



RESERVE BANK OF AUSTRALIA

Speech

An eAUD?

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Thank you for the invitation to speak at this important summit. It is an honour for me to be able to join you. Over recent times, the payments system has evolved tremendously and AusPayNet has been at the centre of this evolution. ^[1] In particular, it has played an important role in coordinating the industry's response to the Strategic Review of Innovation conducted by the Payments System Board. As a result of this work, same-day settlement for direct entry transactions was introduced, the Australian Payments Council was formed and, most importantly, the New Payments Platform (NPP) was developed. I would like to thank both past and current members of the AusPayNet team for your contribution to this effort.

If we look back over a slightly longer period, a clear lesson from history is that as people's needs change and technology improves, so too does the form that money takes. Once upon a time, people used clam shells and stones as money. And for a while, right here in the colony of New South Wales, rum was notoriously used. For many hundreds of years, though, metal coins were the main form of money. Then, as printing technology developed, paper banknotes became the norm. The next advance in technology – developed right here in Australia – was the printing of banknotes on polymer.

No doubt, this evolution will continue. Though predicting its exact nature is difficult. But as Australia's central bank, the RBA has been giving considerable thought as to what the future might look like. We are the issuer of Australia's banknotes, the provider of exchange settlement accounts for the financial sector, and we have a broad responsibility for the efficiency of the payments system, so this is an important issue for us.

Today I want to share with you some of our thinking about this future and to address a question that I am being asked increasingly frequently: does the RBA intend to issue a digital form of the Australian dollar? Let's call it an eAUD.

The short answer to this question is that we have no immediate plans to issue an electronic form of Australian dollar banknotes, but we are continuing to look at the pros and cons. At the same time, we are also looking at how settlement arrangements with central bank money might evolve as new technologies emerge.

As we have worked through the issues, we have developed a series of working hypotheses. I would like to use this opportunity to outline these hypotheses and then discuss each of them briefly. As you will see, we have more confidence in some of these than others.

- There will be a further significant shift to electronic payments, but there will still be a place for banknotes, although they will be used less frequently.
- It is likely that this shift to electronic payments will occur largely through products offered by the banking system. This is not a given, though. It will require financial institutions to offer customers low-cost solutions that meet their needs.
- An electronic form of banknotes could coexist with the electronic payment systems operated by the banks, although the case for this new form of money is not yet established. If an electronic form of Australian dollar banknotes was to become a commonly used payment method, it would probably best be issued by the RBA and distributed by financial institutions, just as physical banknotes are today.
- Another possibility that is sometimes suggested for encouraging the shift to electronic payments would be for the RBA to offer every Australian an exchange settlement account with easy, low-cost payments functionality. To be clear, we see no case for doing this.
- It is possible that the RBA might, in time, issue a new form of digital money – a variation on exchange settlement accounts – perhaps using distributed ledger technology. This money could then be used in specific settlement systems. The case for doing this has not yet been established, but we are open to the idea.

So these are our five working hypotheses. I would now like to expand on each of these.

