

**DIGITAL POLICY,  
STRATEGY AND  
ADVISORY**



# Two Paths to Tomorrow's Money

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Payment systems need to be modernized to meet the needs of 21st Century digital economies, but which road to follow? The publication of the Bitcoin Whitepaper in 2008 raised the prospect of global digital currencies without central issuers or intermediaries. While cryptocurrencies have yet to achieve the status of money, the underlying 'token' technology has prompted bigtech interest in 'stablecoins' and central banks to evaluate novel forms of national currency issuance.

While crypto has captured the column inches, most real world action in payments since 2008 has been elsewhere – the rollout of instant payments schemes, the adoption of electronic money wallets by hundreds of millions of people and the fintech revolution. We stand at a crossroads. Will the future of money be digital tokens, restructuring the financial system as we know it, or a much needed overhaul of account based payments? Finally, how can tokens and accounts live together?

## Introduction

In solving the 'double spend' problem for digital currencies, the Bitcoin (BTC) Whitepaper<sup>1</sup> opened up a host of novel, radical possibilities:

- Global digital currency controlled by code running on a distributed computer network, not centralized issuers
- Trustless, private peer-to-peer payments without involving rent extracting intermediaries
- Programmable money and the development of new forms of decentralized, autonomous economic structures<sup>2</sup>

BTC has yet to make it as a form of money<sup>3</sup> and the cryptocurrency market is, ironically, replete with fee-charging intermediaries. However, the concept of programmable tokenized money is being pursued by banks, bigtechs, fintechs and central banks as a promising method to overcome problems with domestic and international payments. Indeed, the debate has progressed

beyond the technical pros and cons – some see tokenization of national currencies as a geopolitical necessity.

An unlikely alliance of crypto maximalists<sup>5</sup>, central bankers, fintechs and bigtechs all agree that the future of money is tokenized, even if they don't like each other's tokens.

On the other hand, while crypto-currency may have garnered the column inches over the past decade, a galloping transformation has been underway in the domestic and international payments landscape, including:

1. The adoption of Electronic Money (E-Money) wallets by hundreds of millions of customers<sup>6</sup>
2. The deployment of domestic Instant/Faster Payment schemes in dozens of countries<sup>7</sup>
3. A burgeoning Fintech sector that has attracted huge investment and diversified the payments landscape<sup>8</sup>

<sup>1</sup> <https://bitcoin.org/bitcoin.pdf>

<sup>2</sup> Greatly facilitated by the creation of Ethereum: <https://ethereum.org/en/whitepaper/>

<sup>3</sup> Bitcoin's failure to fulfil the functions of money have been extensively discussed, e.g. <https://www.bis.org/speeches/sp181115a.pdf>

<sup>4</sup> [https://www.digitaldollarproject.org/s/Digital-Dollar-Project-Whitepaper\\_vF\\_7\\_13\\_20.pdf](https://www.digitaldollarproject.org/s/Digital-Dollar-Project-Whitepaper_vF_7_13_20.pdf)

<sup>5</sup> A crypto maximalist is someone who believes in the founding ideology of bitcoin – a private, trustless, peer-to-peer world with no central currency issuers or financial intermediaries.

<sup>6</sup> <https://www.citivelocity.com/citigps/banking-next-billion/>

<sup>7</sup> [https://www.bis.org/statistics/payment\\_stats/commentary1911.htm](https://www.bis.org/statistics/payment_stats/commentary1911.htm)

<sup>8</sup> <https://ftpartners.docsend.com/view/9849q93>

These developments have been less newsworthy than crypto and blockchain is not part of their success. In fact they are based on plain old double-entry bookkeeping across digital ledgers/accounts run by bank and regulated non-bank intermediaries.

So we have two very different paths towards tomorrow's money – **one powered by the promise of cryptographic tokens and the other building on recent developments in account based payments.** This paper was written because tokenization is often presented as a silver bullet solution, gathers greatest media attention and appears to be remarkably subject to FOMO<sup>9</sup>. A serious debate about the future of money will weigh up both sides so that it becomes clear that there is more than one way to bring payments into the 21st century.

“If the US dollar is to remain the world’s primary reserve currency in the unfolding digital century, how can it remain an analog instrument and unit of account for things increasingly programmable and denominated as digital tokens? Should it not also become a digital tokenized currency that measures, supports, and transacts with the world’s digital things of value?”

– **Digital Dollar Project Whitepaper<sup>4</sup>**

<sup>9</sup> “Fear of Missing Out” seems to impact crypto investors and the management of financial intermediaries in danger of disruption by a technology that denies their right to exist. Even policy makers are not immune.



## Tokens versus Accounts

As the contest between physical and digital payments winds down we are entering a new phase: *the battle between different forms of digital payments*. There are several ways to conceptualize this new game, for example as a clash of fintechs and traditional banks. But the deeper conflict is between world views of how best to represent value – between those who promote tokenization of financial instruments and those who believe we can further perfect account based systems. The distinction between **digital tokens**<sup>10</sup> and **digital accounts** is troublesome<sup>11</sup>, but even if we cannot construct mutually exclusive categories, the distinction does have some useful benefits in the absence of alternative terminology:

- All accounts are liabilities of one party to another. There is a class of tokens, like BTC, which is not a liability, while all CBDCs and most (but not all<sup>12</sup>) stablecoins<sup>13</sup> are liabilities.
- Accounts are artefacts of double entry book-keeping, where the account holder's credit balance is matched by the bank's liability to the depositor. Tokens like BTC seek to do away with intermediaries, so their design doesn't include their books and records.

