



RESERVE BANK OF AUSTRALIA

Speech

The Future of Payments: Cryptocurrencies, Stablecoins or Central Bank Digital Currencies?

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Introduction

Thank you for the invitation to speak at this Essential Treasurer event.

There is a lot happening in the area of payments and financial market infrastructure that I could speak on today. But as this is my last speech before retiring from the Reserve Bank at the end of the year, I thought I would focus on the development that has generated the most discussion, conversation and debate in the nearly 10 years that I have spent as Head of Payments Policy at the Bank.

And that is the emergence of distributed-ledger technology, cryptocurrencies and stablecoins, and the prospective emergence of central bank digital currencies. There have been some fascinating developments in this area. So today I am going to give an overview of the various types of digital assets, some of the differences between them, what roles they could each play in the future, and some of the policy issues they raise.

A wide range of investors, from households to hedge funds, appear to believe that there is a significant role for cryptocurrencies as investments. This has been accompanied by the launch in various jurisdictions of crypto versions of financial products associated with more traditional asset classes – for example, futures contracts, exchange-traded funds and even micro futures contracts to make smaller investments more accessible. And some mainstream financial institutions are providing access to crypto-assets to their customers. At the same time, for reasons that I will touch on, much of the official sector globally remains sceptical of developments in the cryptocurrency market.

The recent boom in this area is perhaps best illustrated by the fact that Dogecoin, a cryptocurrency that was started as a joke in late 2013, had an implied market capitalisation as high as US\$88 billion

in June this year; it has since fallen back to around US\$31 billion, which makes it the eighth largest cryptocurrency (excluding two stablecoins) by market capitalisation. And the Shiba Inu token, which appears to be equally free of any useful function, is currently the ninth largest cryptocurrency, with a market capitalisation of around US\$26 billion.

While cryptocurrencies have clearly captured the attention of many, no doubt fuelled by influencers and celebrity tweets, it is unclear how widely held they are. But some surveys have claimed that around 20 per cent of the Australian population hold cryptocurrencies, and one claimed that Dogecoin alone was held by 5 per cent of Australians.

I must say that I find these statistics somewhat implausible. I cannot help thinking that the online surveys they are based on might be unrepresentative of the population. We have some experience on survey issues from the Reserve Bank's three-yearly Consumer Payments Survey where we contract a survey firm to have 1,000 or more adults record every payment they make for a week. ^[1] There are important segments of the population – most notably older people, those who live in regional areas and those who do not regularly access the internet – that online survey panels do not capture well; our experience is that it takes a lot of work to do a really good survey of the population. So while it is hard to point to any firmer evidence on cryptocurrency holdings by Australians, some of the estimates out there are extremely surprising and may be symptomatic of the significant amount of hype and misinformation in this area.

But having raised questions about how widely cryptocurrencies are held, I probably should offer a disclosure – namely, that I have had a cryptocurrency wallet since June 2014 – after all, part of my job is to try to understand new payment instruments and technologies. My initial purchase was a small amount of bitcoin, which I have used for a few small transfers and even a purchase at a café that accepted bitcoin, and then to diversify into some ether in August 2018. I stress that the amounts in question are still pretty small.

Cryptocurrencies, stablecoins and CBDCs

The various types of new digital assets or payment instruments can be classified into three broad groups.

Cryptocurrencies

Cryptocurrencies include a broad range of privately issued digital assets. They have their own 'currency' unit and are not denominated in the currency of any sovereign issuer. They utilise cryptography to store the record of transactions and ownership of digital 'coins' in a digital ledger that is distributed (and synchronised) across a number of 'nodes' (or computers) rather than relying on a central party to operate the system. Bitcoin is the most prominent implementation of a decentralised cryptocurrency protocol, but many thousands of variations have emerged. Cryptocurrencies have no intrinsic value, typically do not have any issuer standing behind them, and rely on users' trust in the software protocol that controls the system.