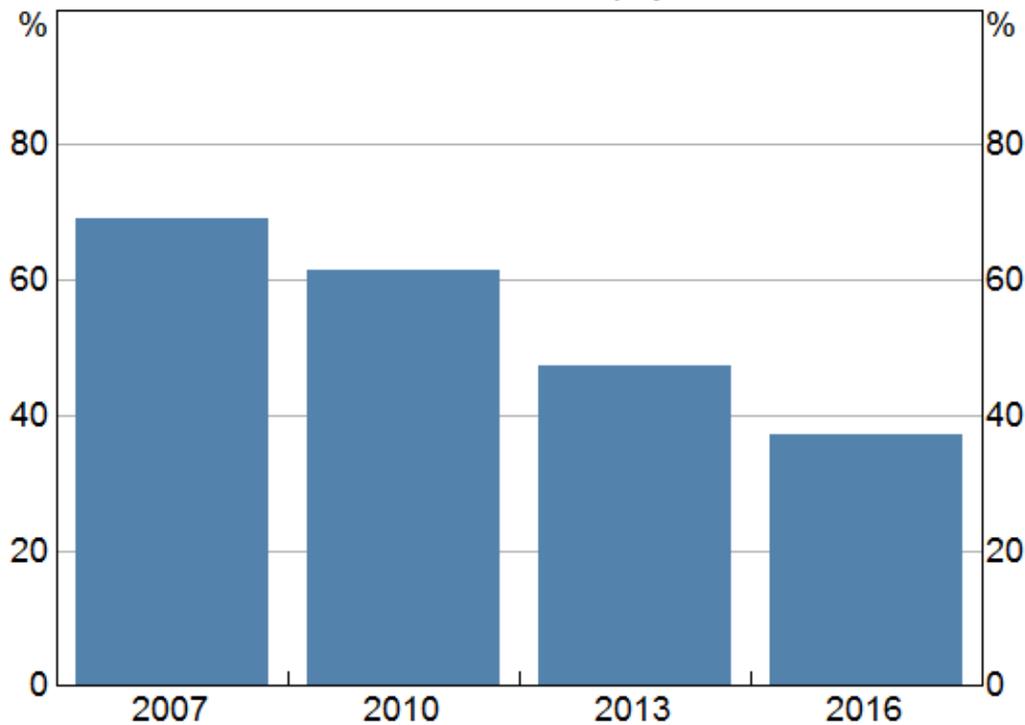
1. The Shift to Electronic Payments

An appropriate starting point is to recognise that most money is already digital or electronic. Only 3½ per cent of what is known as 'broad money' in Australia is in the form of physical currency. The rest is in the form of deposits, which, most of the time, can be accessed electronically. So the vast majority of what we know today as money is a liability of the private sector, and not the central bank, and is already electronic.

With most money available electronically, there has been a substantial shift to electronic forms of payments as well. There are various ways of tracking this shift.

One is the survey of consumers that the RBA conducts every three years. When we first conducted this survey in 2007, we estimated that cash accounted for around 70 per cent of transactions made by households. In the most recent survey, which was conducted last year, this share had fallen to 37 per cent (Graph 1).

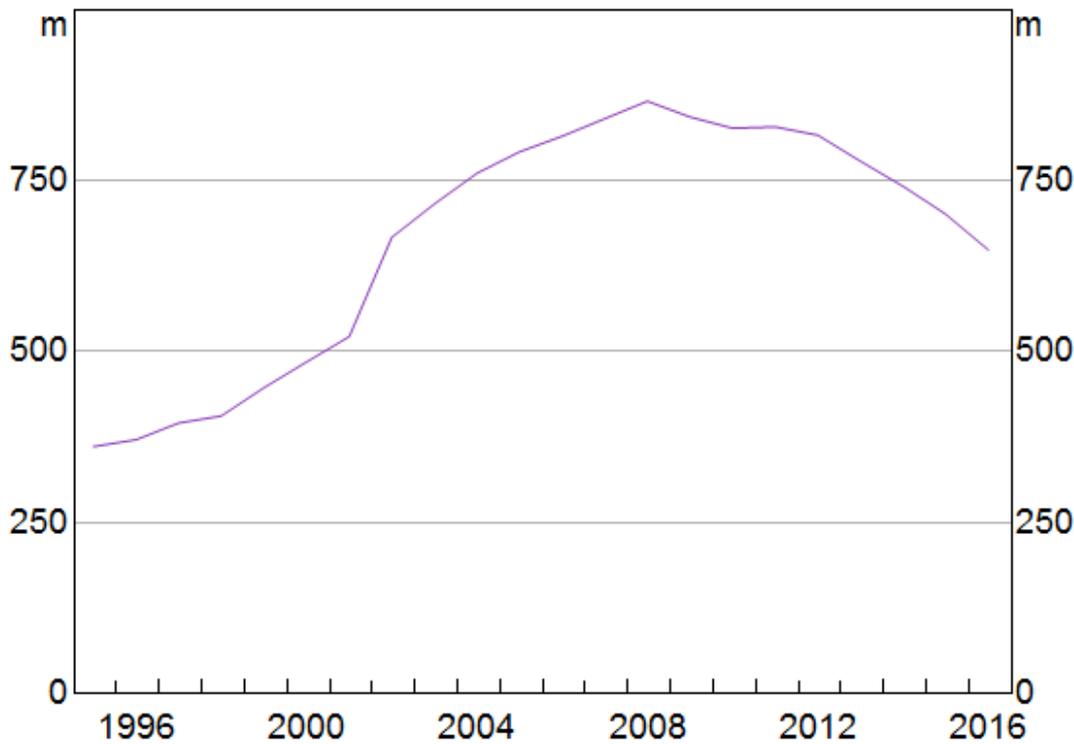
Graph 1
Number of Cash Payments
Per cent of consumer payments



