

## DIGITAL CURRENCIES AND CENTRAL BANKS<sup>1</sup>

### *Context*

This brief bulletin reports on an areas of high topicality for today's central banks and was informed by recent discussion of our central banking Forum<sup>2</sup> [see footnote]. For central banks developments that may transform today's monetary and financial system are clearly of fundamental importance. One such development is the emergence of two new forms of digital "money". The first is privately issued crypto "currencies" [CC]. The second is constituted by fiat-based money in digital form issued by central banks [Central Bank Digital Currencies or CBDCs].

CCs are virtual claims created by applying block chain algorithms recorded in distributed ledger to which access is unrestricted. Fiat-based CBDC are dematerialised claims administered by a central bank and recorded in either a centralised digital register or decentralised ledger subject to oversight by the central bank. Although the settlement of interbank transactions by the central bank has been digitalised for many years and is in fact pivotal for the exercise of monetary policy, CBDC's potentially provide digital substitutes for banknotes and coin.

This note considers digital currencies in light of a discussion of the Forum in September 2018 and is informed by further developments in thinking on these matters since then including by the BIS and the IMF.

### *The Digitalisation of Money*

The digitalisation of money is an ongoing process with potentially profound consequences. Computer technology has been applied in finance for decades and led to substantial changes in the business of banking. They have been incremental, and while they have at times been disruptive – as an example the financial crisis that started in 2007 was in part due to complexity facilitated by computer technology – they have not so far fundamentally altered the basic business model of banks or the money creation process. Banks still borrow short and lend

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<sup>1</sup> Record of themes discussed at a meeting of the Forum on 20 July 2017

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Discussion moderated by Dr Gavin Bingham and Sir Andrew Large, Partners, Systemic Policy Partnership

Disclaimer: The views expressed are unattributed and may not be taken to represent the views of any individual member of the Forum

<sup>2</sup> This paper reports on the discussion of the meeting of the Forum hosted by Oliver Wyman on 18<sup>th</sup> September 2018. The meeting was moderated by Gavin Bingham, Director and Sir Andrew Large, Chairman Oliver Wyman-SPP. The paper is not a record of the meeting but was informed by it. The meeting was held under "Chatham House Rule". The views expressed reflect inputs from forum participants but are unattributed and may not be taken to represent the views of any individual member of the Forum. Forum members participated in their personal capacity, and their participation does not imply the support or agreement of their respective public or private institutions. Members of the Forum, are: Dr Aziz Zeti, Jacques de Larosiere, Donald Kohn, Guillermo Ortiz, His Highness Mohammed Sanusi II, Andrew Sheng, and Sir Paul Tucker.

long, thereby contributing to money creation and providing finance for trade and industry. The replacement of the central bank money base by the substitution of CCs for central bank liabilities if it occurs could be fundamentally disruptive for central banking.

In the case of CC's (and potentially for some types of CBDCs), distributed ledger technology (DLT) is existential. DLT enables the decentralisation of a critical element of the process of creating and transferring claims. This can eliminate the need for intermediaries and allow boundaryless, peer-to-peer payments. The elimination of intermediaries, including potentially central banks themselves, has the potential to disrupt the delicate balance of the trust on which the fiat monetary system is based. This matter because it can alter the money creation process and the credit provision process that lubricates economic activity. It can also have implications for systemic risk and can enable illicit activity beyond the purview of financial authorities.

Like most innovations, digitalisation in finance can have costs and benefits. Benefits might include improvements to settlement and payments, improvement in risk management, better pricing of credit and other services, that are cheaper and faster. In addition, compliance costs in the financial industry might be reduced if transaction records are immutable and available to all users, and data can be shared. And cyber risks might be reduced if the systems are made less susceptible to hacking. Proponents of the use in finance of digital technology in general and blockchain in particular extol such broader consequences as the disintermediation of expensive incumbents to the benefit of society, elimination of the need for costly oversight, and reduction of the risk of misuse of private information by the state.