- All tokens are represented by chains of digital signatures and (arguably) function as digital bearer instruments because the holder of the private key effectively owns the asset. Accounts are not chains of digital signatures nor are they transferrable bearer instruments.

Despite definitional difficulties, promoters of tokenized money know what they mean when they use the term - **a programmable digital bearer instrument most likely riding on Distributed Ledger Technology (DLT) rails**. Things get fuzzy at the edges, for example a token held in a hosted, KYC'd wallet<sup>14</sup> that represents a liability of an intermediary and does not act as a bearer instrument would be hard to distinguish from a normal account.

“We define an electronic coin as a chain of digital signatures. Each owner transfers the coin to the next by digitally signing a hash of the previous transaction and the public key of the next owner and adding these to the end of the coin.”

### – Bitcoin Whitepaper

<sup>10</sup> One source of definitional confusion arises because non-DLT tokenization is a feature of other systems used in the payments space, such as OAuth, OpenID, FAPI and the tokenization of credit/debit card details. In this paper we are talking about tokenization using DLT to construct coins from chains of digital signatures.

<sup>11</sup> <https://libertystreeteconomics.newyorkfed.org/2020/08/token-or-account-based-a-digital-currency-can-be-both.html>

<sup>12</sup> See for example <https://makerdao.com/en/>. The DAI is pegged to USD and references ETH collateral, but nothing outside the Ethereum blockchain/world computer.

<sup>13</sup> Stablecoins are cryptocurrencies that seek some form of stability against 'fiat' currencies or other defined basket of assets. Volatility is thought by some to be an important reason why cryptocurrencies are not yet used as money.

<sup>14</sup> A 'KYC'd wallet' is a store of value owned by a party that has undergone Know Your Customer (KYC) due diligence by a regulated intermediary.



## The Case(s) for Tokenized Money

There are two main cases for tokenized money that may both rest on common technology, but could not have more different aims:

1. **The crypto maximalist case:** In classic public cryptocurrencies the case for tokenization is inherently linked with the original purpose described in the Bitcoin Whitepaper – to avoid central currency issuers, intermediaries and achieve settlement on a pseudonymous/anonymous basis. BTC is an idealistic project. It is to money what Esperanto is to language. Esperanto was constructed in the late 19th century to be a common second tongue that would bring humanity to a state of more perfect mutual understanding and reduce the risk of conflict between nations<sup>15</sup>. BTC is a global second currency in the hands of the people, not authorities<sup>16</sup>.

2. **The 'Tomorrow's Money' case:** When central banks, bigtechs and other financial intermediaries pursue the tokenization of money we are moving far from Satoshi Nakamoto's crypto-utopian vision. These entities are not pursuing a world without intermediaries or centralized issuers, because they are intermediaries or centralized issuers. While sharing few of the aims of BTC maximalists, these players argue that tokenization enables us to create future proof money that meets the challenges of the 21st century. This camp sees value in the technical mechanism of crypto, but ditches most of the ideology.

<sup>15</sup> <https://en.wikipedia.org/wiki/Esperanto>

<sup>16</sup> Like bitcoin enthusiasts, Esperanto speakers are also keen for others to buy the vision to increase their return on investment.

The factions not only differ in objectives, but also in the meaning of their tokens. While BTC is value in itself for the community of users that accept it, schemes like stablecoins or Central Bank Digital Currencies (CBDCs) are generally representations of some other form of value, i.e. claims against another asset<sup>17</sup>. This is a fundamental break from bitcoin, because as soon as a token becomes a representation of something of value elsewhere, then we are no longer in a trustless ecosystem without intermediaries. Suddenly the token holder needs to trust the intermediary holding those assets and the legal system that enforces their contractual rights.

In this paper we sidestep the ideological debate about the merits of private, trustless peer-to-peer money without central issuers or intermediaries. We also steer clear of the notion that the choice between tokens and accounts might have some bearing on geo-political considerations.

Instead we focus on the purported functional and technical benefits of tokenized money versus account based money<sup>18</sup>. What, it is argued, can tokens do that traditional ledgers cannot? Here are some of the main attributes that are claimed as the exclusive domain of cryptographic tokens:

1. **Availability:** The traditional banking system is built on batch processes and end of day cut off times, meaning that it is not 'always on'. At the root of the payment stack is the non-availability of RTGS systems on a 24\*7\*365 basis, so obligations cannot be settled with finality around the clock. Tokenized money, on the other hand, never sleeps.
2. **Programmability:** It is argued that tokenized money can be leveraged in 'smart contracts' for the automation of existing business processes, and the creation of new business models such as Distributed Autonomous Organizations (DAOs). The traditional banking system has been slow to adopt standardized Application Programming Interface (API) technology that might make it more 'programmable'.