While the term 'cryptocurrency' may suggest that they are a form of money, the consensus is that existing cryptocurrencies do not have the key attributes of money (which is why some people prefer

the term 'crypto-assets'). As many observers have noted, they are rarely used or accepted as a means of payment (at least in everyday life), they are not used as a unit of account, and their prices can be very volatile and so they are a poor store of value. In Australia, the effect of the *Currency Act 1965* is that cryptocurrencies are not legal tender, though this does not prevent their use where both parties wish to do so. [\[2\]](#)

Stablecoins

The second group of new digital assets, so-called 'stablecoins', are a type of crypto-asset or token specifically designed to minimise price volatility against a widely used unit of account (such as the US dollar) or a common store of value (such as gold). This is to make them more money-like and attractive as a store of value or method of payment. One way their promoters seek to maintain a stable value is by holding assets that back the coins on issue. However, these backing arrangements to date have had varying degrees of credibility, especially in the case of Tether, the largest stablecoin by market capitalisation, which was recently fined US\$41 million by the US Commodity Futures Trading Commission for misleading statements regarding its assets being fully backed.

Within this group, it may be useful to distinguish between three possible broad types of stablecoins:

- The first category includes essentially all the existing stablecoins, such as Tether, USD Coin and Binance USD. These can be thought of as a bridge between fiat currency and cryptocurrency. They are being used both for payment or settlement for transactions involving cryptocurrencies or tokenised assets, and also as a store of value by people who may have traded in cryptocurrency and wish to then switch to a fiat currency claim but without leaving the distributed-ledger technology (DLT) ecosystem. [\[3\]](#) They are typically issued onto public blockchains.
- The second category would be the types of stablecoins that are being proposed by some large investment banks. These are envisaged for use in more mainstream financial- or corporate-sector uses, including treasury payments and cross-border payments. The assets backing these coins might conceivably be deposits at central banks.
- Third, the proposed Facebook-led stablecoin, Diem, is an example of a stablecoin that would be aimed at retail use. For households or merchants using Diem coins in everyday transfers and payments, the system would have many of the attributes of a stored-value facility (SVF) or 'e-money', and the particular ledger technology behind it would probably not be important to users.

Central bank digital currency

Central bank digital currency (CBDC) is a potential new form of digital money that would be a liability of (or a claim on) the central bank. A retail (or general-purpose) CBDC would be like a digital version of cash that is universally accessible, presumably via wallets on phones and possibly via purpose-built devices like smart cards. There could also be wholesale CBDC, which – similar to settlement accounts at central banks – would be accessible only to a more limited range of participants.

Like cash and settlement account balances, the unit of account of the CBDC would be the sovereign currency (also known as fiat currency). The CBDC would be convertible at par (i.e. one for one) with other forms of money, and in all likelihood it would also be specified to serve as legal tender.

While CBDCs would be issued by the central bank, it is generally expected that customer-facing activities involved in distributing them to users would be undertaken by private-sector entities. It is expected that implementations of CBDCs could use DLT, though this need not be the case and they might rely instead on more traditional databases (this will apparently be the case for the planned Chinese CBDC).

Distinguishing between the new digital assets

While there are many ways to distinguish between the characteristics of the three types of digital assets – cryptocurrencies, stablecoins and CBDCs – there are two particular dimensions that are worth highlighting:

- **Denomination and backing:** There is a spectrum ranging from *cryptocurrencies* (which have their own unit, with no reference to any fiat currency and no asset backing, so that any value they might have is determined purely by what – if anything – others will pay for them) to *stablecoins* (which are typically denominated in fiat currencies or aim for stability against fiat currencies, and are backed by assets that are supposed to ensure redeemability at par) to *CBDCs* (which are denominated in fiat, or sovereign, currencies, and are fully convertible at par into other forms of money).
- **Governance and technology:** CBDCs would clearly have centralised ('permissioned') governance arrangements, as do some stablecoin arrangements, whereas this is typically not the case for ('permissionless') cryptocurrencies, where governance may rely on some form of consensus emerging to change the pre-existing software protocols for the system. And transaction verification would also be quite different for CBDCs and stablecoins. Unlike in cryptocurrencies, where entities compete to verify transactions, including via 'proof of work' mining competitions, CBDCs and stablecoins would likely rely on a smaller number of trusted entities to verify transactions. [\[4\]](#)

The implied market value of all crypto-assets on issue (defined broadly to include stablecoins) is currently around US\$2.6 trillion. Bitcoin, the original cryptocurrency, which is essentially simply a token on a blockchain with no other functionality, remains the largest with a market capitalisation around US\$1.1 trillion. However, its share of total market capitalisation has been falling with the emergence of stablecoins (which to date are almost all linked to the US dollar) as well as the growing market interest in tokens associated with blockchains that use so-called 'smart contracts' and can provide greater functionality than Bitcoin.

