very highest quality borrowers. But this could disrupt credit supply in another way – by starving otherwise creditworthy borrowers of access to funding. Alternatively, some have suggested that a CBDC would have little effect on bank funding and lending if central banks extended to them plentiful cheap loans as compensation for the loss of household deposits.[14] However, a commercial banking system that was largely directly funded by a central bank would overturn centuries-long practice and raise a litany of other issues. Separately, while non-bank lenders in Australia do not rely on deposit funding and so may be less directly affected by a CBDC compared to banks, it is worth recalling that these entities are not prudentially regulated; a material increase in their lending market share might therefore necessitate closer regulatory scrutiny.

What if a CBDC was remunerated at an interest rate a little below the policy rate? Might this aid in monetary policy transmission when policy rates are at the lower bound?[15] It is certainly possible. But to be fully effective, it would necessitate phasing out banknotes, as the higher return on physical cash (zero) would likely prompt some substitution out of CBDC. Yet major central banks, including the Reserve Bank, have committed to continue to make banknotes available to the public. Moreover, most central banks have indicated that the use of CBDC as a monetary policy tool is not the focus of their research.[16] The emphasis instead is on a 'digital banknote' that would complement physical cash, not replace it. This translates to elastically supplying a CBDC that, like physical cash, pays the holder no interest.

A second concern associated with the issuance of a CBDC is that it could threaten financial stability by facilitating bank runs if households lost confidence in banks. Access to a risk-free CBDC could increase the ability for panicked households to substitute out of bank deposits en masse. As bank deposits could be converted into CBDC at the stroke of a keyboard, it would be faster and easier to run into a CBDC than to queue outside a commercial bank and bury physical cash in the yard or under the mattress.

There is no universal consensus among researchers as to just how big an issue this might be. Some have even gone so far as to suggest that a CBDC could enhance financial stability.[17] One way could be by providing authorities with better real-time information on deposit flows, enabling them to respond faster to runs, and thereby reducing depositors' incentive to run in the first place. And because banks would be well aware of this risk, they might manage liquidity more prudently than otherwise. But these arguments are contested, and personally, I don't find them persuasive.

Rather, the main focus of central banks has been to examine measures that could forestall bank runs involving CBDC, or least restrict their impact. These typically involve a combination of limits on holdings or transaction sizes, penalties on bank deposit withdrawals (similar to some money market funds) and negative interest rates on CBDC in periods of stress. What such measures have in common is an effort to restrict the use of a CBDC. To my mind, this raises questions around whether the benefits of a CBDC would be mostly forfeited in the process. At a minimum, making banks more robust to runnable deposits in the presence of a CBDC seems a topic worthy of more analysis. Budding graduate students take note!

The bottom line here is that much will depend on CBDC design choices, and there are many complex issues that would need to be carefully weighed ahead of any decision to proceed with issuing a CBDC.

The eAUD pilot program

To further the Bank's understanding of the benefits and risks that could follow from the issuance of a CBDC in Australia, the Bank has been engaged in a pilot 'eAUD' program with the Digital Finance Cooperative Research

Centre (DFCRC).[18] The program is exploring a variety of possible use cases and builds on the Bank's earlier proof-of-concept exercises in CBDC.[19]

There are two unique features to this eAUD initiative. First, we have not prescribed use cases in advance. Rather, the program has been established as a blank canvas for industry to propose their own use cases. This recognises that in countries like Australia that already have modern, well-functioning payment systems, and where central bank-issued notes are still readily available to the public, the merits of introducing a CBDC are less obvious. Second, the pilot phase will entail the Reserve Bank issuing a real digital claim to approved use case providers.

In response to our call for submissions, the program has attracted much more interest from industry than we anticipated – more than 140 use case proposals from around 80 entities have been submitted. The use cases span everything from e-commerce payments, to offline payments, government payments, and the trading and settlement of tokenised assets. A wide range of use case providers have lodged submissions, ranging from large banks, financial market infrastructure providers and consultancies, to small digital asset firms and fintechs.

Our project team is in the process of selecting a number of proposed eAUD use cases to take forward into the pilot phase early next year. We would like to thank all those entities that have engaged with us on their submissions so far, and look forward to publishing a report on the project around the middle of next year.

Concluding thoughts: Revolution or evolution?

As far as monetary economics goes, the introduction of a general purpose CBDC would be revolutionary – for centuries, physical cash has been the only source of central bank-issued money to which households and non-financial firms have had access. Prior to crossing this Rubicon, a strong public interest case would first need to emerge. On balance, we have yet to see that case made in Australia. We are not alone here – no other advanced economy central bank has committed to issuing a general purpose CBDC. But with our eAUD pilot program in full swing, and changes in the digital economy and money and payments landscape occurring at a frenetic pace, the Bank is keeping an open mind.

