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EURO BANKING ASSOCIATION

DIGITAL CURRENCIES: A FIRST LOOK AT POTENTIAL OPPORTUNITIES AND CHALLENGES FOR BANKS

CRYPTOCURRENCIES, SMART PAYMENTS AND STABLECOIN WORKING GROUP

The Cryptocurrencies, Smart Payments and Stablecoin Working Group of the Euro Banking Association conducted five discussion meetings in 2020 with selected experts from its member community and several guest speakers from the banking and fintech community dealing with cryptocurrencies. The results of this discussion are summarised in this paper.

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INTRODUCTION

Electronic money and digital payments have been a reality in the financial services industry for decades. However, truly digital currencies have yet to gain traction among central banks or financial institutions and their customers. The rise of cryptocurrencies – above all Bitcoin – were met with widespread suspicion from regulators and banks alike. Concerns surrounding illicit funds transfers, data protection, and network resiliency and efficiency combined with a lack of defined use cases for private cryptocurrencies have led to initial scepticism among the financial services industry. However, the technology underlying cryptocurrencies has received far more attention from the financial services industry than cryptocurrencies themselves. So-called cryptotechnologies such as distributed ledger technology (DLT) and blockchain (a sub-set of DLT) present significant opportunities for banks and other stakeholders in the financial services industry, leading to many initiatives from individual players and industry consortiums seeking to develop new products and services that leverage cryptotechnologies.

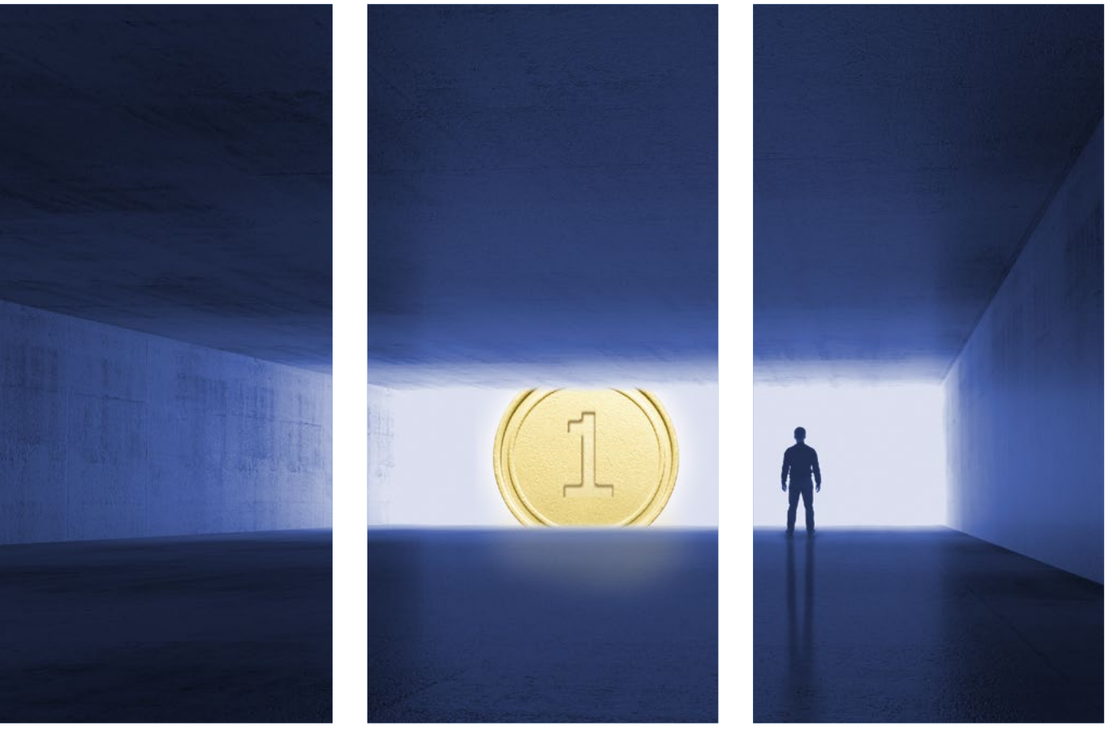
The EBA's Cryptotechnologies Working Group (CWG) was established by the EBA Board to explore concrete use cases for cryptotechnologies in areas such as trade finance, international payments, regulatory compliance, and smart contracts. As the discussion around cryptotechnologies and their implications for banking and finance has evolved, the scope of the CWG's work has expanded as well. In 2019, the CWG explored "The Internet of Things and Smart Payments" in order to provide EBA members a perspective on how the evolution of the Internet of Things (along with other major initiatives such as Open Banking and real-time payments) will impact the payments business and spur the digital economy more broadly. These industry trends have also had an effect on the development of digital currencies, which have taken on new prominence among banks and regulators and have been further pushed by the inefficiencies highlighted during the COVID-19 crisis such as fragile supply chains and the need to disburse funds to people and businesses.

Over the past year, the discussion on digital currencies has become more mainstream. An increasing number of central banks (such as the European Central Bank (ECB), People's Bank of China[1], and the Swedish Riksbank) have announced that they are exploring the possibility of launching their own form of digital currency, referred to as Central Bank Digital Currency (CBDC). Meanwhile, social media giant Facebook recently shook the market by announcing its foray into the space with the development of Diem (originally called Libra) with the potential for other third-party players to follow. In a post-COVID world, there appears to be an even more pressing need for alternative contactless payment options than before due to more business being conducted digitally and increased attention to hygiene for in-person transactions. In light of this, we expect that the development of digital currencies will only accelerate globally. Banks should therefore prepare themselves to not only begin issuing this money but also to offer services to support its use and acceptance.

