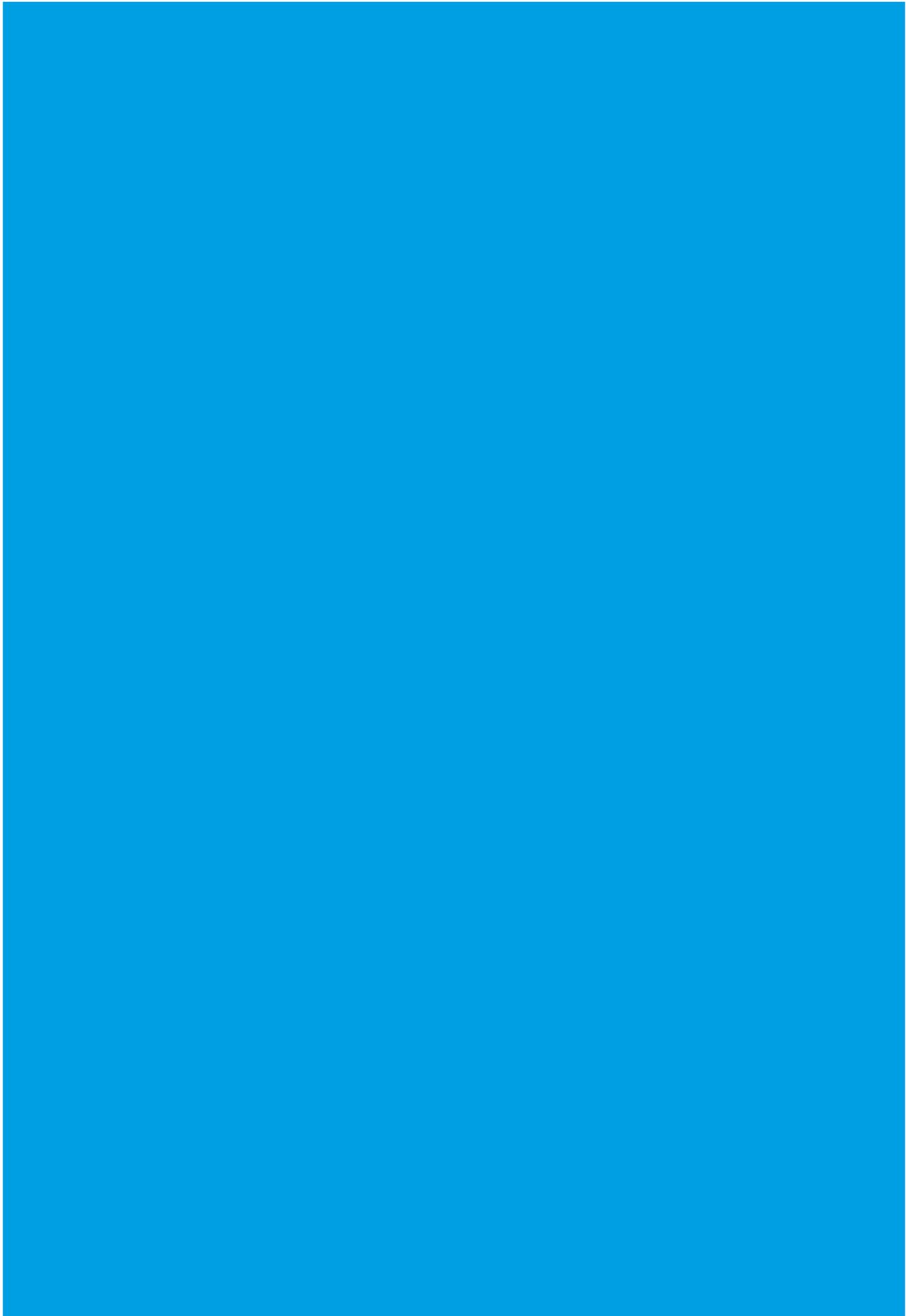


Future of Digital Currencies

Looking beyond the hype

A techUK white paper | September 2020





Contents

Foreword	03
Executive summary	06
Introduction	08
Payments yesterday, today and tomorrow	09
Issues and challenges with digital currencies	15
Potential opportunities and use cases	18
Recommendations	19
Conclusion	20
References	21

Foreword

The new challenges that we are all facing in the current environment have brought to light the necessity of embarking on the digital transformation journey. The recent crisis has highlighted how pivotal technology has become to the activities of the public and the private sectors. Whether that be accessing services, proving your identity online or paying for a product - technology is the great enabler.