3. **Globality:** As banking/fintech licenses are granted on a national level the financial world is Balkanized into silos that operate in their own way. Tokenized money may be able to transcend some of these local constraints, especially in digital bearer instrument form.
4. **Fractionalization:** New business models like Internet of Things (IoT) may require an efficient system of programmable micropayments, which are not well supported by traditional payments rails. All manner of assets may be fractionalized through tokenization, creating the need for tokenized money to settle transactions automatically through smart contracts.
5. **Auditability & Reconciliation:** As DLTs provide immutable records of transactions and a strong defense against repudiation, providing a shared 'gold copy' for the ecosystem participants. This shared view facilitates more efficient transaction reconciliation for users.
6. **Atomic Settlement:** This means that two assets are only exchanged if pre-set conditions are met, at which point the transfer of value is instantaneous. Proponents of tokenization do not limit their advocacy to the subject of money, they want to see the tokenization of every financial instrument. The argument goes that if securities, for example, are tokenized, then it is necessary for tokenized money to perform DVP between the securities tokens and the money tokens through 'atomic settlement'.

Is tokenization the only way to modernize payment systems and deliver a financial system fit for the digital age, or are there other paths to progress? In the remainder of this paper we examine these benefits and argue that they are not the sole preserve of tokenized money. First there is something that both sides may agree upon – we need to upgrade money.

<sup>17</sup> This is not always true. There are stablecoin proposals that don't reference assets external to their own network.

<sup>18</sup> Technically superior solutions don't always win the battle for adoption (for those that recall the VHS/Betamax format war).

## Money in a World of Platforms

The proponents of tokenized money argue that their coins overcome shortfalls in account based payment systems to deliver 21st century money. There is a case to answer here because of the dissonance between modern digital Ecommerce platforms operating 24\*7\*365 and the banking system, which is still largely based on batch processing and 'store & forward' messaging. Banks still live in a world of 'cut off times' and 'end of day' processes and send 'fire and forget' messages to each other that need to be investigated when things go awry.

When banks try to serve 'always on' platforms, this crunching of gears is all too evident and this may explain why bigtechs feel it necessary to invent their own forms of money! The inefficiencies in the banking system do provide niches for agile players to fill and some see fintechs as a modern overlay on a clockwork banking system.

The disconnect between an online digital economy and the legacy banking system will only become more pressing as more business is conducted on digital platforms, accelerated by the Covid pandemic. McKinsey estimates that some \$60trn of economic activity will be conducted on platforms by 2025<sup>19</sup>. And these platforms are increasingly global, which further complicates their integration with a largely domestic set of banking infrastructures.

Digital platforms are going to service the financial needs of their participants on the supply side and

the demand side of their ecosystems. We can see that play out in China with Alibaba and Alipay, and in the growing interest in financial intermediation from West Coast bigtechs. One race will determine **who** will provide those financial services – the banks, fintechs or bigtechs themselves<sup>20</sup>. Another race will determine **how** they will be delivered, through tokens or accounts.

Tokenized money is presented as a silver bullet. Why tinker with the spaghetti of an outmoded financial system when a brand new, screamingly modern DLT infrastructure can replace it? As we think about how to modernize payments we need to begin at the foundational layer. Author and commentator David Birch<sup>21</sup> has said that, *"Payments equals digital identity plus accounting, and accounting isn't the hard part."* The debate between tokens and accounts is about the easy part – the accounting – but maybe digital identity is the key to tomorrow's money, irrespective of the type of ledger.

## Digital Identity

It is no accident that India's rapid adoption of digital money is built on top of the national ID scheme, Aadhaar<sup>22</sup>, which means '*foundation*' in Hindi. Nor is it a coincidence that Sweden's status as the most cashless society is constructed on the bedrock of BankID<sup>23</sup> – not a national ID scheme, but a federated digital identity operated by banks. The Bank ID in Sweden is used by almost all adults on average 40 times per month to access government, banking and other digital services.



<sup>19</sup> <https://www.mckinsey.com/industries/financial-services/our-insights/insurance-beyond-digital-the-rise-of-ecosystems-and-platforms>

<sup>20</sup> See here: <https://www.bis.org/publ/work779.htm>

<sup>21</sup> <http://www.dqwbirch.com/>

<sup>22</sup> <https://uidai.gov.in/>

<sup>23</sup> <https://www.bankid.com/en/>

Other geographies have encountered issues when the foundation of digital ID has been missing. Recent experience in the implementation of PSD2 in Europe is instructive. PSD2 seeks to reduce fraud by requiring a higher level of security and customer consent for online transactions. Unfortunately Strong Customer Authentication (SCA) mechanisms were not prepared in time resulting in a long implementation delay<sup>24</sup>. The United States, which has yet to fully adopt Chip+PIN, represents around 21% of global card volumes but around 48% of card fraud<sup>25</sup>.

Success in digital payments is based on the presence of good identity schemes, and failure is often a byproduct of its absence. The general thrust in the development of account based payments systems has been to strengthen the digital identity underpinnings of electronic payment schemes.

It is natural for crypto maximalists to push in the opposite direction and seek anonymity, but it is remarkable that other promoters of institutional token money seek to usher in a world of digital bearer instruments. The financial system has been seeking to drive out bearer instruments for years<sup>26</sup> due to their inherent financial crime risk<sup>27</sup>.