This report will first provide a definitional framework for "smart payments", outlining its various features and characteristics. It will then examine the current landscape and recent developments in this space. From there, the focus will shift to how digital currencies can be integrated with the existing financial system. The report will conclude by assessing how banks can take advantages of the opportunities and manage the challenges

1 https://www.scmp.com/business/banking-finance/article/3104281/peoples-bank-chinas-digital-currency-already-used-pilot?

that their expected increased use and adoption will present. By further enabling "smart payments", digital currencies may ultimately be the most impactful digital payments initiative for banks, regulators, and end users alike, with the potential to affect nearly every transaction and exchange of goods and services in the economy.



1. CRYPTOCURRENCIES AND SMART PAYMENTS

In the previous CWG report, "The Internet of Things and Smart Payments," we define smart payments as payments that "leverage smart data to enable autonomous payments to be initiated in real time without manual intervention."[2] This definition resulted from the CWG's conclusion that connectivity, automation, and speed will be the key pillars of an Internet of Things (IoT)-ready digital financial ecosystem. Figure 1 summarises the core attributes which smart payments require in the new environment of a digitalised world applying the IoT.

The CWG's broad definition of smart payments will be narrowed down in this report, which will explore the role that cryptotechnologies in particular can play in the development of digital currencies that can enable smart payments. With so many initiatives being carried out – from private cryptocurrencies to stablecoins[3] to central bank digital currency – it can be difficult for banks and regulators to keep track of which aspects of cryptotechnologies are relevant to their business and oversight activities. Therefore, this report will focus on two types of smart payment:

Private-sector issued digital currency: digital currencies that are issued by a commercial bank or other private issuers. This includes private-sector issued cryptocurrencies such as Ethereum or Ripple XRP, bank-issued cryptocurrencies such as JPM Coin[4], or private-sector issued stablecoins such as Facebook's Diem initiative[5].

2 Euro Banking Association,"The Internet of Things and Smart Payments" information paper from the Cryptotechnologies and Smart Payments Working Group, 2019, pg. 5.

3 The BIS defines a stablecoin as "cryptocurrencies with values tied to fiat currencies or other assets." For more, see: https://www.bis.org/publ/work905.pdf

4 https://www.jpmorgan.com/solutions/cib/news/digital-coin-payments

5 https://www.diem.com/en-us/

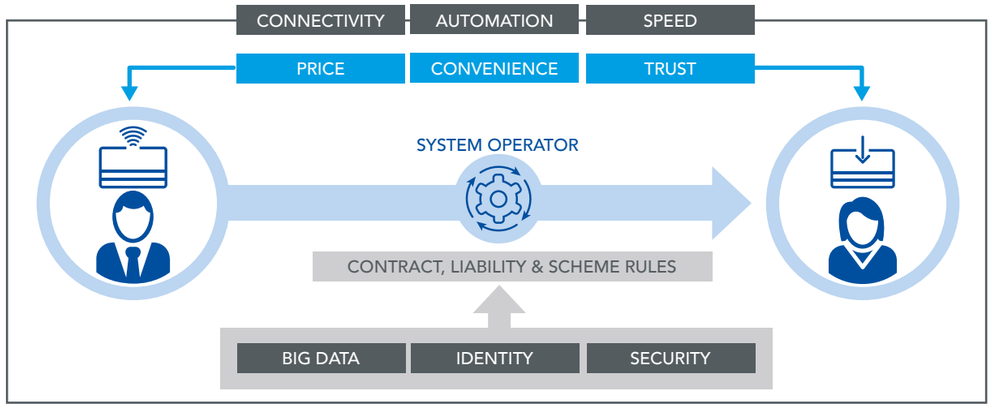
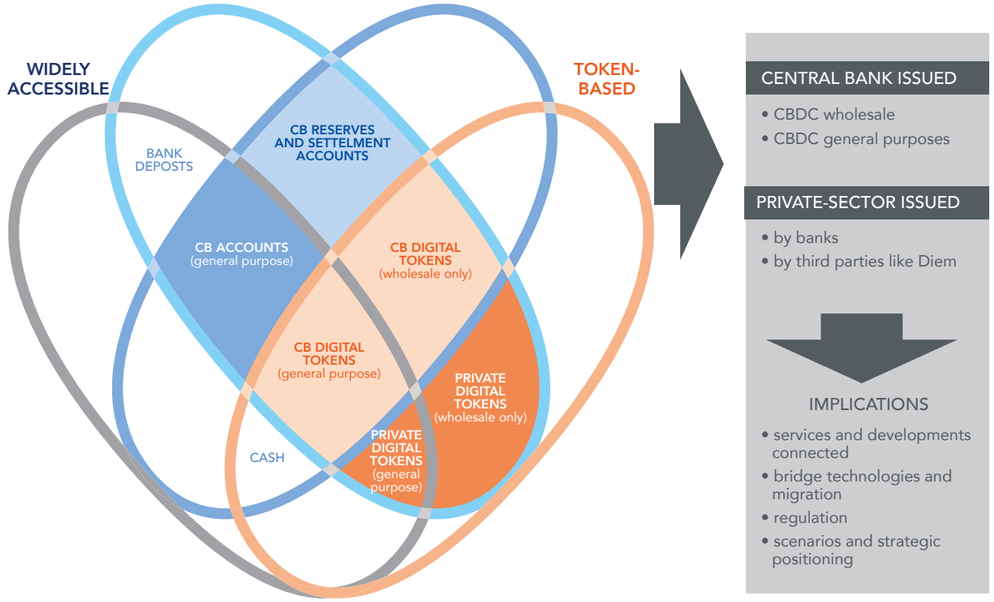


Figure 1: Smart payments as an enabler of the Internet of Things

Source: EBA report "The Internet of Things and Smart Payments"

Figure 2: The money flower

(Adaptation from Bank for International Settlements)



Central Bank Digital Currency (CBDC): digital currencies that are issued by a central bank and that are legally equivalent to fiat currency. A CBDC can be based on DLT or blockchain ledger or legacy technologies and can address either retail payments (general purpose) or wholesale payments (payments only made by financial institutions and not available to consumers and businesses). Most current initiatives are retail CBDCs, meaning they are accessible by consumers and businesses, typically through a commercial bank. In essence, a CBDC would act as a "digital banknote" to be used by commercial banks, third-party payment services providers, and end users.[6]

The issuer of the digital currency has major implications for how it is accessed. CBDC is an account-based instrument that will have near ubiquitous accessibility and exchangeability with traditional fiat currency, while privately issued digital currencies are purely token-based, non-exchangeable with fiat currency, and only accessible via closed-loop networks.