Although a wide range of banking and payments services were already accessible digitally, with customers broadly accustomed to online banking and payments, we have seen drastic changes taking place in the last few months. One of the most striking examples is the decline in cash usage across the globe, and particularly in the United Kingdom. It is now estimated that the use of cash is forecasted to decline by almost 40% in 2020 in the UK compared to 2019¹. This is set to have a fundamental impact on the payments landscape, prompting an accelerated shift towards digital payments.

These developments, combined with the emergence of new private-sector led initiatives, are pushing the discussion around digital currencies further. No longer futuristic speculation, regulators and industry are now having concrete debates about the viability and opportunities of digital currencies, both private and central bank digital currencies (CBDC).

Many opportunities could arise with the implementation of digital currencies, including fostering financial inclusion and providing a solid store of value, especially in developing economies, stimulating innovation across the whole ecosystem, reducing cost, facilitating cross-border payments and direct payments.

Whilst debating the use-cases for digital currencies, it is important to assess the current payments landscape and the purpose of the development of new architectures. It is also vital to protect consumers and monetary stability, which is safeguarded by essential rules and regulations financial firms have to comply with such as Know Your Customer (KYC) and Anti Money Laundering (AML) rules.

Central Banks and regulators have been active in the debate, engaging with the industry and looking at developing CBDCs. We welcome those initiatives and the growing interest from the public sector in the prospect of new technology and innovation in the financial services world.

We are looking forward to continuing to engage with regulators and the industry as we work to ensure we protect consumers, increase inclusion, and make the most of the vibrant tech community bringing innovation to the payments landscape.

This report is a crucial contribution to the current debate around digital currencies and serves as a vital resource for both the public sector and industry when considering the impact that digital currencies will have on the payments landscape in the months and years to come.

We particularly thank the techUK Distributed Ledger Technology Working Group, and Rodger Oates, Consulting Partner, BFSI, at Tata Consultancy Services UK, and Raghava Suresh Samudrala, Industry Advisor, BFSI, Tata Consultancy Services, for their crucial contributions.

1. Executive summary

Digital currencies came back into the spotlight last year with the proposed launch of new large scale private-sector digital currencies.

A number of central banks have expressed an interest in the potential promised by digital currencies. We have seen a recent announcement by six of the world's central banks that they have come together to share their knowledge and experiences in assessing the potential case for a central bank digital currency (CBDC) in their own home jurisdictions.

The group - comprising the Bank of Canada, the Bank of England, the Bank of Japan, the European Central Bank, the Swiss National Bank, together with the Bank for International Settlements (BIS) - will assess CBDC use cases; economic, functional and technical design choices, including cross-border interoperability; and the sharing of knowledge on emerging technologies.