Smart contracts are self-executing computer code running on a DLT platform that automatically perform various functions. You can think of them as 'if, then' statements that allow parties to enter into agreements knowing that they will be enforced – if they can be and if conditions are met – without the need to trust one another or rely on a central party. They enable all sorts of new

applications such as decentralised finance (DeFi), decentralised autonomous organisations (DAOs) and non-fungible tokens (NFTs), which I won't attempt to cover today given our time constraint.

The future for digital assets?

You've probably heard the old saying that has been attributed to Niels Bohr, Yogi Berra and many others that it's tough to make predictions, especially about the future. Nevertheless, I thought I might try my hand with a scenario of how things might play out for the various types of new digital assets.

I can certainly imagine that there will be future use cases for DLT, including where there are significant benefits in terms of resilience from having multiple instances of a ledger, rather than a centralised one. And there may be use cases where there are inefficient legacy business processes where many parties are involved and it would be more efficient to have different parties all able to write to a distributed ledger.

These distributed ledgers may well make significant use of smart contracts for easily automated functions. There might also be all sorts of use cases for DeFi. Though neither smart contracts, nor DeFi more broadly, necessarily require the use of any particular cryptocurrency or token. Plus, I wonder if there will be as much of a shift to peer-to-peer transactions as seems to be envisaged by some DeFi proponents. For example, when Australians hold cryptocurrencies they usually do it through an intermediary, via a hosted or custodial wallet. They typically don't do it via unhosted or self-custodial wallets, where if they lose their private keys they have lost their funds forever. So I suspect there will still be a significant role for some form of intermediaries, even in a world where finance is more decentralised than it is currently.

Now, let us imagine a world where all sorts of financial assets – bonds, equities, derivatives, commodities, etc – can be tokenised and transacted on blockchains. What payment instrument will be used to settle the transactions? I will focus on two aspects of this choice.

First, it seems highly likely that entities and individuals will want to pay with, and receive, financial assets that have a high degree of stability of value. I expect that it will be rare that both parties to a transaction, especially a high-value one, will want the settlement to occur via payment in some cryptocurrency with high volatility. Over the past year, for bitcoin, the standard deviation of its daily change in value has been about 4¼ per cent, and the standard deviation of the five-day change in its value has been around 9½ per cent. For ether, these numbers are around 5½ and 12½ per cent.

So I expect that tokenised asset transactions will typically be settled in fiat currencies, such as the Australian dollar, the US dollar, the euro, etc. And I would expect that the fiat currency instruments used will be riskless or near-riskless; that is, they are likely to be CBDCs or very safe stablecoins issued by regulated entities.

Second, I expect that entities transacting on the blockchain will want to ensure that they can do so with settlement that is clear and final. This is the standard in the financial market infrastructures that settle these transactions today, and it seems likely that market participants and regulators will expect

that standard to apply where transactions involving tokenised financial assets are being settled on a blockchain platform.

Currently, transaction verification in existing cryptocurrencies, with their public blockchains and proof-of-work consensus, is probabilistic. For example, once a transaction is included in a block (i.e. assuming the sender has paid a sufficient transaction fee) the standard rule of thumb is that it takes up to 60 minutes (six blocks, each of around 10 minutes) before a party receiving bitcoin can be highly confident of having received it; for ether, this is much shorter, though the general point applies.

In permissioned networks involving trusted parties, as would likely be the case for CBDCs or regulated stablecoins, it should be feasible to come up with much more efficient consensus mechanisms, matching the safety and certainty of existing delivery-versus-payment (DVP) processes in the non-tokenised world. This could ensure that large institutions will have confidence in buying and selling tokenised assets. More broadly, I think it is likely that a world making greater use of DLTs, smart contracts, etc will still find a significant role for some degree of centralised systems and decision-making.