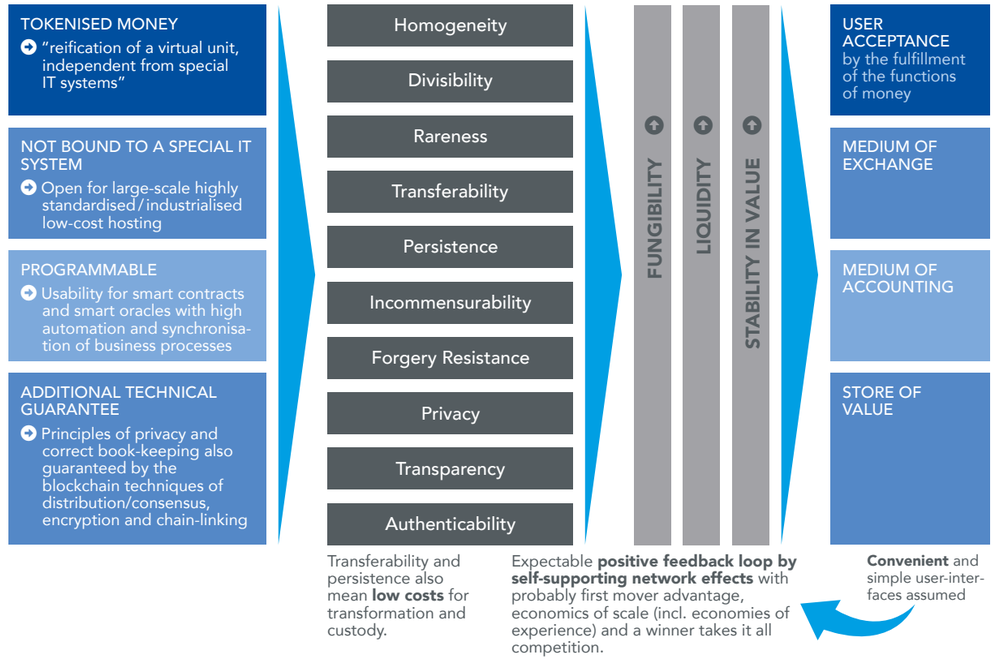
There are a number of different technologies that can be used to develop CB or private digital currencies. Distributed ledger technology (DLT) is seen as a promising set of technologies due to its ability to establish accuracy and security across every participant in the network, ensuring that every participant receives an identical and immutable view of the status among all participants.[7] DLT is being explored in both private-sector issued cryptocurrencies and CBDC. DLT is seen as having unique advantages (even in the case of a central bank acting as central counterparty), including:

- **operational resiliency** through the lack of a single central counterparty
- **cybersecurity** ensured through cryptographic protocols
- **programmable** nature enhances payments functionality to include additional services such as smart contracts
- **lower cost** through reduction in intermediaries (e.g. in cross-border or delivery versus payment (DvP) transactions)
- **legal certainty** for all system participants

These potential advantages have been a guiding factor for central banks, commercial banks, and third-party technology providers as they explore DLT-based digital currency. The following section will explore the most notable of these projects.

Figure 3: Benefits of DLT-based cryptocurrencies

Source: BearingPoint



6 https://www.bis.org/publ/othp33.pdf

7 For more on the key aspects of DLT and cryptotechnologies more broadly, see: https://www.abe-eba.eu/media/azure/production/1549/applying-cryptotechnologies-to-trade-finance.pdf

2. MARKET OVERVIEW AND DEVELOPMENTS

The development of digital currencies has been long theorised, but only recently has it received a substantial push from central banks and the financial services industry more broadly. Until recently, almost all cryptocurrency initiatives were spearheaded by third parties such as Ethereum or Ripple. But with a growing number of central banks actively exploring cryptocurrencies and tech giants such as Facebook joining the fray with their Diem initiative, digital currency has now become relevant for banks and regulators who are interested in understanding the medium- and long-term impact it will have on the financial sector.

Most digital currency projects focus on either wholesale or retail payments:

- **Wholesale:** cryptocurrencies that are only available for use by authorised participants such as banks (similar to central bank reserves). This can be either central bank issued (such as a CBDC) or privately issued (e.g. Ripple).
- **Retail:** general use cryptocurrencies that are made available to consumers, businesses, and other end users.

The majority of relevant digital currency initiatives that are live or in development today focus on retail payments.[8] Major CBDC initiatives such as the Swedish Riksbank's e-krona pilot project[9] assume usage by consumers and businesses alike. The European Central Bank also assumes that a digital euro would act as a "digital representation of cash" that would have the same legal standing and availability to end users as euro payments today.[10] Facebook's Diem project envisions using stablecoins to expand the reach of retail digital payments in markets with large un- and underbanked populations.[11]

The immediate focus for most CBDC projects is understandably on domestic markets, as this is where most central banks have oversight and regulatory authority. The priority for these projects is on understanding the proper technological basis for cryptocurrencies, on clarifying any regulatory or legal issues, and on understanding how to integrate a CBDC with existing payment and financial systems in a way that continues to guarantee wider financial stability. However, the need to improve the costly legacy cross-border payment arrangements used by banks today is a key focus for central banks as well.[12] Central banks have begun exploring CBDC through forums like the Bank for International Settlements (BIS), which recently published high-level principles for CBDC.[13] Non-central bank initiatives tend to expand the scope beyond domestic markets. Facebook's Diem assumes deployment across multiple markets, while Ripple explicitly targets the cross-border space (its XRP cryptocurrency is expected to act as a bridge currency for difficult to service currency corridors and lower the cost of FX conversion for banks).