Source: RBA calculations, based on data from Colmar Brunton, Ipsos and Roy Morgan Research

A second way of tracking the change is the decline in cash withdrawals from ATMs. The number of withdrawals peaked in 2008 and since then has fallen by around 25 per cent (Graph 2). This trend is likely to continue.

Graph 2
Number of ATM Withdrawals*
 Annual levels

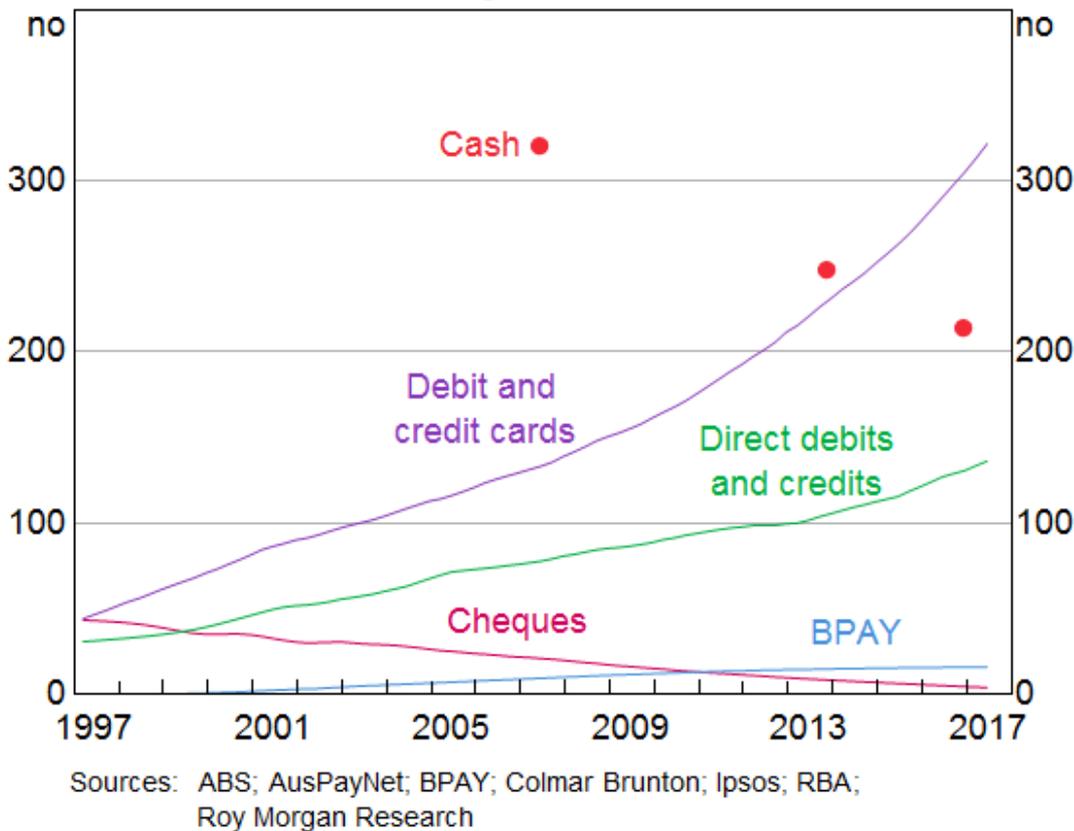


* Includes both domestic and international ATM cash withdrawals on Australian-issued cards

Source: RBA

The third area where we can see this shift is the rapid growth in the number of debit and credit card transactions and in transactions using the direct entry system. Since 2005, the number of transactions using these systems has grown at an average annual rate of 10 per cent (Graph 3). This stands in contrast to the decline in the use of cash and cheques.