On the potentially negative side a variety of issues arise. The present lack of scalability of the technology when used in CC's such as Bitcoin inhibits the expansion of such arrangements and leads to huge and wasteful energy consumption associated with "coin mining". The anonymity enabled by the technology behind CCs, which lies behind the "crypto" label, makes them suitable for illicit use, thereby confounding AML/CTF strategies based on the ability to identify those involved in individual payments.

### ***Crypto "currencies"***

What do CC's mean for central banks? As custodians of payments systems and authorities responsible for monetary and financial stability, central banks need to be attuned to consequences of the private issuance of crypto currency for the exercise of their policy functions. If one thinks of the three main attributes of money there are to date no clearly positive benefits for society that current forms of money or its close substitutes do not already provide. As a unit of account, it is hard to see what advantages any CC has over fiat money, except perhaps in jurisdictions where trust in the existing system is absent for example because of hyperinflation. But even then, the alternative of the use of another stable fiat currency ("dollarization") is also generally available. As a means of payment success would require very wide acceptance and this does not seem to be in prospect for legitimate economic activity. And as a store of value the sheer volatility and unpredictability of the value of CC's have to date rendered them highly questionable.

Beyond this, it is questionable whether CCs can garner the trust need for serving as money. Many of the current promoters and users are tainted and the promotion of such assets through so called Initial Coin Offerings [ICO's] have in a number cases been shown to be fraudulent or subject to unverifiable claims.

### ***General implications for public policy delivery and the case for regulation***

Policy makers need to ask how the technology behind CC's affects the performance of public policy mandates. A useful perspective is the one of market imperfections and other factors that inhibit policy delivery. Money (whatever its form) exists because of a market

failure when trade takes place through barter: the inability to multilateralise transactions. With barter you get immediate settlement but only between two counterparties. There is no need for trust as regards the exchange itself, but equally no capacity to get a multiplicity of goods or services in exchange for whatever you have of value that you wish to trade. We need something in-between to move beyond the shackles of bilateralism. Money (whether it be shells, tobacco, gold, banknotes issued by central banks, claims on banks held in current accounts or digital tokens issued according to an algorithm and recorded in a distributed ledger) provides that something in-between. It acts as both medium of exchange and store of value. Whatever its form, money needs to be trusted for it to permit multilateralised trading. The basic question is how to establish and maintain that trust, and whether CC's have the capability of generating it.

Creation of traditional cash and deposit-based money is a process that is well understood and controlled. Although the bulk of "money" takes the form of bank liabilities, the banks are regulated and central banks control base money. By and large, central banks have tolerated new means of payment, in part because they do not want to stifle innovation. But crypto currencies could pose a fundamental threat: if economic transactions are settled via private network CC's over which the authorities have no control in new units of account, then central bank money no longer constitutes base money. The central bank's monetary policy could then become irrelevant, as the interest rates it sets might then not affect agents' intertemporal trade-off between consuming or saving. Beyond that central banks and their governments, will no longer make money through seigniorage. The impossibility of discretionary action to provide liquidity to the system in the private crypto currency implies no means of adjusting money supply in reaction to changes in demand, and no lender of last resort. Added to this are the unknowns as to the impact of CC's on the delivery of policy, potentially both in relation to monetary policy transmission, as well as financial stability and herd behaviour. And for policy makers the use of the assets as investment vehicles also raises issues in terms of KYC, and possibly the danger of fire sales at moments of stress.

### **Trust**

As stated above this is a fundamental quality needed for fiat money to work, and also needed to ensure the delivery of monetary policy objectives. Its demise would be a significant issue for policy makers. Today there is general trust in mechanisms for transfers of cash and payments and settlements. In turn these contribute to overall trust both in the fiat money system itself and in its stewards, central banks. This trust underpins both monetary policy and efforts to promote financial stability. However well designed in terms of functionality, in the case of CC's the public is being invited to place trust in an unfamiliar set of decentralised processes, in the algorithms and paradigms behind them, and in an initially unfamiliar set of private sponsors. The question is, what are the relevant implications of needing to place trust in new technology on the one hand or, in familiar processes and institutions on the other. An argument for putting trust in technologies like DLT is that is free from human foibles and frailty. It operates according to rules, albeit rules that can be extremely complex or which might be changed and potentially involve such a high degree of recursiveness that they take on the attributes of artificial intelligence. However, at the same time it undermines the capacity to take discretionary action.