8 https://www.bis.org/publ/bppdf/bispap114.pdf
9 https://www.riksbank.se/en-gb/payments--cash/e-krona/technical-solution-for-the-e-krona-pilot/
10 https://www.ecb.europa.eu/pub/pdf/other/Report_on_a_digital_euro~4d7268b458.en.pdf
11 https://www.diem.com/en-us/?noredirect=de-de
12 https://www.fsb.org/2020/04/enhancing-cross-border-payments-stage-1-report-to-the-g20/
13 The report was developed jointly by the Bank of Canada, Bank of England, Bank of Japan, the ECB, the Federal Reserve, the Sveriges Riksbank, and the Swiss National Bank. BIS, "Central bank digital currencies: foundational principles and core features," October 2020.

2.1 CURRENT INITIATIVES

While the use of cryptocurrencies by financial institutions is still in its early phase, recent years have seen several notable developments that are relevant for banks and other financial system stakeholders. The following is a non-exhaustive overview of several key CBDC and stablecoin initiatives currently being explored by central banks, commercial banks, and technology firms.

People's Bank of China (PBOC)

China's digital yuan, known as DCEP, is the most advanced CBDC initiative among the world's largest economies. The PBOC has been working on DCEP since 2014, and recently launched a series of successful pilot programs in major cities to test the use of the digital yuan, with expanded pilot programs soon to follow. As a digitalisation of the yuan, the DCEP will operate using a tiered system in which the PBOC will issue DCEP to bank intermediaries, and bank intermediaries will distribute DCEP to retail participants through electronic wallets, rather than via bank accounts. It is notably based on a centralised ledger, rather than on a DLT framework, which the PBOC has said is more suitable for a large-scale retail payments system. And while it is currently only in scope for use domestically, it could eventually be linked up with the country's cross-border interbank payment system to help facilitate international transactions in yuan.

Sweden e-krona

In February 2020, the Swedish Riksbank partnered with Accenture to launch a one-year pilot of the e-krona, with the option to extend and expand the project. The pilot uses a tiered system for issuance and distribution similar to the PBOC but is based on a DLT framework using R3's Corda platform. The success of the e-krona project will be closely watched by the world's major central banks to inform future design and technology decisions.

Facebook's Diem

The Diem project is the most prominent example of a third-party's foray into the stable coin space. However, it has faced intense backlash from regulators ever since it was announced in June 2019, with concerns that a privately issued digital currency lacked the proper regulatory framework and could ultimately undermine monetary sovereignty and monetary policy if adopted on a large-scale. This led the Diem association to make several changes to its initial approach, such as offering single-currency stablecoins, creating a more robust compliance framework and forgoing the envisioned transition to a permission-less system. Despite the changes, Diem still faces many regulatory roadblocks and will need to win the approval of regulators in the US, Europe, and elsewhere before it can take off.

JPM Coin

In February 2019, JP Morgan Chase became the first US bank to announce plans to launch a dollar-backed digital currency, referred to as JPM Coin. Unlike retail-focused initiatives, the JPM coin is designed to facilitate B2B money movement flows for a select few of the company's institutional clients. The bank envisions that the digital currency could be used to instantly settle cross-border payments or carry out securities transactions, rather than conducting them through wire transfers on legacy networks. Still in a pilot phase, the JPM Coin will be issued on Quorum Blockchain, JPM's own blockchain technology, and subsequently extended to other platforms.

Digital euro

Unlike the PBOC and Riksbank, the ECB is still at the very early stages of work on a possible digital euro, having recently published a report describing potential design options as well as the associated legal, technological and policy challenges that would need to be considered. Looking ahead, the ECB has undergone an extensive public consultation[14] and preparatory work on the topic and will decide in mid-2021 about whether or not to go forward with development. While the ECB is moving forward in its work, the launch of a digital euro is likely several more years away.

14 The ECB's digital euro survey received over 8,000 responses by January 2021. https://www.ecb.europa.eu/press/pr/date/2021/html/ecb.pr210113~ec9929f446.en.html

3. INTEGRATING CRYPTOCURRENCIES IN THE EXISTING FINANCIAL SYSTEM

As the ECB is making plans for a digital euro, the working group has been thinking about the ways to introduce the new currency to the market, specifically in terms of what questions and challenges it might bring. While plans for a digital euro are still in the early stages, the ECB – like every central bank currently exploring CBDC around the world –has indicated that a digital euro will likely co-exist with legacy payment systems and currency arrangements. Banks in Europe and beyond will therefore need to balance the adoption of a digital euro with the continued use of instant payment systems, ACH systems, card systems, and RTGS systems. Likewise, they will need to continue managing reserve accounts at the central bank for existing payment systems alongside any reserve requirements needed for a digital euro. As such, banks and other stakeholders may need to use bridge technologies that can "translate" between and automate payments and other financial services that leverage a digital euro or legacy payment system.