Graph 3
Transactions per Capita
 Rolling annual sum

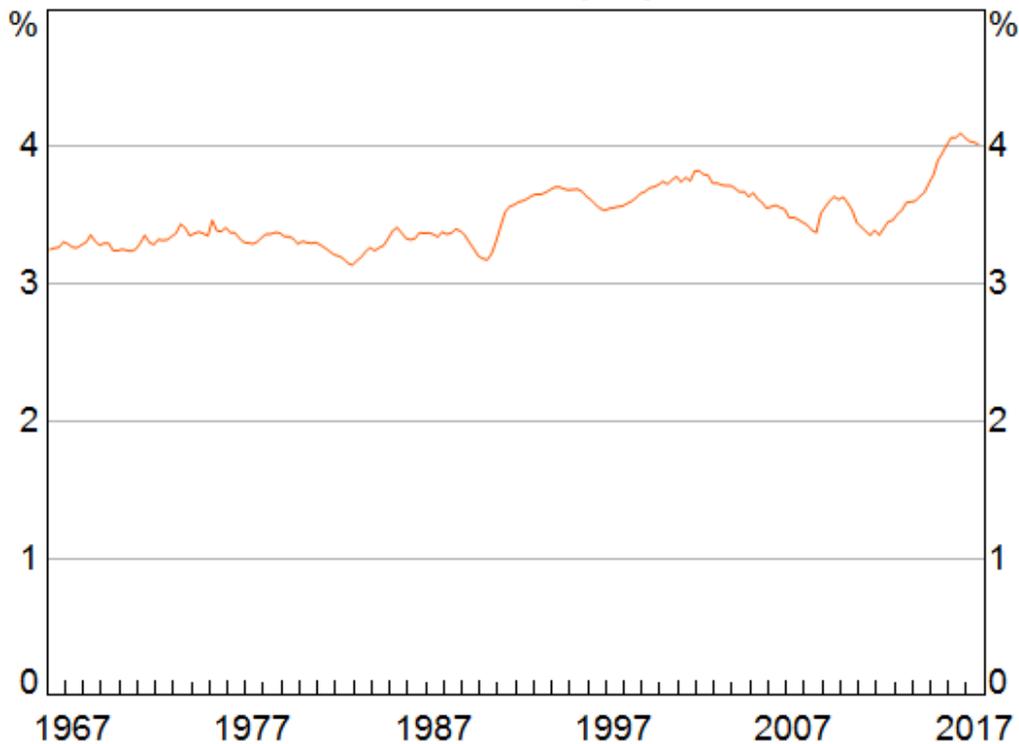


The overall picture is pretty clear. There has been a significant shift away from people using banknotes to making payments electronically. Most recently, Australia's enthusiastic adoption of 'tap-and-go' payments has added impetus to this shift. In many ways, Australians are ahead of others in the use of electronic payments, although we are not quite in the vanguard. It is also worth pointing out, though, that despite this shift to electronic payments, the value of banknotes on issue is at a 50-year high as a share of GDP (Graph 4). Australians are clearly holding banknotes for purposes other than for making day-to-day payments.

Graph 4

Australia – Currency to GDP

Nominal, seasonally adjusted



Sources: ABS; RBA

This shift towards electronic payments, and away from the use of banknotes for payments, will surely continue. This will be driven partly by the increased use of mobile payment apps and other innovations. At the same time, though, it is likely that banknotes will continue to play an important role in the Australian payments landscape for many years to come. For many people, and for some types of transactions, banknotes are likely to remain the payment instrument of choice. [\[2\]](#)

2. Banks are likely to remain at the centre of the shift to electronic payments

In Australia, the banking system has provided the infrastructure that has made the shift to electronic payments possible. In some other countries, the banking system has not done this. For example, in China and Kenya non-bank entities have been at the forefront of recent strong growth in electronic payments. A lesson here is that if financial institutions do not respond to customers' needs, others will.