Proponents of institutional token money will argue that law enforcement is facilitated versus account based systems because every transaction on the token network is visible on the private permissioned blockchain, smart contracts will enforce payments limits, and on/off-ramps from the system can be subject to additional checking. They will need to strike a balance between creating a private cash equivalent and a mass surveillance system and beware of non-KYC'd wallets that might open the system to significant abuse. They need to be aware that significant activity can take place outside of the on/off ramps, and that ultimately whoever holds the private key owns the token. If all wallets are to be KYC'd, then the foundational nature of digital ID once more comes to the forefront.

Digital identity is not only the base layer of digital money – tokens or accounts – but of the entire digital economy. McKinsey estimates that GDP can be stimulated by 3-13% through the introduction of good digital identity<sup>28</sup>. Whether a national scheme like Aadhaar, a bank consortium like Bank ID in Sweden or a wider consortium like Itsme<sup>29</sup> in Belgium, it is clear that the cornerstone of a modern payments system and a modern digital economy is the ability for consumers, businesses and machines to transact securely and with appropriate privacy<sup>30</sup> through good digital ID schemes.

“When we talk about a digital dollar, we are referring to a token-based digital representation of money issued by a central bank that is a digital bearer instrument, akin to a digital bank note representing a direct liability of the Federal Reserve.”

## – Digital Dollar Whitepaper

<sup>24</sup> <https://www.fca.org.uk/news/statements/strong-customer-authentication-and-coronavirus>

<sup>25</sup> [https://www.businesswire.com/news/home/20150804007054/en/Global-Card-Fraud-Losses-Reach-16.31-Billion#.Vch\\_sPIViko](https://www.businesswire.com/news/home/20150804007054/en/Global-Card-Fraud-Losses-Reach-16.31-Billion#.Vch_sPIViko)

<sup>26</sup> For example, TEFRA 1982 imposed tax penalties for domestic US bearer bonds, and this was extended to offshore bearer bonds by FATCA in 2009.

<sup>27</sup> The movie 'Die Hard' shows that criminals will go to great lengths to obtain bearer instruments.

<sup>28</sup> <https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/digital-identification-a-key-to-inclusive-growth>

<sup>29</sup> <https://www.itsme.be/en/>

<sup>30</sup> Digital ID needs to sit on top of effective privacy legislation. The legislation comes first.

This is a place where DLT may have a role to play, for example one of the leading companies in the field, SecureKey, has deployed digital ID systems at national scale using Hyperledger<sup>31</sup>. Crypto maximalists may cling to the notion of anonymous global payments, but for everyone else in the formal token or account based payment space, every wallet or account will need to be KYC'd, and that means establishing the holder's identity, both individuals and businesses.

#### RECOMMENDATIONS:

- Every country needs a digital identity infrastructure. It can be a national scheme like Aadhaar or a federated scheme like Itsme. Either way there are major inefficiencies when every economic actor has to establish their counterparty's identity by themselves.
- Support standards bodies in the space such as OpenID Foundation<sup>32</sup>, W3C<sup>33</sup> and DIF<sup>34</sup>.
- Governments have the power to catalyze sustainable digital ID schemes – the first step is to create a market by becoming a commercial customer of the scheme, i.e. as a Relying Party, and to provide credentials like social security numbers, in digital form.
- Policy makers should be extremely wary of the financial crime risk of digital bearer instruments, any tokenized money scheme that allows P2P exchange of value and the danger of non-KYC'd wallets.

### 'Always on' Money

Ideally the bedrock of digital money going forward will be a new generation of interoperable digital identity schemes – they might even be built on DLT. The next order of business is to make sure that digital money is always on. One benefit of tokens that is hard to resist is their 24\*7\*365 availability on the DLT, even though the on/off ramps may not be. Banks still have end of day processes, cut off times and FX<sup>35</sup>, equity, debt and derivatives<sup>37</sup> markets are not always on.

At the heart of the matter is the need for national currencies to be always available for finality of settlement, meaning that obligations can be extinguished once and for all without being unwound by bankruptcy proceedings<sup>38</sup>. RTGS systems need to be capable of operating around the clock. A number of these systems are consulting on their next iterations, with many considering extensions to opening hours<sup>39</sup>. If the first generation of RTGS systems is approaching end of technical life, then perhaps this is time to consider tokenized central bank money systems as replacements, otherwise known as 'wholesale' CBDC. This is just a technical question – either DLT is the best technology for RTGS, or it isn't.

Whether central bank money becomes available 24\*7 through tokens or accounts, a host of consequences will flow through the financial system. Other financial markets that rely on central bank money for net, Payment versus Payment (PVP) or Delivery versus Payment (DVP) settlement<sup>40</sup> will be able to extend their own operating hours. RTGS participants will be impelled to overhaul their batch based systems and introduce more automation, for example to manage treasury operations.