3.1 RELATIONSHIP BETWEEN COMMERCIAL BANK MONEY AND CENTRAL BANK MONEY

Commercial bank deposits (referred to as deposit money) and the monetary base relate to each other. One reason for this is that clearing and settlement between commercial banks is not done using commercial bank deposits but with central bank deposits as a part of the monetary base. Moreover, commercial banks have the duty to pay back their customers' deposits in central bank money. In addition, they are legally required to hold a certain amount of funds in reserves at the central bank. Thus in order to ensure a successful implementation of a digital euro[15], the following technical and functional issues area should be considered:

15 https://www.ecb.europa.eu/euro/html/digitaleuro.en.html

- **Technical:** The technical connection between the monetary base and commercial bank deposits in the euro area depends on maintaining the relationship between central bank deposits and commercial bank deposits. A break in this relationship would risk both the quality and security of money as it would entail a fundamental re-ordering of the financial system by having central banks offer a digital euro directly to end users. The implementation of a CBDC should not restrict the necessary functions of commercial bank deposits and vice versa. The ECB's work in defining its own technical standard for a CBDC is a crucial step in this regard.

- **Functional:** The consensus among CWG members mirrors the position of the ECB and other central banks exploring CBDC today: the functional roles of a central bank and commercial banks should remain unchanged when a CBDC is implemented. There are two main reasons for this. The first and most immediate reason is to maintain operational and financial stability. A CBDC will exist alongside legacy systems and currency arrangements, so it cannot be too disruptive at the outset. The second reason is that commercial banks will likely continue to create money as they do today under the fractional reserve banking system. Although a CBDC would theoretically enable a central bank to have complete control of the money supply – thereby removing commercial banks' function in creating money as they do today – this would almost certainly have immediate downstream effects that would be detrimental to the stability of the overall financial system. Any future move that would impact the fractional reserve banking system would likely be best approached as a gradual process with input from commercial banks and other financial institutions.

Figure 4 gives an overview of how the different types of money in our financial systems relate to each other. It shows how central bank digital currencies could interact with commercial bank deposits within a digital euro constructed as a cryptocurrency.

3.2 BRIDGE TECHNOLOGIES AND MIGRATION

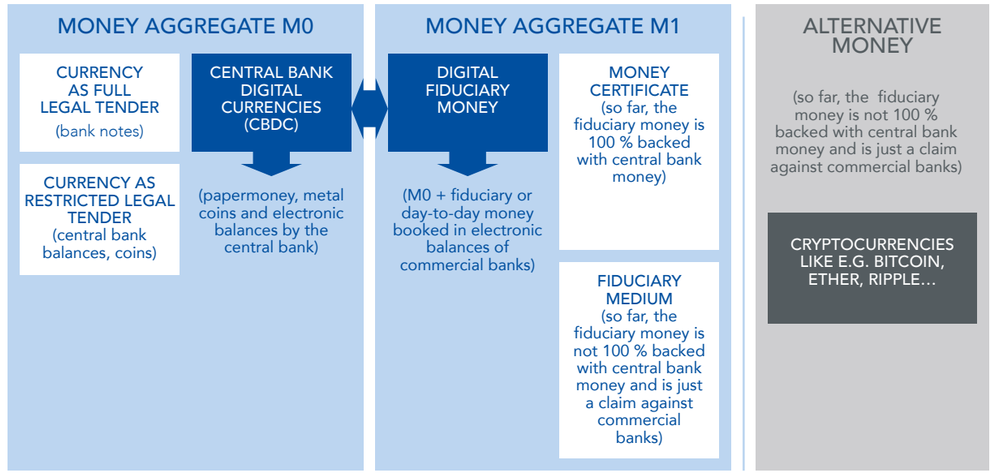
As noted, a digital euro would likely be introduced through a gradual migration phase, during which legacy infrastructure runs parallel to new infrastructure. Parts of various legacy infrastructures would be updated at different times according to commercial and regulatory needs. Carefully designed bridge technologies could help facilitate the smooth implementation and adoption of a digital euro. The working group discussed two such examples that could be adapted to the digital euro.

Iberpay: Iberpay built a prototype blockchain-based payment network[16] where banks, enterprises and customers could use a digital euro as deposit money. To clear payments between banks, Iberpay developed a connector between the blockchain based infrastructure for the digital euro in the form of commercial bank deposits and central bank deposits. Such a technology could be used to bridge between digital euro deposits and commercial bank deposits when a digital euro goes live. The use of blockchain enables Iberpay to implement additional services such as smart contracts.

16 https://www.europeanpaymentscouncil.eu/news-insights/insight/programmable-instant-payments-dlt-networks-and-distribution-digital-money

Figure 4: Relation between the different types of money with the view on digital money

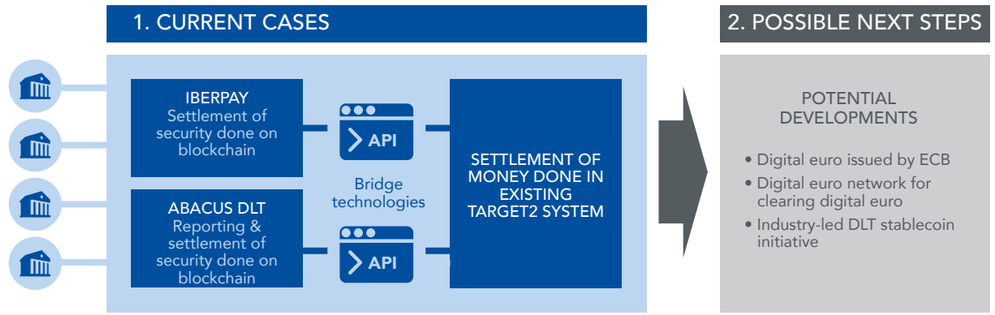
Source: BearingPoint



NOTES
Digital currencies will not replace the different functional types of money in the existing monetary order. It is just another typically blockchain-based form of money witch could deliver some additional advantages like better transferability independent from a single bank or correspondent banks or a smart contract connection between fiduciary money (M1) backed with central bank money (M0). If this new medium fulfills its assumed advantages it could replace existing media of money like paper notes or classical IT systems.