At this stage, it seems likely that the banking system will continue to provide the infrastructure that Australians use to make electronic payments. This is particularly so given the substantial investment made by Australia's financial institutions in the NPP. The new system was turned on for 'live proving' in late November and the public launch is scheduled for February. It will allow Australians to make payments easily on a 24/7 basis, with recipients having immediate access to their money. The RBA has built a critical part of this infrastructure to ensure interbank settlement occurs in real time. Payments will be able to be made by just knowing somebody's email address or mobile phone

number and plenty of information will be able to be sent with the payment. This system has the potential to be transformational and will allow many transactions that today are conducted with banknotes to be conducted electronically.

Importantly, the new system offers instant settlement and funds availability. It provides this, while at the same time allowing funds to be held in deposit accounts at financial institutions subject to strong prudential regulation and that pay interest. This combination of attributes is not easy to replicate, including by closed-loop systems outside the banking system.

However, the further shift to electronic payments through the banking system is not a given. It requires that the cost to consumers and businesses of using the NPP is low and that the functionality expands over time. If this does not happen, then the experience of other countries suggests that alternative systems or technologies might emerge.

One class of technology that has emerged that can be used for payments is the so-called cryptocurrencies, the most prominent of which is Bitcoin. But in reality these currencies are not being commonly used for everyday payments and, as things currently stand, it is hard to see that changing. The value of Bitcoin is very volatile, the number of payments that can currently be handled is very low, there are governance problems, the transaction cost involved in making a payment with Bitcoin is very high and the estimates of the electricity used in the process of mining the coins are staggering. When thought of purely as a payment instrument, it seems more likely to be attractive to those who want to make transactions in the black or illegal economy, rather than everyday transactions. So the current fascination with these currencies feels more like a speculative mania than it has to do with their use as an efficient and convenient form of electronic payment. [\[3\]](#)

This is not to say that other efficient and low-cost electronic payments methods will not emerge. But there is a certain attraction of being able to make payments from funds held in prudentially regulated accounts that can earn interest.

3. Electronic banknotes could coexist with the electronic payment system operated by the banks

In principle, a new form of electronic payment method that could emerge would be some form of electronic banknotes, or electronic cash. The easiest case to think about is a form of electronic Australian dollar banknotes. Such banknotes could coexist with the electronic account-to-account-based payments system operated by the banks, just as polymer banknotes coexist with the electronic systems today. [\[4\]](#)

The technologies for doing this on an economy-wide scale are still developing. It is possible that it could be achieved through a distributed ledger, although there are other possibilities as well. The issuing authority could issue electronic currency in the form of files or 'tokens'. These tokens could be stored in digital wallets, provided by financial institutions and others. These tokens could then be used for payments in a similar way that physical banknotes are used today.

In thinking about this possibility there are a couple of important questions that I would like to highlight.

The first is that if such a system were to be technologically feasible, who would issue the tokens: the RBA or somebody else?

The second is whether the RBA developing such a system would pass the public interest test.

In terms of the issuing authority, our working hypothesis is that this would best be done by the central bank.

In principle, there is nothing preventing tokenised eAUDs being issued by the private sector. It is conceivable, for example, that eAUD tokens could be issued by banks or even by large non-banks, although it is hard to see them being issued as cryptocurrency tokens under a bitcoin-style protocol, with no central entity standing behind the liability. So, while a privately issued eAUD is conceivable, experience cautions that there are significant difficulties and dangers associated with privately issued fiat money.

The history of private issuance is one of periodic panic and instability. In times of uncertainty and stress, people don't want to hold privately issued fiat money. This is one reason why today physical banknotes are backed by central banks. It is possible that ways might be found to deal with this financial stability issue – including full collateralisation – but these tend to be expensive. This suggests that if there were to be an electronic form of banknotes that was widely used by the community, it is probably better and more likely for it to be issued by the central bank.

If we were to head in this direction, there would be significant design issues to work through. The tokens could be issued in a way that transactions could be made with complete anonymity, just as is the case with physical banknotes. Alternatively, they might be issued in a way in which transactions were auditable and traceable by relevant authorities. We would also need to deal with the issue of possible counterfeiting. Depending upon the design of any system, we might be very reliant on cryptography and would need to be confident in the ability to resist malicious attacks.

This brings me to the second issue here: is there a public policy case for moving in this direction?