<sup>31</sup> <https://securekey.com/>

<sup>32</sup> <https://openid.net/foundation/>

<sup>33</sup> <https://www.w3.org/>

<sup>34</sup> <https://identity.foundation/>

<sup>35</sup> <https://www.investopedia.com/terms/f/forex-market-trading-hours.asp>

<sup>36</sup> Example: <https://www.tradinghours.com/exchanges/lse/trading-hours>

<sup>37</sup> Example: <https://www.cmegroup.com/trading-hours.html>

<sup>38</sup> [https://ec.europa.eu/info/law/settlement-finality-directive-98-26-ec\\_en](https://ec.europa.eu/info/law/settlement-finality-directive-98-26-ec_en)

<sup>39</sup> Information about the UK RTGS renewal programme: <https://www.bankofengland.co.uk/payment-and-settlement/rtgs-renewal-programme>

<sup>40</sup> PVP and DVP are like prisoner swaps in spy movies – the assets are released simultaneously and come under immediate stewardship of the other side.

We will have to think through knock on effects that may impact some basic tenets of traditional banking. For example, the concept of 'overnight' interest may have to change. In today's world each bank calculates overnight interest by picking a time for their end of day process to run, at which point they take a snapshot of their balances. The batches run to calculate interest on and to generate statements. In a world of always on money this process will not be tenable due to the possibility of 'batch process arbitrage'. If each bank chooses its own cut off time for interest calculations, then by knowing these timings it would be possible to move money between several institutions to collect overnight interest on the same balances on the same day<sup>41</sup>.

This serves to illustrate that modernizing payment systems need to be pursued judiciously by policy makers charged with the safety and soundness of the financial system. Unintended consequences lurk behind different policy decisions and design decisions. Particular care needs to be exercised when contemplating the extension of 24\*7 central bank money to the retail market, so called 'retail' or 'general purpose' CBDC, a scheme that may upend the financial sector as we know it.

#### RECOMMENDATIONS:

- RTGS systems should operate on an 'always on' basis as a catalyst for other financial markets, participants and infrastructures to extend opening hours to 24\*7 operation.
- Policy makers with end of life RTGS systems may wish to explore private permissioned DLT designs against more traditional architectures.

## Atomic Settlement<sup>42</sup>

Promoters of tokenized money position 'atomic' settlement as a key benefit, meaning that settlement only takes place 'if and only if' certain conditions have been met. In fact financial markets have supported DVP and PVP for decades in account based systems<sup>43</sup>.

There is a misunderstanding that if aspects of the financial world are to tokenize, then tokenization of money is required in order to deliver atomic settlement. This is not true, as is demonstrated by the work on synchronized settlement in the Bank of England RTGS renewal program<sup>44</sup>.

This route to atomic settlement is better than tokenizing a portion of the money that market participants hold at central banks, as this splits the liquidity pools. If RTGS systems support conditional settlement, then this liquidity inefficient mechanism is not required.

There is a danger that decision makers come to believe that certain features and benefits are uniquely associated with either token or account based systems, when they can be delivered by either. This is the case for atomic settlement and for another allegedly unique feature of tokens – programmability.

#### RECOMMENDATIONS:

- Next generation RTGS systems should support synchronized settlement as a generic capability through APIs in order to support DVP and PVP with external venues (whether those venues are tokenized, or not).
- DLT based financial market infrastructure should be able to perform synchronized settlement through APIs with either account or token based RTGS systems.

<sup>41</sup> This can be addressed through industry rules for value dating of transactions.

<sup>42</sup> Also known as 'synchronized', 'conditional' and 'if and only if' settlement. These terms are interchangeable.

<sup>43</sup> <https://www.hkma.gov.hk/eng/news-and-media/press-releases/2018/08/20180824-4/>

<sup>44</sup> <https://www.bankofengland.co.uk/payment-and-settlement/rtgs-renewal-programme/synchronised-settlement>

## Programmable Money

Programmability is often positioned as a unique capability of tokenized money in support of novel business models like IoT and to bring efficiencies to existing processes through smart contracts. Are tokens the key to programmable money? It could be argued that APIs<sup>45</sup> rather than tokens are the route to a programmable financial system, and a programmable digital economy more broadly. Once again the talk is in tokens but the action may be elsewhere.

“The programmable euro is a prerequisite, among others, for Internet of Things (IoT) applications and the full automation of value-added processes. It offers the opportunity to hugely increase efficiency.”

### – Association of German Banks<sup>46</sup>

A great wave of innovation would be unleashed were it possible to access the banking system through standardized, secure APIs. ‘Open banking’ should be the path towards a programmable financial system, but progress is painfully slow. Regulators have done the banking community a favor in pushing them towards participation in the API economy, but because the horse has been dragged to the water it is only drinking the minimum required. All too often banks see open banking as a compliance project and more of a threat than an opportunity, fearing competition and disintermediation from ‘over the top’ fintechs.

It will be a strategic error if banks remain in compliance mode given the gauntlet thrown down by programmable digital tokens, and the reality that digital Ecommerce platforms will deliver financial services whether or not the banking system provides the appropriate APIs. The only way for banks to be relevant in the world of platforms is to show up with a full suite of retail and wholesale banking APIs<sup>47</sup>. At this time there is no global effort by the banking community to bring about a programmable financial system through standardized APIs, but there should be. It is simply a mistake to believe that programmability can only be achieved through digital tokens, but the banking community needs to move towards this objective of its own volition rather than being pushed.

As for the programmability of tokens through smart contracts, the security of code running on public blockchains has been a source of concern since the DAO hack in 2016 and continues to this day in the nascent Decentralized Finance (DeFi) industry<sup>48</sup>. Whether smart contracts on private permissioned ledgers will operate and interact as expected on private permissioned ledgers remains to be seen.