Figure 5: Potential use of bridge technologies toward a final version of the digital euro

Source: BearingPoint



Central Bank Digital Currencies (CBDC) and digital fiduciary money would be needed to realise all advantages of a blockchain-based financial ecosystem.

ABACUS DLT: ABACUS DLT is a proof of concept for a blockchain-based regulatory reporting software. Banks have the duty to report data about their business to the central bank and other financial regulatory authorities for statistics and supervision. Currently, the data about a single transaction executed between two banks is processed and stored independently in the IT systems of these two banks. This data must be transformed to the data structure which the officials require using regulatory reporting software. Each bank reports its data independently. This process is costly and could result in data loss or inconsistencies between institutions. The idea behind ABACUS DLT is to automate regulatory reporting using smart contracts on a blockchain-based infrastructure. Assets and money in the form of a digital euro could be exchanged with each other in the blockchain network between these two business partners. The network's consensus mechanism will ensure that both banks have the same data. The regulator could then either "pull" the information directly from the blockchain network or become a node on the network and have the data automatically sent to it. If the new digital euro infrastructure includes the possibility to exchange assets via smart contracts (comparable to the Ethereum network) and the network's data format is in line with regulatory requirements, no additional regulatory reporting software would be necessary.[17]

Figure 5 provides an overview of the current state of these bridge technologies. As noted, these bridge technologies could be replaced at a later stage by a more integrated DLT-based network underlying a digital euro or industry stablecoin initiative.

Bridge technologies will be crucial in ensuring interoperability between cryptocurrencies such as

17 https://www.bearingpoint.com/ecomaXL/files/Presentation_Crypto_Summit_Regulatory_Reporting_DLT.pdf

CBDC and legacy payment systems and currency arrangements. This will be even more crucial with stablecoins, as these cryptocurrencies have no direct relationship with a central bank or other monetary authority. In the context of CBDC, bridge technologies can help ensure:

- links between digital commercial bank deposits and CBDC to ensure a holistic view of settlement in both currency types
- potential to store a record of other financial assets on a DLT-based CBDC network, with automated regulatory reporting achieving through the use of smart contracts

Use of bridge technologies will be crucial for enabling banks to strategically position themselves as the use of CBDC and other cryptocurrencies matures. By being able to offer both crypto and non-crypto payments (and leverage the smart data generated by these payments), banks have the opportunity to expand their presence on the payments and banking value chain and future-proof their products and services.

HOW BANKS COULD LEVERAGE DLT FOR SMART PAYMENTS

Distributed ledger technology (DLT) has the potential to lower the barriers to entry for many market players to issue their own currency. These networks are often based on open-source technology available and do not require a central issuing entity. Currently, non-banks do not have the legal privileges or functional expertise to issue commercial deposits – nor would such privileges be recommended from a macroeconomic perspective. But commercial banks could leverage their existing ability to issue commercial bank deposits by developing their own DLT-based cryptocurrencies with smart payments functionality enabled by smart contracts. This would allow banks to automatically connect the core function of a payment to related functions needed for certain transactions (e.g. regulatory reporting, financing information, or insurance products).

Since each exchange of value requires a secure identification of each of the parties involved, identification could be a market entry point for banks. Through their KYC processes commercial banks already store and process a valued database of proven identities through which they could generate substantial value for partners throughout the network. Other functions of the financial value chain such as connections to logistical processes, invoicing, accounting, taxation and regulatory reporting could be enabled via open APIs of the issued commercial deposits. DLT-based cryptocurrencies should be engineered with the most granular data possible. Data protection and compliance by design could be directly integrated into a DLT-based cryptocurrency to help automate compliance processes and ease potential regulatory concerns

4. SCENARIOS AND POSSIBLE STRATEGIES FOR BANKS

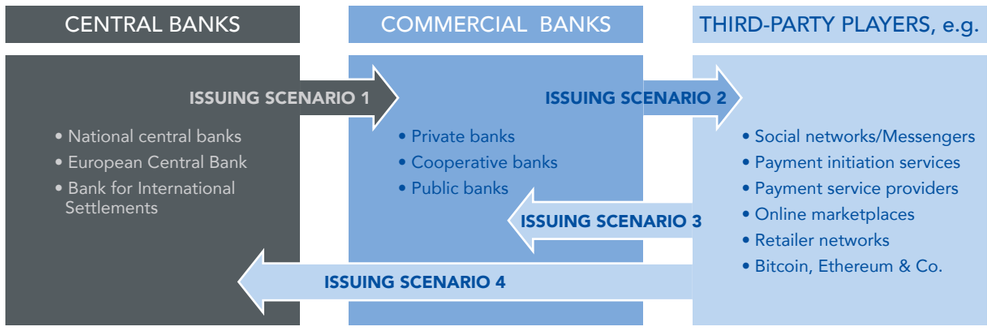
There are many questions around the role of banks in an ecosystem where cryptocurrencies are used throughout the value chain. Legal uncertainty remains about the types of cryptocurrencies which may be appropriate for use by financial institutions. Furthermore, there is no consensus on technology. While most third-party initiatives such as Facebook's Diem will use a blockchain-based network to distribute smart payments, CBDC initiatives see a mix of blockchain initiatives (e-krona) and centralised initiatives (China's DCEP). Banks' future role may be in part determined by the technological basis used for smart payments.

In theory, CBDC has the potential to completely bypass bank commercial deposits. Although very unlikely, central banks could offer directly to consumers and businesses via direct accounts at the central bank. Central banks, however, e.g. the European Central Bank[18], German Bundesbank[19] and Swedish Riksbank have explicitly stated that they do not foresee a retail CBDC in competition with commercial bank deposits, but a form of CBDC that would be offered to financial institutions. However, the introduction of a CBDC or proliferation of stablecoin initiatives could lead to increased competition by fintechs and challenger banks who would also benefit from the opportunities of cryptocurrencies. This could threaten traditional bank deposits, the foundation for all other services offered by banks. The following scenarios highlight the possible ramifications when digital currencies are offered to the retail market by the different issuers.