Such a case would need to be built on electronic banknotes offering something that account-to-account transfers through the banking system do not. We would also need to be confident that there were not material downsides from moving in this direction.

Our current working hypothesis is that with the NPP there is likely to be little additional benefit from electronic banknotes. This, of course, presupposes that the NPP provides low-cost efficient payments. One possible benefit of electronic banknotes for some people might be that they could have less of an 'electronic fingerprint' than account-to-account transfers, although this would depend upon how the system was designed. But having less of an electronic fingerprint hardly seems the basis for building a public policy case to issue an electronic form of the currency. So there would need to be more than this.

Among the potential downsides, the main one lies in the area of financial stability.

If we were to issue electronic banknotes, it is possible that in times of banking system stress, people might seek to exchange their deposits in commercial banks for these banknotes, which are a claim

on the central bank. It is likely that the process of switching from commercial bank deposits to digital banknotes would be easier than switching to physical banknotes. In other words, it might be easier to run on the banking system. This could have adverse implications for financial stability.

Given these various considerations, we do not currently see a public policy case for moving in this direction. We will, however, keep that judgement under review.

4. Exchange settlement accounts for all Australians?

Another possible change that some have suggested would encourage the shift to electronic payments would be for the central bank to issue every person a bank account – for each Australian to have their own exchange settlement account with the RBA. In addition to serving as deposit accounts, these accounts could be used for low-cost electronic payments, in a similar way that third-party payment providers currently use accounts at the RBA to make payments between themselves. Some advocates of this model also suggest that the central bank could pay interest on these accounts or even charge interest if the policy rate was negative. [\[5\]](#)

On this issue, we have reached a conclusion, rather than just develop a hypothesis. The conclusion is that we do not see it as in the public interest to go down this route.

If we did go down this route, the RBA would find itself in direct competition with the private banking sector, both in terms of deposits and payment services. In doing so, the nature of commercial banking as we know it today would be reshaped. The RBA could find itself not just as the nation's central bank, but as a type of large commercial bank as well. This is not a direction in which we want to head.

A related consideration is the same financial stability issue that I just spoke about in terms of electronic banknotes. In times of stress, it is highly likely that people might want to run from what funds they still hold in commercial bank accounts to their account at the RBA. This would make the remaining private banking system prone to runs.

The point here is that exchange settlement accounts are for settlement of interbank obligations between institutions that operate third-party payment businesses to address systemic risk – something that is central to our mandate. A decision to offer exchange settlement accounts for day-to-day use would be a step into a completely different policy area.

5. New settlement systems based on distributed ledger technology and central bank money?

One final possibility is for the RBA to issue Australian dollars in the form of electronic files or tokens that could be used within specialised payment and settlement systems. The tokens could be exchanged among members of a private, permissioned distributed ledger, separate from the RBA's Real-time Gross Settlement (RTGS) system, but with mechanisms for the tokens to be exchanged for central bank deposits when required. Such a system might allow the payment and settlement process to become highly integrated with other business processes, generating efficiencies and risk reductions for private business. As part of this, the tokens might also be able to be programmed and

sit alongside smart contracts, enabling multi-stage transactions with potentially complex dependencies to take place securely and automatically. This seems to be the general model that some people have in mind when they talk about 'putting AUD on the blockchain', although other technologies might be able to achieve similar outcomes.

Whether a strong case for the development of these types of systems emerges remains an open question. We need to better understand the potential efficiencies for private business and why it would be preferable for such a settlement system to be provided by the central bank, rather than the private sector; why privately issued tokens or files could not do the job. We would also need to understand why any efficiency improvement could not be obtained by using the existing Exchange Settlement Accounts and the NPP.

We would also need to understand whether and how risk in the financial system would change as a result of such a system. It remains unclear which way this could go. On the one hand, these types of processes could use a very different technology from the current system, which is based on account-to-account transfers, so they could add to the resilience of the overall payments system. But there would be a whole host of new technology issues to manage as well.

To help understand these various issues, Reserve Bank staff have been liaising closely with fintechs and financial institutions. We also regularly talk with other central banks that have tested distributed ledger technologies in some related contexts. We are also currently working with some external entities to observe or participate in proof-of-concepts similar to those of other central banks. So this area remains a work in progress for us.