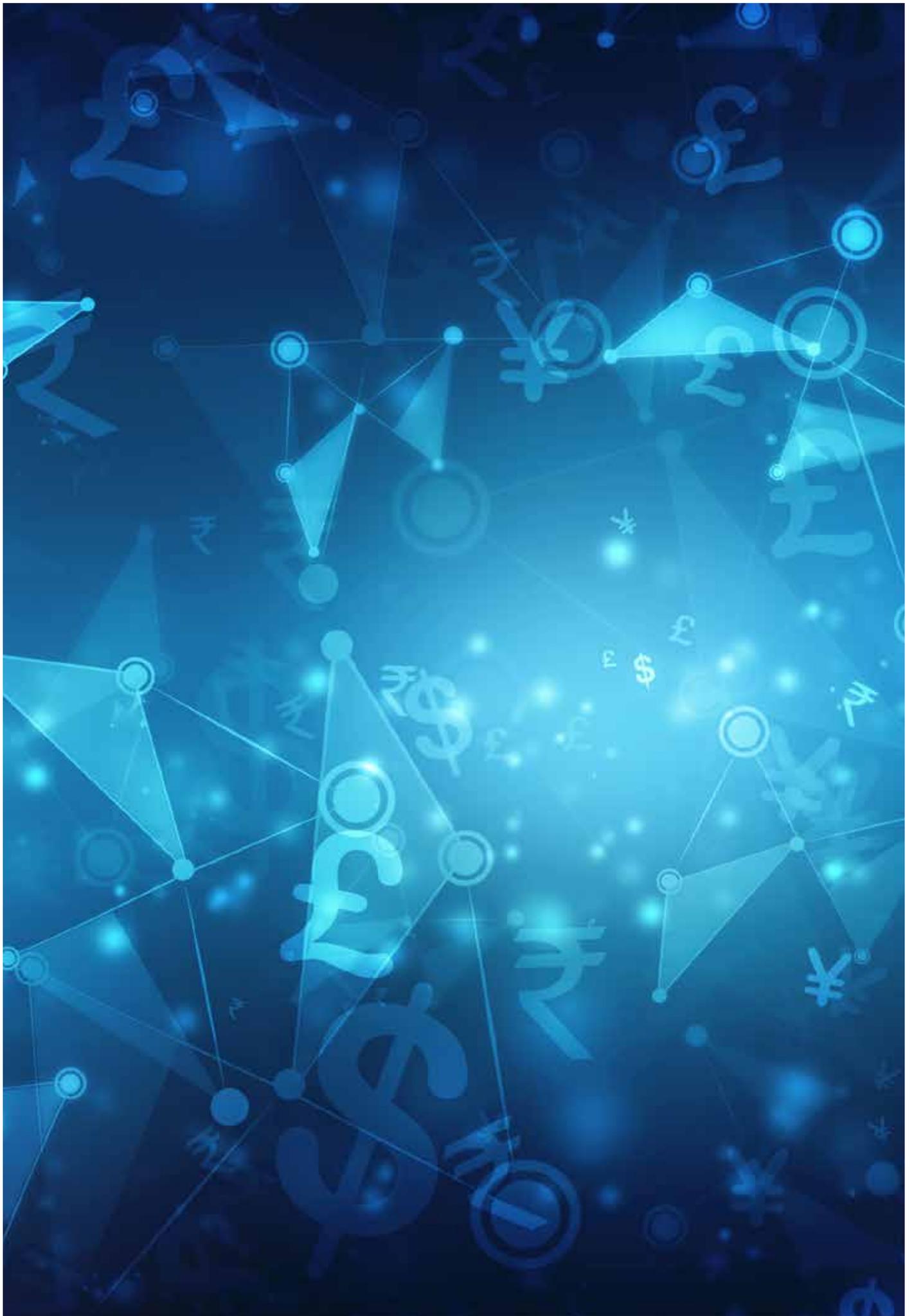
In addition, the G7 has recently published a detailed report on the impact of global stablecoins covering risks, governance and policy measures, while the World Economic Forum has published a policy insight report on central bank issued digital currencies. In the UK, the Bank of England published a discussion paper to engage widely on the benefits, risks and practicalities of introducing a central bank digital currency, which would not necessarily be built using decentralised ledger technology (DLT)².

A digital currency is a broad term used to describe electronic money issued using blockchain and or distributed ledger technologies as the underlying technology. Digital currencies come in various forms and can be categorised depending on who issues them and how they are valued and distributed.

This paper will;

- define what is meant by a digital currency
- describe different types of digital currencies i.e.: cryptocurrencies, stablecoins and central bank issued digital currencies
- address the hype: can digital currencies provide a faster and superior payment infrastructure?
- consider what challenges each will face in broader adoption
- highlight what we believe is the potential associated with each type of digital currency
- provide recommendations to governments, regulators on how they should consider and promote their wider adoption.

In addition, this paper will focus on the business aspects of the digital currencies, rather than the underlying technology.



2. Introduction

A currency system is a store of value that allows the exchange of goods and services for a sum of money. In short, it has traditionally been issued in the form of paper or coins and increasingly in a digital format, usually issued by a government and generally accepted at its face value as a method of payment. There are currently approximately 180 national currencies recognised by the United Nations in circulation. Several countries also use the U.S dollar, or their currencies are directly pegged to the U.S dollar.

In order to be widely accepted we believe payments must have the following characteristics.

1. **Regularity parity:** any payment mechanism looking for widespread mainstream adoption needs to comply with existing rules and regulations, primarily anti-money laundering and know your customer/know your business (KYB).
2. **Ease to use and user experience:** it needs to be easy for a non-technology savvy user to make and receive payments.
3. **Stability and volatility:** the value should remain relatively stable without undue volatility.
4. **Global acceptance:** it needs to be widely accepted and easily converted into other currencies or physical assets.
5. **Real time:** transactions should be able to be completed in real or near real time.
6. **Trusted and certainty of transaction:** there needs to be certainty of transaction and value at point of transaction or it will not be trusted.
7. **Security:** a currency needs to be able to be stored and used in a secured fashion without loss.
8. **Scalability:** payments mechanism needs the ability to cope with significant volumes of transactions if they are to become widely adopted.
9. **Cost to transact:** the cost of using to make transactions should be minimal or it will be prohibitive to its widespread adoption.