#### RECOMMENDATIONS:

- Banks need to move out of compliance mode and fully adopt APIs.
- Many APIs published by banks should be standardized, internationally if possible.
- The financial system should collaborate on building a programmable financial system and governments should extend this concept across other industry segments.

<sup>45</sup> One of the largest directories of APIs is called ‘ProgrammableWeb’: <https://www.programmableweb.com/news/what-are-benefits-apis/analysis/2015/12/03>

<sup>46</sup> <https://en.bankenverband.de/newsroom/comments/europe-answer-libra/>

<sup>47</sup> The author’s ‘TED style’ talk at SIBOS 2019 on this topic: <https://www.youtube.com/watch?v=3IcYAqQZMMs&feature=youtu.be>

<sup>48</sup> <https://cointelegraph.com/news/figuring-out-whos-to-blame-for-defis-persistent-security-issues>

## Modernizing Retail Payments

The global adoption of instant payment schemes combined with E-money solutions from non-bank regulated entities is transforming the domestic payment scene in many parts of the world. These developments have all been built upon account based rails.

In 2019, the Libra Whitepaper<sup>49</sup> proposed a radical new architecture for digital money involving the creation of a synthetic currency unit operating as a digital token on a DLT that would transition to permissionless operation in due course. At first sight it was not clear whether Libra should be categorized as an E-money scheme, a security or something new entirely. In its subsequent revision the scheme has shifted focus to single currency stablecoins, leading to comparisons with E-money and the scheme being evaluated with respect to Principles for Financial Market Infrastructures (PFMI)<sup>50</sup>.

Libra sought to overcome volatility as one of the factors that has inhibited BTC's usage as a method of payment. In contrast to domestic faster payment schemes and E-money wallets that are rooted in national jurisdictions, Libra would operate on global social media and commerce networks that through network effects have garnered hundreds of millions of consumers and businesses across the world.

The announcement of Libra alongside the impact of Covid and an economic environment in which central banks are interested in exploring new levers to exercise monetary policy has accelerated the evaluation of another option to modernize digital money, 'retail' or 'general purpose' CBDC.

One approach may be to let these heavyweight contenders slug it out. On the account based team we have traditional banks, neo-banks and non-bank regulated E-money wallet providers. On the token team we have bigtechs, central banks and efforts from the crypto community to either make bitcoin scalable<sup>51</sup> or tokenize commercial bank money on public blockchains<sup>52</sup>.

It is far from clear, however, whether these alternatives operate on a level competitive playing field:

1. **Banks** may benefit from regulatory barriers to entry that may outweigh the disadvantage of legacy cost structures. Banks have privileged access to clearing systems and central bank money.
2. **Fintechs and neo-banks** may suffer from impeded access to the wider banking system and/or clearing systems. They may suffer from regulatory arbitrage if stablecoin regulatory regimens are more permissive than, for example, E-money regulations<sup>53</sup>.
3. **Bigtechs** enjoy network effects that may create competition issues, similar to those of owners of dominant operating systems that pushed their own internet browsers on users. The inchoate status of stablecoin regulations in different countries may additionally create arbitrage benefits against players operating under existing frameworks.
4. **Central banks** enjoy structural advantages in the form of central bank money, which is free of counterparty risk and enjoy settlement finality. Retail CBDC could be a digital payments category killer.
5. **Public crypto** efforts suffer from compliance risk, e.g. the need to comply with FATF standards<sup>54</sup> and have impeded access to the banking system.

<sup>49</sup> <https://libra.org/en-US/white-paper/>

<sup>50</sup> <https://www.bis.org/cpmi/publ/d101a.pdf>

<sup>51</sup> <https://lightning.network/lightning-network-paper.pdf>

<sup>52</sup> See this overview of the 'cryptodollar' phenomenon: <https://www.castleisland.vc/cryptodollars>

<sup>53</sup> A critical point is that E-money players have the obligation to redeem at par, which stablecoin operators may not.

<sup>54</sup> <https://www.fatf-gafi.org/publications/fatfrecommendations/documents/guidance-rba-virtual-assets.html>

Sorting through these complex issues goes far beyond the technical comparison of tokens versus accounts. Indeed the policy choices are simplified when we consider the accounting systems at the heart of each scheme as a black box... after all DLT is just another kind of database.

Looking back on a decade of progress in the adoption of digital money, leading to the point in several countries where policy makers are concerned about the viability of cash, it is hard to deny that there is a thriving private digital payments market at work. It is harder still to argue that this market is suffering from such an extreme level of failure that the central bank should step in with its own offering<sup>55</sup>. This is not to argue that central banks can leave digital payments to the free market – they cannot – but the line between what should be in the public sphere and what should be private needs to be carefully drawn.

#### RECOMMENDATIONS:

- Central banks should carefully consider the potential impact of general purpose CBDC on thriving private markets for digital payments, as well as wider repercussions for the financial system, i.e. concentration of deposits at the central bank.
- Account based schemes should build on the success of faster payment schemes and digital wallets, learning lessons from countries like India<sup>56</sup>. In particular, the development of national 'Request to Pay' schemes would benefit merchants and stimulate tremendous innovation by bigtechs and fintechs<sup>57</sup>.
- Stablecoin models should not enjoy regulatory arbitrage benefits against players operating under established frameworks, e.g. E-money providers who need to redeem at par value and cannot pay interest.