So I can imagine a future where the establishment of strong regulatory frameworks for stablecoins could lead to issuance of stablecoins by highly rated entities, and central banks could move towards issuing CBDCs. In either case, they would be denominated in fiat currencies, be safer than existing stablecoins, and would likely have faster, safer and more efficient transaction verification mechanisms than most cryptocurrencies. Accordingly, it is likely that they would be viewed as superior instruments for the settlement of transactions in tokenised assets on distributed ledgers.

What role would there be for cryptocurrencies in this scenario?

I think there are plausible scenarios where a range of factors could come together to significantly challenge the current fervour for cryptocurrencies, so that the current speculative demand could begin to reverse, and much of the price increases of recent years could be unwound. Some of the factors could include:

- Households might be less influenced by fads and a fear of missing out and might start to pay more attention to the warnings of securities regulators and consumer protection agencies in many countries about the risks of investing in something with no issuer, no backing and highly uncertain value.
- The very high use of energy involved in mining proof-of-work cryptocurrencies could attract greater attention from governments and policymakers. The most recent estimates from Digiconomist.net put the annualised energy usage of the Bitcoin system at similar to that of Thailand, the world's 23rd largest economy in terms of energy consumption. Ethereum has been planning to switch from proof-of-work consensus to the less energy-intensive 'proof-of-stake' for many years, with this now scheduled to happen in 2022; however, for the time being, Ethereum's energy usage is estimated to be equivalent to the Philippines, the 35th largest economy in terms of energy consumption. Together, energy

consumption to run the Bitcoin and Ethereum systems is estimated to be close to the energy consumption of the world's 13th largest economy.

- There could be greater focus on the (near) anonymity that many cryptocurrencies can offer, and their potential use in facilitating financial crime and the black economy. [\[5\]](#) Tax authorities and agencies with responsibility for preventing financial crime could pay greater attention to transactions going through the on- and off-ramps linking cryptocurrencies to the traditional financial sector (e.g. digital currency exchanges). [\[6\]](#)

If there were to be global policy action to deal with some particular concerns about the use of cryptocurrencies, plus the arrival of new stablecoins and CBDCs that could safely meet the needs of a wide range of users, existing cryptocurrencies might then have only niche use cases, at best. If so – and also reflecting that the relevant code is often open-source, publicly available and easily copied – it seems plausible that current valuations of many cryptocurrencies would not be sustained. Mark Carney, former Governor of the Bank of Canada and the Bank of England has made a very similar point. [\[7\]](#)

The Bank's work on digital assets

Given the possible significant role of CBDCs and stablecoins in payments in the future, I will now provide a brief overview of work in this area by the Reserve Bank and the official sector more broadly.

There is considerable focus globally on CBDCs, with surveys from the Bank for International Settlements indicating that essentially all central banks are doing work in this area. The Central Bank of the Bahamas is the first central bank to have introduced a full-fledged CBDC and the Eastern Caribbean Central Bank is following; in both cases, the focus is on improving financial inclusion. China is in the advanced stages of piloting an e-RMB or digital yuan for household use and it seems increasingly likely that it will move to full issuance.

No high-income economies have yet made the decision to issue a CBDC. Sweden and the euro area appear to be the jurisdictions thinking most seriously about a possible CBDC. The Riksbank's interest has been prompted by Sweden's rapid shift to electronic payments and the growing difficulty that some households and businesses have faced in continuing to access and use cash. In the case of the European Central Bank, the considerations include a desire to enhance the role of the euro internationally and within the 19-country bloc, as well as unease about the possible dominance of large foreign payments and technology companies in the payments sector. In both cases, however, any decisions on possible issuance are probably a couple of years away.

By contrast, the US Federal Reserve appears much less convinced of the case for a retail CBDC, with both the Chair and a Deputy Chair having expressed scepticism recently and one Governor giving a speech in August entitled 'CBDC – A Solution in Search of a Problem?'. [\[8\]](#) Fed officials have pointed to ongoing improvements in the existing payments system, the uncertain benefits of a CBDC and new risks that it could introduce. They have also questioned the idea that the Fed needs to introduce a CBDC to compete with foreign CBDCs, cryptocurrencies or stablecoins.