3. Payments, yesterday, today and tomorrow

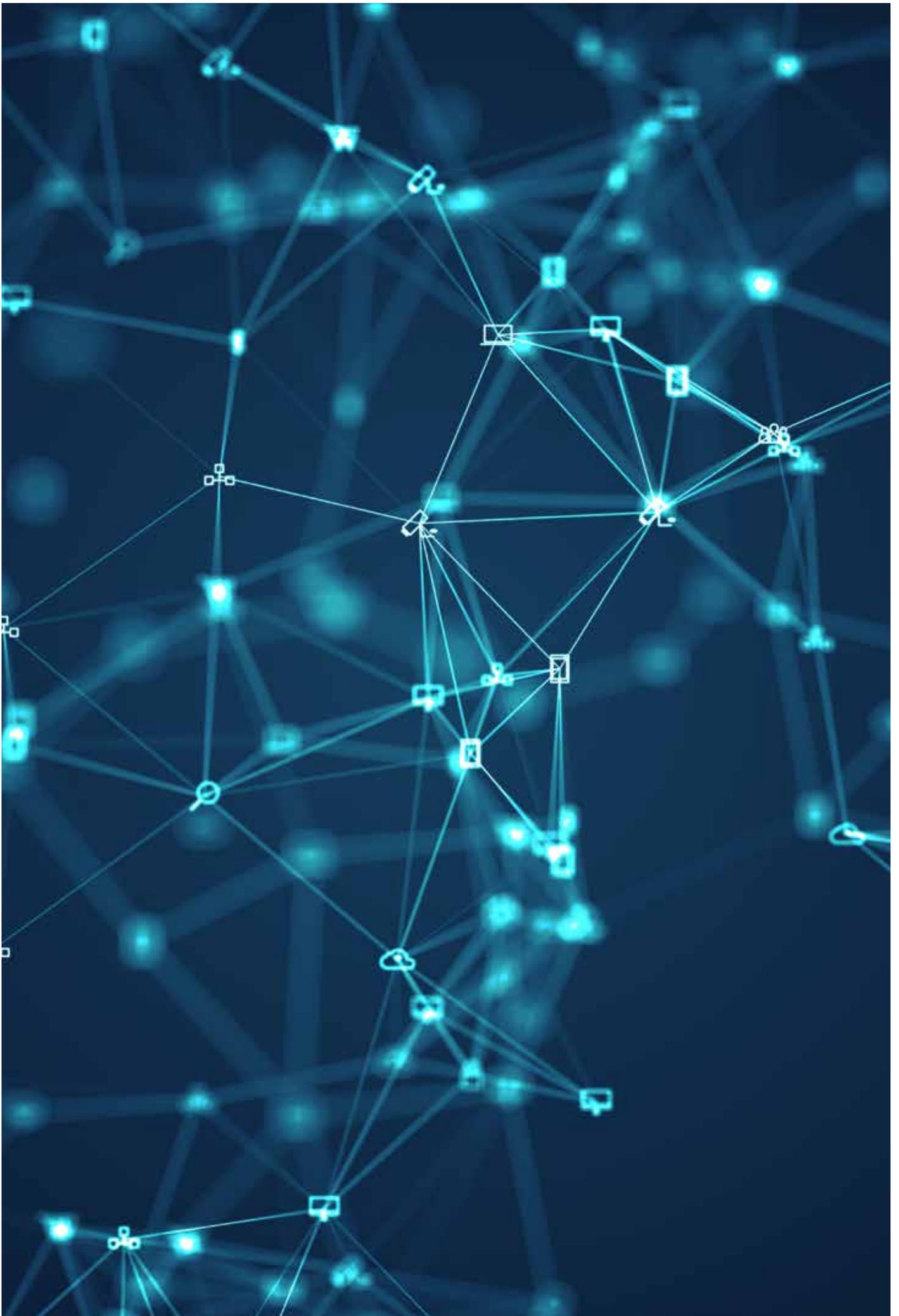
Payments have evolved over a long period of time and it has resulted in a lot of legacy (technical and non-technical) built into the current payments landscape, i.e. technology solutions, cross-border banking relationships, consumer protection guarantees and regulatory compliance. As a result, payments both domestically and internationally have traditionally been cumbersome, costly and time consuming.

Bitcoin promised to transform payments, allowing real time peer-to-peer payments, at zero or nil cost. As a result, fintechs, banks, regulators and financial market infrastructure firms started exploring digital currencies as a new potential business opportunity. However, to date these developments have had limited real-world payments impact.

While several parties have experimented with new digital currencies, traditional payment mechanisms across the globe have not stood still but have been transforming with many large countries implementing real-time payments for domestic and regional markets such as the European Union (EU).

In the EU, Single Euro Payments Area allows payments to be processed across borders at the same cost, and as efficiently and safely, as national payments, while more recently, TARGET has introduced the Instant Payment Settlement, or TIPS. This service, which was launched a year ago, enables payment service providers to transfer funds to their customers in real time, around the clock, every single day of the year.