## International payments

The CPMI recently released its Stage 2 report to the G20 on improving cross border payments, listing 19 building blocks to address challenges and frictions<sup>58</sup>. Improving international remittances is often presented as a particularly good use-case for tokenized money: payments through traditional correspondent banking channels are not instant, cheap or fully transparent. Alternatively, tokens can be transferred on blockchains instantly and as easily as sending an e-mail.

In a simplified description of the account based model the payer's bank sends a message to the beneficiary's bank asking them to credit one of their account holders. The beneficiary's bank may do that on the basis of a credit line, or they will expect to receive settlement, e.g. into their correspondent bank. The essential feature is that messaging and settlement are separated.

In the case of an international payment with tokens, the value is transferred from one address to another instantly. Messaging and settlement are one. While this tokenized flow may sound appealing, it should be noted that it is only possible because the value transfer takes place with digital bearer assets. Physical bearer assets are problematic from a financial crime perspective, but they are to a certain extent bounded by space – there is only so much cash that can fit inside a suitcase. There is no limit to the amount of digital bearer assets that reside on a USB stick. There are also two ways for bad actors to exchange digital tokens – one is to sign a transfer with a private key, and the other is to give an accomplice the private key. Whoever has the private key has the digital asset.

<sup>55</sup> If market failure was identified in the broadband market, for example, it would be extraordinary for government to address the issue by launching its own broadband service rather than by regulating the industry more precisely.

<sup>56</sup> <https://www.bis.org/publ/bppdf/bispap106.pdf>

<sup>57</sup> <https://www.citibank.com/tts/sa/flippingbook/2017/The-Request-to-Pay-Revolution>

<sup>58</sup> <https://www.bis.org/cpmi/publ/d193.pdf>

In recent decades the financial system has been steadily migrating away from bearer instruments due to the inherent financial crime risk<sup>59</sup>. It would seem odd to reverse this trend and rebuild cross border payments, which already carries higher AML risk compared to domestic transfers, on digital bearer assets. Beyond this general objection, there are further specific problems with some of the proposals to tokenize international payments:

#### 1. Retail CBDC for international payments

– some have argued that retail CBDC will solve for international payments, but this is perplexing. Into which wallets will the CBDC be transmitted? Will they be provided by fintechs regulated in the home country of the CBDC? Or fintechs regulated in the destination? Foreign recipients of internationally transmitted CBDC will find themselves in an unusual position – they will be beneficiaries of 100% deposit protection from a foreign central bank, a benefit that they may not enjoy in their national banking system... and a benefit that bank depositors in the home country of the CBDC do not enjoy.

#### 2. Crypto assets as bridging currencies in international payments

– some schemes suggest that banks will adopt cryptoassets (tokens not backed by other assets) as a settlement asset for international payments. This is a problematic suggestion because cryptoassets are intangibles from an accounting perspective<sup>60</sup>, and banks are unlikely to expand their exposure to intangible assets due to their treatment under Basel 3 paragraph 67<sup>61</sup>.

Can age-old correspondent banking deliver instant payments? SWIFT<sup>62</sup> is a secure interbank messaging network and standards body that covers over 10,000 banks. Recently SWIFT gpi has delivered transparency to international payments and led to an improved end to end service, with around 50% of payments reaching the beneficiary within 30 minutes<sup>63</sup>. At the recent SIBOS conference in 2019 SWIFT made it clear that it will help the community deliver an instant cross border payments experience.

Some things will need to change for SWIFT to modernize:

- The SWIFT FIN network is an example of ‘store and forward’ messaging that need to migrate to a more modern interactive protocol.
- The messaging standards on SWIFT are MT messages and these will need to transition to ISO 20022 messages that hold richer data.
- SWIFT may becoming a secure API hub that supports interactive messaging between banks during different stages of a transaction lifecycle – pre-validation, the transaction itself, synchronized settlement, and post transaction.
- SWIFT is moving to enable connectivity into national faster payments schemes.

<sup>59</sup> <http://news.bbc.co.uk/1/hi/8678979.stm>

<sup>60</sup> <https://www.iasplus.com/en/standards/ias/ias38>

<sup>61</sup> <https://www.bis.org/publ/bcbs211.pdf>

<sup>62</sup> <https://www.swift.com/>

<sup>63</sup> <https://www.swift.com/our-solutions/swift-gpi>

As in the creation of federated digital ID schemes and agreement on API standards to make the banking system programmable, the overhaul of correspondent banking will require collaboration between banks on a global scale. Achieving consensus and aligning resource allocation between large numbers of institutions is difficult and time consuming. Time will tell if the banking community can rise to the challenges before more agile alternatives reach mass adoption.

As the CPMI report shows, there is no silver bullet to make international payments as easy as domestic payments. One thing policy makers should keep at front of mind – digital bearer instruments and cross border payments may not be a marriage made in heaven. Just as we wouldn't return to clunky Roman numerals, we should not regress to a world of bearer instruments.