Reserve Bank staff have also not been convinced to date that a strong policy case has emerged in Australia for a CBDC. The primary reason has been that Australia's existing electronic payments system already provides households and businesses with a wide range of safe, convenient and low-cost payment services. The New Payments Platform (NPP) was a major upgrade to the payments system, allowing real-time, data-rich, easily addressed account-to-account payments that can be made on a 24/7 basis. The capability of the NPP has been highlighted in the past few months with its use to deliver more than 19 million COVID support payments, providing immediate value and mostly on weekends. Looking ahead, the NPP will be used to deliver incoming cross-border payments and could potentially be linked up with other fast payment systems to enable instant cross-border payments. More broadly, much (if not all) of the innovation and new functionality that could potentially be enabled by a CBDC could in principle also be enabled by innovation based around commercial bank deposit accounts, e-money or stablecoins.

However, the Bank acknowledges the argument being made internationally that with all the innovation that is occurring in the payments area, provision of a new digital form of central bank money for general purpose use could be important for safeguarding confidence in national monies and the role of fiat currencies at the heart of monetary, financial and payment systems. In addition, there appears to be growing recognition that the network effects inherent in payments could result in large (walled-garden) technology companies or payment schemes coming to dominate the payments industry. So there could be potential benefits arising from central banks issuing general-purpose CBDCs that might be used by different types of entities, including non-bank payment providers, to offer transfers between digital wallets of households and merchants. By introducing CBDCs, central banks would not be getting into the retail payments business, but they would be providing a riskless and interoperable form of digital money that could potentially stimulate competition between different private-sector service providers.

Given the possibility that the balance could shift towards a case for issuance of retail CBDCs, the Bank has been stepping up its CBDC research. 'Supporting the evolution of payments' is one of the six strategic focus areas in the Bank's strategic plan, and research on CBDC is a key element of this. The Bank is looking to do experiments around retail CBDC and we are currently engaging with the new Digital Finance Cooperative Research Centre (CRC) on possible projects; the Bank is one of the 29 founding entities that will work through the CRC to explore the opportunities arising from the digitisation of assets.

As regards wholesale CBDC, the Bank has been conducting research on the technological and policy implications for several years, based on a view that it was more likely that a case for issuance could emerge. Our first project, done in 2019 in conjunction with the Bank's in-house Innovation Lab, developed a proof-of-concept of a DLT-based interbank payment system using a tokenised form of CBDC backed by exchange settlement account balances held at the Bank.

More recently, the Bank has been working on Project Atom, which has been conducted with four external parties. This has extended the earlier proof-of-concept in a number of ways, including to incorporate a tokenised financial asset in the form of a tokenised syndicated loan, and to explore the implications of DVP settlement on a DLT platform. A report on the project will be published shortly.

Currently, our staff are working on Project Dunbar, together with the BIS Innovation Hub and the central banks of Malaysia, Singapore and South Africa. This project aims to develop prototype shared platforms for cross-border transactions using CBDCs of many different jurisdictions. Such platforms could allow financial institutions to transact directly with each other in CBDCs, eliminating the need for intermediaries and potentially improving the speed, cost and transparency of wholesale cross-border transactions.

Turning now to stablecoins, a first point to note is that to date there has been essentially no issuance of Australian dollar stablecoins, nor use of them as a payment method in Australia. [\[9\]](#) However, given the possibility that there could be a potential significant role for stablecoins in the settlement of transactions in tokenised assets, or that large retail-focused stablecoins could emerge, it is important that a suitable regulatory framework is developed. If stablecoins are intended to be safe payment instruments and serve as alternatives to other forms of money, it is important for consumer protection and financial stability that they are appropriately regulated.

The Bank and other members of the Council of Financial Regulators (CFR), together with AUSTRAC and the ACCC, are involved in a working group that is examining the appropriate regulatory framework for crypto-assets, including stablecoins. This work builds on the CFR's earlier work on the regulation of stored-value facilities in Australia, including possible digital wallets using stablecoins.