There have also been massive improvements in the services and experience for both retail and commercial customers. As a result, moving money within a country, and between countries has become near real-time with high traceability and is increasingly seen as frictionless and low cost. The barriers to frictionless payments are no longer related to technology but due to the requirements for KYC and AML which digital currencies do not provide an answer to.



What is a digital currency?

We have classified digital currencies into the following three types. Terminology and nomenclature are not uniform across the industry and hence these terms need to be understood in conjunction with the description provided.

- **Cryptocurrencies:**

A cryptocurrency is an asset created within a blockchain based ledger and includes cryptographic functions to secure financial transactions. Cryptocurrencies leverage blockchain technology to gain decentralisation, transparency, and immutability and, as they are typically issued by private entities rather than governments, they lack the legal tender status of a fiat currency.

Bitcoin, Ethereum, Litecoin and similar cryptocurrencies which are based on the public blockchain can be considered as cryptocurrencies. Transactions are validated and recorded by distributed processing servers that are unknown to each other called nodes. The value of the cryptocurrencies is set by the market through trading at crypto exchanges. Cryptocurrency transactions are anonymous (it is not possible to identify the source, recipient or purpose of the transaction), public (anyone can read the contents of the transaction) and permissionless (anyone can setup the infrastructure to be the processing node). As there is no underlying asset for the cryptocurrencies their price tends to be highly volatile. Cryptocurrencies are predominantly developed on public permissionless blockchains.

- **Stablecoins:**

A stablecoin is a new class of cryptocurrency that attempts to offer price stability and are backed by a reserve asset. Stablecoins have gained traction as they attempt to offer both instant processing and security or privacy of payments of cryptocurrencies as well as the volatility free stable valuations of fiat currencies. Stablecoins, as they are not government-backed, also lack the legal tender status of a fiat currency.

There are several types of stablecoins including:

1. FIAT-backed – either against a single FIAT (e.g. USDT/USD) or basket of currencies (such as that proposed by SGA/Saga).
2. Crypto-backed – either 1:1 against another cryptocurrency or against a basket of cryptocurrencies (MakerDAO is a well-known example).
3. Algorithmic-based – computationally stable through a smart contract that ‘burns’, or ‘mints’ additional tokens as needed. Examples being Basis and ANCT/Anchor.

The process of safekeeping the assets and representing the units of the asset as tokens in the distributed ledger for easy transfers is referred to as 'tokenization'. Stablecoins may be pegged to a single currency/asset or pegged to a basket of assets thus making its price vary not only depending on the underlying assets but also based on the demand/supply. Stablecoins typically require trusted third parties for safekeeping the underlying assets and issuing the tokens on the ledger. Such differentiated access to the ledger cannot be achieved in permissionless blockchains and hence it must be implemented via permissioned blockchains.

Private-sector digital currencies have evoked strong reaction from regulators and policy makers. The G7 working group has published a detailed report on global stablecoins³.

- **Central bank issued digital currencies (CBDC):**

Central banks currently manage the national fiat (a currency established as money by government regulation or law). In most countries, fiat balances are maintained in the central bank ledger system and in electronic payment clearing systems in a digital form. Only a small portion of the money is issued in terms of physical cash for physical transactions.

CBDCs are expected to be denominated in national currencies and hence will be similar to fiat currencies in digital form but may use a distributed ledger technology solution as the underlying technology.

However, whilst the Bank of England has emphasised some benefits of DLT, such as enhancing resilience, availability and enabling the development of programmable money through smart contracts, it indicated that CBDCs would not necessarily be run on a DLT platform⁴.

CBDCs issued by central banks are expected to be pegged to national fiat currencies and are expected to be convertible at par. Many central banks have experimented with issuing fiat currencies to banks through distributed ledger technology to enable real time peer-to-peer transfer between the banks and/or between the customers. To date CBDCs are being considered in broadly the following forms:

Wholesale CBDC:

Central bank issues funds into the DLT based interbank ledger for the purposes of inter-bank payments. Customers' accounts would continue to be maintained in the respective core banking accounts of their banks. An Interbank ledger is used for moving the funds across the banks as per customers' funds transfer instructions. In this approach, interbank ledger replaces the traditional centralised payment infrastructure. Intra-bank movements and customer balance updates will continue to be maintained in their existing core banking systems.