#### RECOMMENDATIONS:

- International payments should not be made on a 'fire and forget' basis – the participating parties in the chain need to pre-validate the transaction before it is made.
- Domestic clearing systems, such as instant payments, should offer controlled access to regulated non-resident entities.
- Proposals to restructure cross border payments based on digital bearer instruments should be considered very carefully from a financial crime perspective.

## Tomorrow's Money

Proponents of tokens and accounts have different methods, but all roads lead to the kind of money we need to support the digital economy. Always on, programmable, instant, hyper-connected, embedded and secured through digital proof of the parties involved in each transaction.

Bitcoin has been the inspiration for a host of imitators that share the founding ideology of a trustless, peer-to-peer world without central issuers and intermediaries. In an ironic plot twist,

central issuers and intermediaries have sought to adopt this technology for their own ends. They may not subscribe to the bitcoin manifesto, but they believe that digital tokens might provide a better technical architecture for modern money.

Many of the advantages claimed for tokenized money may equally be delivered through account based systems. For example, the concepts of programmable money and atomic settlement are not unique properties of tokens. Having abandoned the religion of bitcoin, advocates for tokenization may need to examine more closely what is left in the shell, being careful not to carry forward artefacts of blockchains that are only there to achieve its original purpose. In 2018 Vitalik Buterin pointed out that the cost of computing on Ethereum is around 1 million times more expensive than a popular cloud computing service. The inefficiency is only justified in achieving the ideological ambitions of the network, i.e. to achieve independence from official authorities.

So far crypto has captured mind-share more than market-share in the payments space, but that could be about to change with the launch of mass market stablecoins and CBDCs. As decision makers deliberate on the impacts and policy choices before them, the following observations may be helpful.

1. **Digital money is a stack of capabilities to be considered holistically:** equipping the digital economy with payment services that act as an enabler rather than a constraint will only be achieved through a 'stack' that includes digital ID, always on central bank money, real time retail payments, overhauled international payments, a programmable financial system and a host of other elaborations. Policy makers should consider the India example and seek to optimize the entire 'stack' rather than individual pieces. This thought process leads to careful consideration of foundations, like digital identity.

<sup>64</sup> <https://www.youtube.com/watch?v=7WL9hr445uo>

2. **Technology neutral regulations:** if the distinction between tokens and accounts is fuzzy, then it may be dangerous to regulate them differently. For example, if stablecoins are regulated differently than E-money, then there is a danger that E-money operators 'invert' to the more permissive regimen, potentially at the expense of customers (e.g. losing the right to redeem at par value).
3. **Simplify the debates and parse the issues:** novel proposals based on tokenization can be tricky to evaluate through a fog of jargon and technical details. It can be useful to look for equivalences to separate out the issues. For example, general purpose CBDC is the same as saying that people and businesses should be able to hold an account at the central bank. Forget about tokens, is this what a central bank is for? Does it make sense to centralize deposits at the central bank?
4. **Both camps have mountains to climb:** in the contest between tokens and accounts both camps have their strengths and weaknesses. Account based incumbents have to wrestle with inertia and changes require consensus and collaboration. On the other hand token based challengers are fragmented and irreconcilable between each other – they have the problem to achieve mass adoption. Tokenizers will need to solve for the financial crime aspects of bearer instruments, the critical issue of private key management and regulatory uncertainty. However, the post Covid world may be ready for new formats of digital money.

To the crypto maximalist, all roads point to the nirvana of a decentralized world without intermediaries. They are bemused to see that those they seek to depose – centralized issuers and financial intermediaries – are among the most fascinated by their technology. It is as though Superman can't stop playing with Kryptonite.

Let us also reflect on the potential pitfalls of this new world of digital money that we are rushing towards, whether delivered through tokens or accounts. Is it exclusionary to those who do not want, or cannot transact electronically? Is it vulnerable to emerging cyber-attacks, fraudsters, or even solar flares? Is digital money a danger to our privacy?

The bitcoin Whitepaper was a turning point in the history of money, generating a fundamental debate that is likely still in its early stages – no doubt we will evolve to a synthesis that melds the best of tokens and accounts. It is important that policy makers develop an appreciation for the full range of possibilities to deliver tomorrow's money and hear from practitioners on all sides of the debate as we work together to build a digital economy for everyone.



## Author Biography

Tony McLaughlin is responsible for Emerging Payments and Business Development in Citi's Treasury and Trade Solutions (TTS) business. Tony works on Citi's 'Future of Money' strategy, is responsible for the TTS E-commerce proposition and is deeply involved in new methods of payment, Distributed Ledger and Fintech engagements. He provides advice on the future of payments to Governments, Regulators, Fintechs, Big Techs, Corporates and Financial Institutions.

He joined Citi in 2004 and has been Cash Management Head for Asia Pacific based in Hong Kong and the Global Transaction Services Head for the United Kingdom, spearheading Citi's engagement with large public sector clients and payment aggregators. Tony was responsible for the design and development of ABN AMRO's Third Party Continuous Linked Settlement (CLS) offering, core electronic banking platform and Transactional Foreign Exchange solution.

At HSBC Holdings, he fulfilled a global strategy role for the Payments and Cash Management business, helping to set the five year strategy. Before that he was a Senior Product Manager for Barclays Bank with responsibility for electronic collections products including International Direct Debits.

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