### **Anonymity**

CC's can be, and usually are, designed so that the identity of the holder is not known. As such, they can involve a reversion to, or a recovery of, one of the original features of money: providing an anonymous claim of an unspecified agent on an unknown counterparty at some future time. Given the scope for tokens to be exchanged when no physical assets are involved, and no physical interchange is necessary as between counterparties, the question of money laundering, terrorist financing and other illicit uses thus come to the fore.

### *Regulation: so, what is needed?*

A feature of many CCs is that they do not fit within traditional approaches to financial regulation, which relies basically on regulation of institutions, issuance and trading. CCs have promoters, not issuers, and the technology, algorithms and products are not subject to direct regulation. Clearly much more thinking is needed to determine whether and how CCs should be subject to regulation. A useful framework approach for such thinking might be that relating to market failures.

### *Central bank digital currencies*

In some countries including the Nordics notes and coin in circulation (“cash”) have fallen considerably as other payments mechanisms have developed. If the authorities determine that the replacement of cash by CCs or near money substitutes is not feasible or desirable, it seems natural to think about a fiat alternative such as CBDCs.

The fact that many of the issues that arise are not resolved may explain why to date no major jurisdiction has gone ahead with issuing a CBDC. Complicating things too are the many possible variants of CBDC. They may simply involve an extension of the application of digital techniques now employed in wholesale central bank transactions, or they could amount to disintermediation of the banking system by providing direct access to the population in general. Or, they can be distinctly new, DLT-based assets. They could be in the form of tokens, or deposits at the central bank itself. In theory, a central bank digital currency could exploit the virtues of DLT while retaining the central bank’s capability to steer inflation via interest rates and money supply, while also denying anonymity and the illicit uses that come with it.

It can be asked whether there is value added in central banks supplying a retail form of payment, directly competing with those offered by the private sector. Historically a number of central banks provided private accounts and the practice persisted until it was abolished, sometimes against the protests of the account holders, so that central banks could focus exclusively on their core public functions. There would seem to be little point providing services to the public if they can be provided privately and more efficiently by others.

### *What are firstly the benefits for the users of CBDC’s compared to traditional money?*

Areas where CB’s look for advantages for users include the following. Clearly each jurisdiction will be very different. And the following is but a small reflection of possibilities:

- Providing a meaningful link to the central bank provider, and hence helping underpin trust in the fiat arrangements as cash disappears from the economy
- Bypassing banks where reluctance to lend or supply services has negative impact on the economy
- Reduced costs of obtaining currency [of relevance in dispersed and unbanked communities]
- Eliminating security concerns of holding physical cash
- Encouraging increased e-literacy of the population

### *Secondly, what about the implications for policy makers?*

- CBDC issuance may be an answer to any competition from CC’s
- If the CBDC is to replace cash the elderly, the e-illiterate could be disadvantaged

- It might accelerate financial inclusion for those without bank accounts, credit cards or mobile phones
- A CBDC could be designed to disintermediate deposits, and also lending, from the commercial banks. Is this desirable, and what role would the central bank play? What might it do to impact the essential services provided by the banking sector?
- One issue that warrants consideration is whether the issue of CBDCs will increase or decrease financial stability
  - CBDCs will in all likelihood be accorded more trust than their private counterparts. This is because there is a public institution that stands behind them either directly or indirectly as the guarantor of the robustness of the algorithms and uniqueness of the block chains
  - But it is just because of their greater trustworthiness that they could inadvertently increase instability. A bank run, possibly a massive and instantaneous run, into CBDCs from deposits held with commercial banks could compromise the stability of the financial system
- For countries whose FX is a peg to another currency, what would be the implications for maintaining that peg?
- The wisdom of a system of electronic identity attached to wallets for use with CBDC's could provide benefits including in relation to targeted availability of data but also raises questions about data privacy

Bottom line, whilst for central banks issuing CBDC's may give them the opportunity to retain control of and trust in fiat arrangements, the very large range of both design and policy considerations and unknowns attached mean central banks are needing to devote more time and attention to planning for potentially disruptive changes.