One distinct possibility is that the next few years prove to be more evolutionary than revolutionary. It is not hard to imagine that existing forms of digital money and payments infrastructure continue to modernise in a way that captures many of the potential benefits of a general purpose CBDC, but in a minimally disruptive way. This could include further advanced functionality in fast payment systems and greater direct access for non-bank service providers.[20] It might entail connecting these systems across national boundaries in order to substantially lower the cost and time involved in cross-border transactions, as is now underway in some ASEAN countries. It could include the emergence of reserve-backed payment stablecoins and tokenised bank deposits to facilitate atomic settlement of financial and real assets. And building on the role that Exchange Settlement balances already play in the Australian financial system, it also seems a smaller leap to imagine that a wholesale CBDC would circulate more expansively ahead of a general purpose variety.

In the meantime, while we continue to progress our CBDC research program, Australians should be confident that they will retain access to banknotes issued by the Reserve Bank for as long as they place value on them as a public good.

Endnotes

[*] Thanks to Geneve Bullo for her assistance in preparing the graphs in this speech, and to colleagues in Payments Policy Department for comments on an earlier draft.

[1] For an early foray into the Reserve Bank's thinking on some of these and other related issues, see Richards T, C Thompson and C Dark (2020), 'Retail Central Bank Digital Currency: Design Considerations, Rationales and Implications', RBA *Bulletin*, September.

[2] For a more detailed exposition of some of these concepts, see Bank for International Settlements (2022), 'The Future Monetary System', Annual Report, Ch III.

[3] Government is not irrelevant here – for one example, fiat currency draws part of its value from its use in the settlement of debt and tax obligations.

[4] In Australia's case, this translates to the settlement of around $200 billion worth of interbank payments each day via the Reserve Bank Information and Transfer System (RITS), Australia's high-value payments system. RITS is used by banks and other approved institutions to settle their payment obligations on a real-time gross settlement basis.

[5] Caddy J and Z Zhang (2021), 'How Far Do Australians Need to Travel to Access Cash?', RBA *Bulletin*, June; J Caddy, L Delaney, C Fisher and C Noone (2020), 'Consumer Payment Behaviour in Australia', RBA *Bulletin*, March.

[6] For a useful review, see Ahnert T, K Assenmacher, P Hoffmann, A Leonello, C Monnet and D Porcellacchia (2022), 'The Economics of Central Bank Digital Currency', ECB Discussion Paper No 2713, August. Privacy preferences can also vary widely across countries, as a recent ECB public consultation found: see ECB (2021), 'ECB Publishes the Results of the Public Consultation on a Digital Euro', Media Release, 14 April.

[7] Indeed many observers have noted that China's interest in a CBDC could be partly related to the ability to monitor transactions for the purposes of informing social credit assessments. This is clearly not a relevant consideration in Australia.

[8] See most recently Waller C (2022), 'The U.S. Dollar and Central Bank Digital Currencies', Speech at Digital Currencies and National Security Tradeoffs Symposium presented by the Harvard National Security Journal, Cambridge, Massachusetts, 14 October. For a neutral treatment of the case for and against a U.S. CBDC, see Board of Governors of the Federal Reserve System (2022), 'Money and Payments: The U.S. Dollar in the Age of Digital Transformation', January.

[9] IMF (2022), 'Behind the Scenes of Central Bank Digital Currency', FinTech Note, 9 February.

[10] See most recently Gill T, C Holland and G Wiley (2022), 'The Cost of Card Payments for Merchants', RBA *Bulletin*, September.

[11] See Financial Stability Board (2022), 'G20 Roadmap for Enhancing Cross-border Payments: Priorities for the Next Phase of Work', October.

[12] A CBDC would also create operational issues for the implementation of monetary policy, though I generally view these as less material. A full exposition of these issues is beyond the scope of these remarks.

[13] See Ahnert *et al*, n 6.

[14] Brunnermeier MK and D Niepelt (2019), 'On the Equivalence of Private and Public Money', *Journal of Monetary Economics*, 106, pp 27–41.

[15] Bordo M and A Levin (2017), 'Central Bank Digital Currency and the Future of Monetary Policy', NBER Working Paper No 23711; Lilley A and K Rogoff (2021), 'The Case for Implementing Effective Negative Interest Rate Policies', in J Cochrane and J Taylor (eds), *Strategies for Monetary Policy*, Hoover Institution Press, Ch 2, pp 27–90.

[16] See Graph 1 and IMF, n 9.

[17] See, for instance, Keister T and C Monnet (2022), 'Central Bank Digital Currency: Stability and Information', *Journal of Economic Dynamics and Control*, 142, Art 104501; Brunnermeier and Niepelt, n 14.

[18] See RBA and DFCRC (2022), 'Reserve Bank and Digital Finance Cooperative Research Centre to Explore Use Cases for CBDC', Joint Media Release No 2022-23, 9 August; RBA and DFCRC (2022), 'White Paper: Australian CBDC Pilot for Digital Finance Innovation', 26 September.

[19] RBA (2021), 'Project Atom: Exploring a Wholesale CBDC for Syndicated Lending', December; Bank for International Settlements (2022), 'Project Dunbar – International Settlements Using Multi-CBDCs', March.

[20] For work the Reserve Bank is doing in this area, see RBA (2022), 'Payments System Board Annual Report', Ch 2.