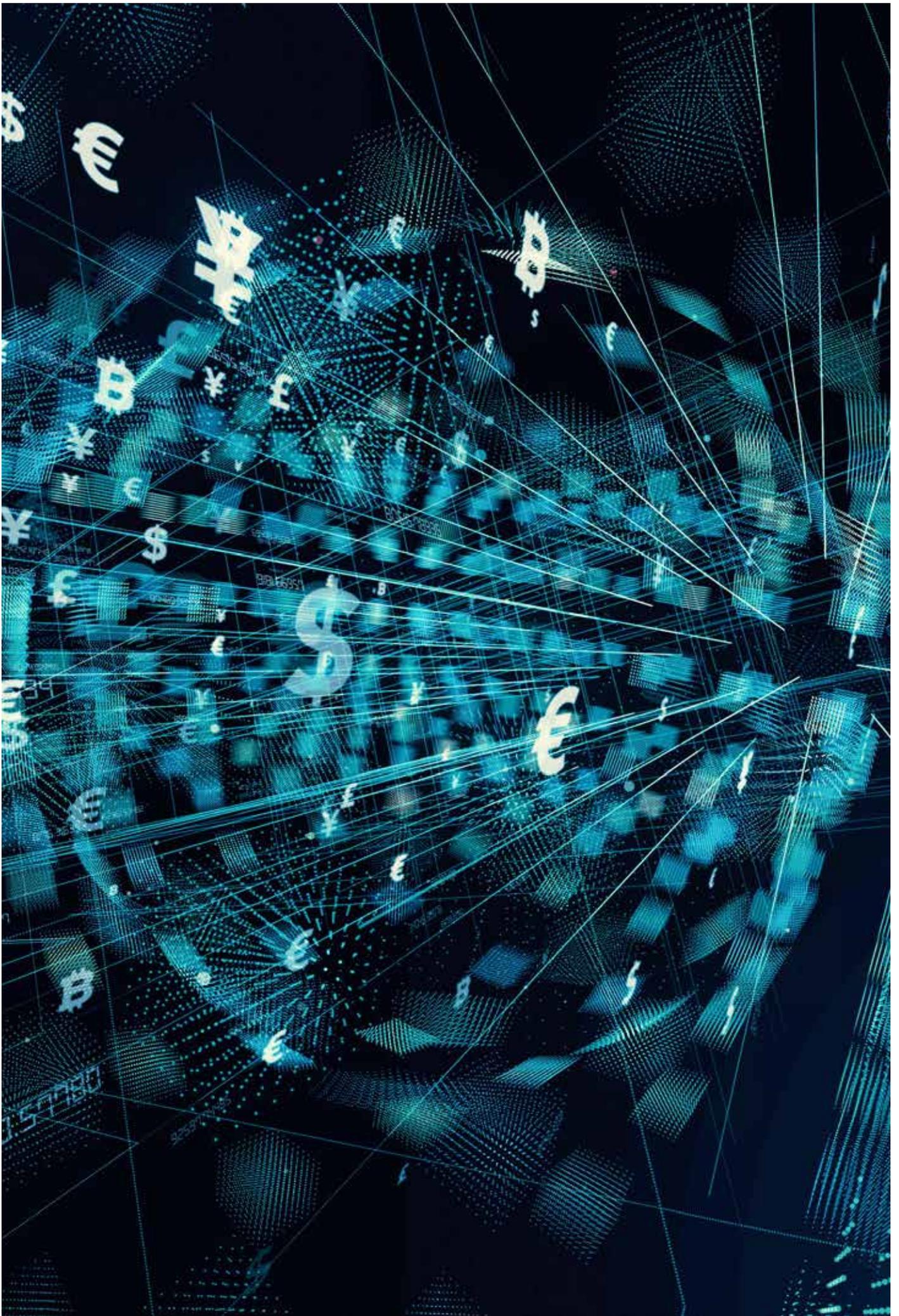
Retail CBDC:

Retail and business customers will be able to directly access the distributed ledger. Hence, customers will have a choice to hold their balances in a bank account or maintain it in a CBDC distributed ledger.

Other than tracking cash and managing circulating currency with more accuracy, monetary authorities hope that a CBDC will allow them to more effectively police against money laundering, drug trafficking, as well as counterfeit cash.

CBDCs could also help ensure the public has continued access to a risk-free form of money issued by the central bank in the context of the declining use of physical cash (set to drop to 9% of payments in the UK by 2028) and predominance of commercial money (97% of the money we use, for transacting and storing our wealth, takes the form of electronic claims on banks)⁵.

Perhaps more controversially, digital currency is seen as a solution to the relative anonymity offered by cash. With it, some central governments could keep better tabs on whatever is done with money, not just illicit activity. For example, they may be better able to monitor and tax informal economies, as well as consumer habits.