### *Wider implications and coping with change*

Digital currencies are of course only one manifestation of the changes being wrought by the continuing development of information technologies and artificial intelligence. While neither crypto currencies nor CBDC's may ever completely replace existing forms of central bank money, digitalisation has the potential to be more disruptive in the financial industry than in many others because this industry operates more than others by collecting, analysing and expropriating value from data. This includes information on transactions and accounts and settlement in payment systems, as well as a wealth of data relating to the creditworthiness of counterparties, the value of collateral and the risks associated with financial operations. Information is the life blood of the financial industry, and digital technologies are altering the ways information is collected, analysed and utilized.

These ongoing changes are part of a continuing process that has unfolded over decades. Securities transactions are almost fully dematerialised and wholesale interbank transactions are digitalised. Why then should further change in the same direction be disruptive? The answer lies in discontinuities or tipping points that can occur even when the processes leading up to them are gradual. Take credit intermediation for example. One of the reasons that it takes place through financial intermediaries is because information about counterparties is costly to collect, verify and analyse. Digital technologies reduce these costs and facilitate peer to peer lending. The willingness and ability of big tech companies (Apple, Google, Facebook, Amazon, Microsoft, etc.) to provide close substitutes for services traditionally offered by banks and other conventional financial intermediaries as well as the potential growth of niche peer to peer lenders and providers of brokerage services could ultimately be quite disruptive. And beyond what we can see on the horizon there are entirely

new technologies such as self- executing smart contracts that could eliminate the need for payment and settlement altogether.

So, given all the uncertainties and unknowns how are central banks and indeed the public authorities meant to react? A key problem is that the technology community and the financial authorities tend to “talk past” each other. The financial authorities have ramped up their efforts to understand what might happen, but there is not sufficient engagement with those who are developing cyber-finance.

In addition, central banks and other authorities face a number of organisational challenges before they can successfully adopt and integrate the new technologies into their operational framework. Firstly, changing the way that central banks operate is a long-term process often requiring political and industry support. Secondly competing culturally with the private sector for highly specialized skill sets and talent to design, implement, and manage these technologies may prove challenging. And third central banks will want to have a superior confidence in the containment of potential risks associated with new technologies before they adopt them, including in the integrity of data and operational resilience.

The present debate seems to lack objectivity both as to the realities and timescale of the benefits and the degree of the risks. One suggested approach is for some neutral body or bodies to use their convening power to facilitate creation of a “forum” with a global remit for debate, research and engagement with the various parties. To achieve objective understanding this needs to include both public policymakers and industry and act on a “no-advocacy” basis. It would need to work towards:

- Defining principles that need to be adhered to such as data privacy or interoperability
- Creating standards of practice to match up to these with behaviour commensurate with public policy demands

There is a case for ensuring that all interested parties are aware of what is taking place, perhaps through the good offices of the FSB, OECD or the IIF.

## **Conclusion**

The application of digital technology in banking and finance has been transformative. Looking ahead it has the potential to be disruptive. Cryptocurrencies are unlikely to displace central bank money, but central banks need to address the challenges posed by cyberfinance and its implications for policy delivery. If they choose to issue digital currency, they should take account of potential effects such as facilitating bank runs. Dialogue with the technology sector should help to understand and address the wider potential disruptive consequences for the financial industry and help central banks prepare their own organisations for the changes required to adopt and manage these technologies.

Whatever happens and beyond the discussion of digital currencies as such it is becoming clearer now that DLT applications have the potential to be a major factor in enhancing efficiency of financial infrastructure looking ahead. This is likely introduced policy challenges for central banks that they will need to address whatever the future of digital currencies.