The CFR agencies have also been engaging with their international counterparts on the regulatory issues surrounding stablecoins, and the potential risks to the financial system, especially from stablecoins that have the potential to scale rapidly and become widely used in a number of countries (so-called 'global stablecoins'). One element of this work is a consultation by the Committee on Payments and Market Infrastructures and the Board of the International Organization of Securities Commissions on the applicability of some existing international standards (the Principles for Financial Market Infrastructures) to stablecoin arrangements. Another example of the sharp focus on stablecoins internationally was the recent report in the United States from the President's Working Group on Financial Markets which called for comprehensive regulation and oversight of stablecoins used for payments to deal with risks from the potential for destabilising runs, disruptions in the payment system, and concentration of economic power.

Conclusion

As you will have seen from this quick tour, the digital asset space has provided no shortage of research, analysis and policy work over the past decade and it has been fascinating to be working at the Reserve Bank over this period.

I can assure you that work on the future of payments will be a high priority for the Bank in coming years as part of its responsibility to ensure that there are safe forms of money that the public can trust, to foster stability in Australia's monetary, financial and payment systems. The Bank will continue to work with the private sector and our international counterparts to ensure we stay abreast of innovations in the payments system. And there will be significant work to be done with the other financial regulators and the Parliament to ensure that we have a fit-for-purpose regulatory framework for digital assets.

It will be fascinating to see how things evolve over the next decade.

Endnotes

- [*] I thank a number of colleagues who have helped me think about these issues, especially Chris Thompson, David Emery and Cameron Dark.
- [1] For the most recent survey conducted in late 2019, see James Caddy, Luc Delaney and Chay Fisher (2020), '[Consumer Payment Behaviour in Australia: Evidence from the 2019 Consumer Payments Survey](#)', RBA Research Discussion Paper 2020-06.
- [2] El Salvador is the one country where Bitcoin is now legal tender (along with the US dollar); the jury is still out on the experience.
- [3] The tokenisation of assets is the process of creating digital tokens that represent ownership rights to real-world assets, which can be traded, stored and transferred on DLT platforms. The use of DLT and 'smart contracts' (described below) in asset tokenisation has the potential to deliver a number of benefits, including improving the efficiency, transparency, liquidity and accessibility of asset markets.
- [4] In proof-of-work verification, entities ('miners', which may or may not hold the cryptocurrency) compete to be the first to generate a solution for the computational or cryptographic problem that confirms that a block of proposed transactions is genuine, with the reward being some newly 'mined' tokens. As the computing power of competing miners (or consortiums of miners) increases, the difficulty of the cryptographic problem is increased. In proof-of-stake consensus, the rewards to successful verification ('forging') are typically shared between all validators, based on the amount of the cryptocurrency they hold or have 'staked'. Innovations in the approach to transaction verification draw on a significant body of literature dealing with the incentives of different parties, which may have no relationships and may not trust each other, to behave honestly as opposed to attacking the system (by claiming to verify their own dishonest transactions).
- [5] See, for example, Kenneth Rogoff (2021), 'The Real Reason Crypto Exists', *Australian Financial Review*, 8 June.
- [6] The application of AML/CTF rules for cryptocurrencies is still evolving. It is possible to hold and transact in cryptocurrencies without any involvement with intermediaries through the use of unhosted or self-custodial wallets. Most jurisdictions have reporting requirements for large cryptocurrency transactions into or out of fiat currencies, with regulatory attention now turning to transactions at cryptocurrency exchanges involving unhosted wallets. Policy here is being led by the Financial Action Task Force and the US FinCEN.
- [7] 'With respect to crypto, only the niche will survive. With limited use cases, crypto assets will, by definition, be not that valuable ... [T]okens at the heart of programmable networks, will have to remain just that, of token value': Mark Carney (2021), 'The Art of Central Banking in a Centrifugal World', Andrew Crockett Memorial Lecture at the Bank for International Settlements, Basel, 28 June, p 11.
- [8] Christopher J Waller (2021), 'CBDC – A Solution in Search of a Problem?', Speech at the American Enterprise Institute, Washington DC, 5 August.
- [9] While it remains to be seen whether the proposed Diem stablecoin system will launch internationally, there is no indication that Australia is an early target market. Facebook noted in April that it is yet to take any of the steps that would be required to set up a local entity to provide Diem-based payment services to Australian households. It also indicated that even when it launched in other countries, its 'Novi' digital wallet would not be available for download in Australia or be open for Australian users to register because it is not licensed or authorised to provide services in Australia.

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