4. Issues and challenges with digital currencies

Bitcoin has been around for more than ten years but has not developed to the extent that it can rival the current payment systems. Large scale private-sector digital currencies have been met with stiff resistance from regulators and policy makers across the globe. We will discuss the issues and challenges associated with digital currencies and why in the current form they are not yet a viable option for payment modernisation.

Cryptocurrencies: Key weaknesses

Cryptocurrencies are popular for peer-to-peer anonymous payments and speculative investments. However, cryptocurrencies, we believe, are not suited for mass adoption in either domestic or international banking payments mainly because of the following reasons:

- **Regularity parity:** With cryptocurrencies it is possible to transact without the identity of the sender, receiver and purpose of the transaction getting revealed. This is not acceptable under the current regulatory regime globally. It is mandatory for any payments system to support KYC/AML/Combating the Financing of Terrorism and other appropriate regulations. Until cryptocurrencies are able to address this failing, regulators will prevent their adoption into mainstream.
- **Ease to use:** To be widely adopted payments need to be easy to be used as users need to make a wholesale shift from current payments mechanisms, they are comfortable with. Cryptocurrencies are difficult to use for most non-tech savvy users and are not even straight forward for tech savvy individuals. Without improving the user experience, cryptocurrencies will never enter the mainstream.
- **Stability and volatility:** Cryptocurrencies as an asset/store-of-value have proven to be highly volatile so far. Using cryptocurrencies for payments exposes transacting parties to pricing risks which most users are unwilling to accept.
- **Scalability:** The technology is yet to be proven at a commercial scale required for large volumes of transactions.
- **Real time:** Despite the promise, the permissionless blockchain is significantly slower than traditional payment systems.
- **Cost to transact:** Bitcoin promised to allow transaction at zero cost, multiple studies have shown that cost per transaction is considerably higher than with traditional payment mechanisms.

Protection: events have demonstrated that when things go wrong with cryptocurrencies there is no protection for the users. In addition, there is a possibility to lose the entire value if private keys are not securely held.

Stablecoins: Key weaknesses

Global stablecoins have raised potential risks across a broad range of policy domains, such as legal certainty, investor protection, financial stability, and compliance with anti-money laundering requirements.

Regularity parity: Currently stablecoins can transfer value across the globe instantly, as they do not need to adhere to the same compliance requirements as that of a fiat currency. However, public authorities have made clear that the bar will be set very high for them going forward.

The G7 in a recent report emphasised that the existing regulatory frameworks for financial integrity, data protection, and consumer and investor protection should also apply to global stablecoins. The G7 reports recommends parity in terms of regulatory and policy framework. This in practice may be difficult to apply. Global stablecoins will lose their competitive edge of instant processing if they need to enforce regulatory parity. Their cost effectiveness will also be questioned when they are required to setup the necessary operations and expertise for AML/CTF and other sanctions related compliance checks. Therefore, the proposed benefits in terms of efficiency and real time transfers are based on regulatory arbitrage, which is not sustainable as the scale and adoption of stablecoins increase.

Stability and volatility: The G7 report identified several risks with global stablecoins operated by large private players, including loss of control of monetary policy sovereignty and potential market abuse by market makers. In addition, there is a concern that a global stablecoin sponsored by a large private firm, with its own currency independent of the banking system may not provide the needed control for regulators to ensure stability. As a result, control of monetary policy will move from central banks to the private entities sponsoring the currency. The value of a stablecoin may also fluctuate and the price fluctuation will depend on the nature of underlying basket of assets, currency exchange rates and interest rates.

Protection: The protection offered will depend on the strength of the issuer and the governance surrounding the stablecoin. The protection offered is not the same as by a national government in a stable country.

Depending on the design, digital currencies come with foreign exchange risk, liquidity risk, fraud risk and other potential risks.

Central bank issued digital currencies (CBDC): Key weaknesses

CBDCs are being considered as replacements for elements of fiat currency. Today most of the fiat currency transactions are in digital form except for cash transactions. From a risk point of view, CBDCs do not carry any additional risks like stablecoins.

According to the Bank for International Settlements, “in most instances, the risks associated with payments, clearing, and settlements are the same irrespective of whether the activity occurs on a central ledger or a synchronized distributed ledger. However, DLT may pose new or different risks, including:

1. potential uncertainty about operational and security issues;
2. the lack of interoperability with existing processes and infrastructures;
3. ambiguity relating to settlement finality;
4. questions regarding the legality of DLT implementations;
5. the absence of an effective and robust governance framework; and
6. issues related to data integrity, immutability, and privacy. DLT is an evolving technology and has not yet been proven to be sufficiently robust for wide-scale implementation”⁶.