Conclusion

This brings me to the end of the elaboration of my set of five working hypotheses. I would like to conclude by summarising.

There is a lot going on in the world of payments. Much of this is being driven by advances in technology. These advances are opening up possibilities that were difficult even to dream about a little while ago.

These changes are leading to much greater use of electronic means of payment and the development of new electronic payment methods. This process has much further to run, although physical banknotes are likely to remain an important part of the payments landscape for many years to come.

This shift to electronic payments is most likely to occur through products offered by the banking system. The NPP is a very big step here. If it had not been developed it is likely that non-bank solutions would have gained wide acceptance. This may still happen. But it seems plausible that Australian households and businesses will continue to hold the bulk of their money in the form of commercial bank deposits, which come with flexible, low-cost electronic payment options, earn interest and are prudentially regulated. But this will require the banks to offer the services that customers want at a reasonable price.

The case for adding an electronic form of Australian banknotes to the payments mix has not been established, even if it were technologically feasible. My working hypothesis here is that the NPP will serve this purpose. The RBA is in close contact with our peers in other countries on this issue and few see electronic banknotes on the horizon.

We do not see a case for the RBA offering every Australian a bank account for the purposes of making payments. Doing so would fundamentally change our banking system in a way that would not promote the public interest.

A convincing case for issuing Australian dollars on the blockchain for use with limited private systems has not yet been made. It is certainly possible that this type of system could lead to more efficient, lower-cost business processes and payments. My working hypothesis here is that such a case could develop, although we need to work through a range of complex operational and policy questions.

As we work through these various issues, we look forward to an ongoing dialogue with the payments industry and other interested parties.

Finally, before I finish I would like to briefly highlight three other issues that I know are of current interest to the payments industry as well as the Payments System Board. [\[6\]](#) These are:

- the importance of allowing merchants to route debit card transactions through the least-cost network
- the need to address rising rates of fraud in card-not-present transactions
- the need to develop a strong system of digital identity that can be used in the financial sector, and perhaps elsewhere.

In the Payments System Board's view, it is in the public interest that timely progress be made in all three areas. The Board's preference is that this progress be made by industry participants, without the need for regulation. In the event that this did not occur, the Board would need to consider what steps it might take to promote the public interest.

Thank you for listening and I am happy to answer questions.

Endnotes

[\[*\]](#) I would like to thank David Emery, Tony Richards and other staff in the RBA's Payments Policy Department for assistance in the preparation of these remarks.

[\[1\]](#) AusPayNet stands for Australian Payments Network. Prior to mid 2017 it was the Australian Payments Clearing Association (APCA).

[\[2\]](#) In our most recent consumer payments survey, around 12 per cent of respondents used cash for all of their in-person transactions during the survey week, and cash was used more intensively by older Australians and those in rural and regional areas. See Doyle M-A, C Fisher, E Tellez and A Yadav (2017), 'How Australians Pay: Evidence from the 2016 Consumer Payments Survey', RBA Research Discussion Paper No 2017-04.

- [3] So-called Initial Coin Offerings – crowdfunding-type ventures, typically blockchain-enabled, that allow participants to contribute digital currencies or other funds in return for digital tokens that may provide certain future rights or benefits – appear to be contributing to some of this speculative mania.
- [4] The concept of electronic cash is actually not new. A report from the Bank for International Settlements from over 20 years ago noted that e-money innovations 'have the potential to challenge the predominant role of cash for making small-value payments and could make retail transactions easier and cheaper for consumers and merchants' (Bank for International Settlements (1996), 'Implications for Central Banks of the Development of Electronic Money', October). A tokenised eAUD could also be seen as an updated version of the 1990s technologies that yielded prototypes such as Digicash and Mondex. These were ultimately not commercially successful, but they demonstrated that versions of electronic cash were feasible.
- [5] Of course, it might also be possible to pay/charge interest on electronic banknotes as well. This would raise some of the same issues discussed here.
- [6] These were noted in the Bank's Payments System Board updates following the [August 2017](#) and [November 2017](#) meetings.

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