Scenario 1: Central banks replace commercial bank deposits by offering CBDC to the retail market directly. All relevant central banks have explicitly said that they have no intention of doing this – but once a CBDC goes live, this decision could theoretically be reversed. Once a digital euro goes live, there will exist a technical basis for providing digital euro directly to end users should the ECB determine that this is necessary to achieve wider public policy objectives. This could be used as a type of ultimatum in case commercial banks do not innovate.

Figure 6: Possible scenarios in the new market with tokenised money

Source: BearingPoint



18 https://www.ecb.europa.eu/pub/pdf/other/Report_on_a_digital_euro~4d7268b458.en.pdf

19 https://www.bundesfinanzministerium.de/Content/DE/Downloads/Finanzmarktpolitik/2020-07-08-fintechrat-digitaler-euro.pdf?__blob=publicationFile&v=3

Scenario 2: Commercial banks offer blockchain-based deposits as a cryptocurrency issued via third party players. The advantage of this scenario would be that commercial banks leverage their financial expertise while using the technical abilities of third-party players. By building expressive user interfaces and utilising network effects, leveraging these strengths could be an important enabler of smart money.

Scenario 3: Third-party players issue crypto-currency that represent a portfolio of different currencies or assets but are offered as one single legal tender. However, this type of stablecoin has not yet received the approval of governments and regulators, given the potential that it would have to replace (or compete with) fiat currency and thereby threaten monetary sovereignty and monetary policy. In the United States, for example, Facebook was forced to walk back its plans for the Diem scheme after it received significant backlash from regulators.

Scenario 4: Third-party players offer their own commercial deposits or comparable form of tokenised deposit. This currency could be based only on the legal tender of the affected currency area (single-currency stablecoin), a portfolio of several legal tenders (multi-currency stablecoin) or even other stable assets. This is the type of stablecoin that Facebook has ultimately settled on for Diem. If this form of cryptocurrency were linked to the single legal tender of the affected currency area (i.e. fiat currency), it would compete with commercial bank deposits and not with the central bank as an issuer.

Although most near-term use cases for CBDC are domestic, additional use cases focused on cross-border business and international payments could also bring benefits. Therefore, interoperability and convertibility from one CBDC and commercial deposit ecosystem into another should be possible, just as in the existing foreign exchange market. From this geographical perspective, two main scenarios stand out:

Scenario A - One single global cryptocurrency: This could be central bank-issued (a standardised global CBDC) or a stablecoin (such as Diem) with wide usage in multiple countries.

Scenario B - Multi-coin wallet: Multiple CBDCs issued by different national central banks are available through a single wallet – users purchase the CBDC they need to get goods and services form the affected currency area. For the exchange of these CBDC an exchange like the existing foreign exchange market could be used, with the addition of smart contract functionality if the exchange is built using DLT. This will require collaboration to ensure interoperability and ensure the necessary reach of each CBDC deployment.

4.1 STRATEGIES FOR MARKET POSITIONING IN A SMART PAYMENT ECOSYSTEM

Transactions in smart payment ecosystems require more than just the transfer of funds. An exchange requires clarified identities, contracting, the transfer of the defined goods or services, invoicing, accounting and taxation. Digital currency initiatives - whether CBDC, commercial bank or third-party cryptocurrencies – therefore may include related services such as invoicing, accounting and digital identity (e.g. KYC and sanctions screening) that will be affected by a mass adoption of cryptocurrencies. A currency that fulfils or is automatically connected to these functions could serve as the basis for a "smart payment."

The following table gives some suggestions how banks could position themselves strategically in the market environment of cryptocurrencies.

Table 1: SWOT analysis for bank`s strategic positioning in cryptocurrencies

	Opportunities for banks include offering blockchain-based commercial deposits, more liquid transactions and a technically integrated ecosystem of financial services.	**Threats** to banks include the possibility of getting "stuck" between CBDC and cryptocurrencies issued by third-party players. Commercial bank deposits could be offered instead by third-parties, and banks could also lose services connected to commercial deposits to these players.
Banks' **strengths** are their functional expertise in financial and in regulatory questions, their relationship with clients with legally proven identities, and their respective financial histories.	Possible strategy: Banks could conceptualise and issue their own cryptocurrency in the form of blockchain-based commercial deposits in order to facilitate the distribution of CBDC from the wholesale to the retail market. In doing so, banks should focus on back-end-related solutions focused on determining the basic rules and functions of the commercial deposits and not front-end technical solutions.	Possible strategy: If the value of the cryptocurrency market rises further, two opportunities present themselves to banks. They could either issue their own cryptocurrency and connect it to other financial services or connect financial services to cryptocurrencies issued by other players. The last option is less attractive because it would mean losing the core business of creating commercial deposits and would represent a significant shift of their role within the financial system.
Banks' **weaknesses** are their lack of technical innovation compared to GAFAs[20]. Hence, a shortage of technical resources to adapt market-demands is possible.	Possible strategy: Banks will find it hard to compete in the more technically-orientated market of changing user interfaces for different clients and operating systems. Therefore, when issuing cryptocurrencies in the form of their own commercial deposits, they should focus on the functional construction of the back-end solution. Technical support can be provided by third-party players if needed. This cryptocurrency should then have an open user interface for several front-end solutions and connected services developed as apps by many different players. Making the data required for this type of development available to third-parties already exists through the PSD2 framework.	Possible strategy: Banks should take advantage of their functional expertise and legal status as creators of money in the monetary system to conceptualise and issue their own commercial deposits in the form of a cryptocurrency with open APIs to several user interfaces and financial services. Banks could position themselves as issuing authorities for commercial deposits. Banks could utilise the technical standard given by CBDC developed with the help of professional IT firms. A close dialogue with central bank working groups creating a CBDC is thus essential. Banks should also focus on the advantages of additional services connected to blockchain-based commercial deposits. These services will make the deposits more attractive. Where banks do not have the expertise to develop the applications and smart contracts for these services, they should work together with fintechs and other third-party players. Therefore, they should give them access to their commercial deposits via open APIs.