Scalability: The technology has not yet been proven at a commercial scale required for the large volumes of transactions that domestic payment systems currently deal with. However, this may not be a major bottleneck as CBDCs will be implemented using permissioned environments which in tests have proved highly scalable.

Ease to use: Current customer channels like mobile wallets are intuitive, easy to use and secure for most users. For users to migrate to any new payment mechanism it will need to offer incremental benefits or experience. The potential benefits to users have not been clearly articulated to date.

Cost: The cost of moving from the current payment system to CBDCs will be considerable as transformation is required by all parties and may take many years. The cost advantage offered by a CBDC based solution over the current highly scalable proven payment architectures using digital fiat is yet to be articulated in a convincing manner.

Privacy: A CBDC will not be a peer-to-peer system as all transactions will have to be validated to prevent double spend. A trusted intermediary/pseudo clearing system will be needed to validate every transaction, which makes it similar to current payment systems. If the transaction chain must be disclosed by the sender to the receiver as part of proper validation, this could also prove to be a significant roadblock for privacy.

5. Potential opportunities and use cases

Currently cryptocurrencies are not yet ready for mass adoption in either domestic or international banking payments primarily because they are not compatible with global regulatory regimes, they fail to protect users, and for the majority of users they are simply not convenient or a practical way to make payments. However, the potential use cases for the adoption of digital currencies is real.

Cryptocurrencies have and will continue to prove popular for peer-to-peer anonymous payments, speculative investments and where there is market or political failure. Cryptocurrencies will continue to operate in these niches around mainstream payment mechanisms.

Stablecoins operated by large businesses are unlikely to be a stable alternative in the short/midterm for payments in fiat currencies as there are many essential regulatory hurdles to be overcome.

However, we believe stable coins could prove popular in:

- Closed loop environments e.g. replacing other payment methods such as the Starbucks prepaid card
- Ecosystems such as WeChat pay where there is the opportunity of seamless integration between multiple services on a single platform
- Enabling transaction between peers in the wholesale financial markets and cross border payments. However, to be adopted stablecoins will need to address issues around conversion, execution and liquidity management.

CBDCs as currently planned will not replace fiat currencies as there needs to be a quantification of the business case for migrating from a digital fiat to CBDCs built on blockchain, which does not exist today.

Therefore, CBDC projects currently underway will only progress to implementation if the business case can be established and risks are assessed properly.

CBDCs developed in co-ordination with multiple central banks may have a greater potential in cross-border payments, as they could eliminate the need to go through layers of correspondent banks and enable real-time cross-border transactions, thus increasing the efficiency and lowering the overall transaction cost.

6. Recommendations

We fully endorse central banks, governments and regulators should to allow and support innovation in payment mechanisms, allowing new and existing players to try new technologies. It is critical, however, that central banks and governments maintain monetary sovereignty and ensure regularity parity.

They need to ensure that payment mechanisms can be innovated but not at the expense of the users. Private sponsored assets being marketed as a payment mechanism pose significant risks to the consumers, banks and monetary policy stability.

Interested parties should engage in conversations and collaborate to see how new technologies can help transform the payments landscape. In addition, there is a need for innovation to look beyond technology underpinnings of payments and look at the regulatory and compliance environment to see how roadblocks around KYC and AML can be innovated to improve payments.

Organisations looking to consider developing or deploying digital currencies need to consider:

- cryptocurrencies usage as a payment mechanism is expected to remain limited to parts of the world and the economy which aims to operate independently of the Government
- stablecoins usage as a payment mechanism is expected to operate in closed loop environments, be it online games or for in app payments or for purchases in a defined ecosystem
- central bank digital currencies are unlikely to be adopted until a compelling business case that compensates for the cost of transformation is formulated and the issues identified in the paper are addressed.

7. Conclusion

This paper has defined what a digital currency is and the different types of digital currencies that exist: cryptocurrencies; stablecoins and Central Bank Digital Currencies. We have considered the potential for adoption and the challenges and barriers each type of digital currencies will face and must address to ensure widespread adoption.

Technology potential of digital currencies and their capability for near real time peer-to-peer value transfer has been demonstrated through bitcoin as well as various experiments/pilots. However, when we look at regulatory and policy framework parity, digital currencies have shown limitations in catering to the scale, stability, privacy, security, and fault tolerance requirements of large scale national/cross border payment systems.

Digital currencies in their current form, may not achieve the desired benefits when the same regulations are applied to fiat currencies. As a result, the payments industry needs to continue its focus on transforming its existing business models, standards, infrastructure and communication protocols for payments modernisation while keeping an eye on the emerging technologies.

Digital currencies have been around for more than ten years, and so far they have had limited adoption into mainstream payments and we do not expect this to change in the short/midterm.

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