20 GAFA refers to Google (now Alphabet), Amazon, Facebook and Apple

5. CONCLUDING OBSERVATIONS AND WAY FORWARD

The development of digital currencies – whether as CBDC, as stablecoins, or as private cryptocurrencies – will provide central banks, commercial banks, and end users with a new tool to enable smart payments that meet the needs of the evolving digital economy. It remains to be seen whether blockchain-based commercial deposits will promote additional value for the market compared to existing currency arrangements. Banks who issue crypto-based commercial deposits could create a higher demand for their issued deposits and for services connected with them. The introduction of a CBDC such as a digital euro may obviate the need for banks to issue their own cryptocurrency initiatives. However, since no central bank is currently planning to disintermediate banks by directly offering a CBDC to end users, banks will still have to ensure that they can maintain a CBDC or stablecoin ledger and make these forms of digital currency available to consumers and businesses. The failure to do so may see banks losing out to third-party players or other banks.

Digital currencies (either via a CBDC or stablecoin) could help banks deliver smart payments by providing a basis for further automation of payments and connected services needed by consumers and businesses for a variety of transactions and use cases. Digital currencies could also help automate regulatory compliance and give central banks and other monetary authorities new insights into currency flows that could aid financial stability and manage risk in the digital economy. It could also allow for a new era of collaboration in the non-competitive space not just between banks and third parties, but between banks themselves. With research and pilot projects around CBDC and stablecoins currently a rising area of interest for central banks and other authorities, banks and technology providers need to start thinking about how digital currencies can help meet future challenges and enable new business models in payments and banking.

- As central banks continue to develop CBDC initiatives and stablecoin initiatives evolve, banks should be sure to take the following steps into consideration:

- engage with regulators and other key stakeholders in further development of CBDC and stablecoin initiatives

- evaluate current market position and opportunities to use smart payments to expand services in the financial value chain (possibly through collaboration with third parties)

- determine relevance of CBDC and stablecoins for other digitisation initiatives currently being pursued (e.g. PSD2/open banking, instant payments)

- when exploring CBDC, evaluate potential in both retail payments and wholesale payments

- review both domestic and cross-border transaction payment flows to determine relevance of CBDC and/or stablecoins in these business areas

- understand end user demand for crypto-currencies or products and services that can be enabled by CBDC and/or stablecoins

- review existing compliance and liquidity management practices to help determine potential changes needed when using CBDC or stablecoins

The working group has identified a number of decisive issues and questions that would benefit from further exploration, including:

- Who should offer CBDC to the retail market? Commercial banks or the central banks directly?

- Should a cryptocurrency be fully backed by the central bank directly? Or could commercial banks launch DLT-based demand deposits backed by reserves held at the central bank?

- Should custody and ownership of a digital currency be in the hands of the same entity if the entity is the owner of the private key granting access to the money?

- How much privacy should end-users be afforded in using a digital euro? Should end-users be able to use a digital euro anonymously, like cash, or must usage be tied to a digital identity?

- In light of data privacy regulations such as the GDPR, industry stakeholders should determine the appropriate data to be collected by a CBDC or stablecoin network. A key issue will be determining which data is saved “on ledger” and which data is protected by individual stakeholders.

- In the absence of a unified digital legal entity identifier standard in Europe, how can industry stakeholders ensure a harmonised approach to digital KYC and AML/CTF?

- Are new regulations necessary prior to implementing a digital euro? How will the digital euro affect regulations and compliance issues such as reporting requirements and anti-money-laundering rules?

As the development of digital currencies moves forward in Europe and beyond, the working group will continue to identify key issues for exploration and engage with regulators and other industry stakeholders to help ensure that the introduction of digital currencies will help benefit the wider payments ecosystem.

GLOSSARY

The following definitions are based on working group discussions as well as references to industry authorities such as the BIS, ECB, and others.

Blockchain

A sub-set of DLT that records transactions and assets on a ledger in "blocks" of transactions that are linked together each time the ledger is updated. Blockchain is often used interchangeably with DLT in the financial services industry. While all blockchains are forms of DLT, not all DLTs are blockchains.

Central Bank Digital Currency (CBDC)

The CPMI defines a CBDC as "a digital form of central bank money that is different from balances in traditional reserve or settlement accounts."[21] A CBDC can leverage cryptotechnologies such as DLT/blockchain or be based on a centralised database. A CBDC can also be general use (retail) or only available to registered financial institutions (wholesale). Most CBDC initiatives today are retail CBDCs. A CBDC differs from traditional fiat currency in that it does not have a physical equivalent and, in the case of retail CBDC, can be distributed to consumers and businesses (either through a financial institution or theoretically directly from a central bank).

Cryptocurrency

A form of digital currency that uses cryptographic methods to validate and secure each transaction recorded to a decentralised ledger without a centralised authority.

Cryptotechnologies

A shared, uniform ledger that is replicated among all participants over a network of interconnected computers. Security and reliability is ensured through the use of cryptography and control of the ledger is decentralised among participants in the network, meaning that there is no single authority responsible for updating and maintaining the ledger.

Digital currency

A digitally native currency that is exchanged through a digital network (i.e. there is no paper-based or other analogue form of a digital currency). A digital currency may have different legal statuses based on the issuer of the currency. A central bank-issued digital currency (CBDC) may have the same legal status as fiat currency, while a privately issued digital currency such as Bitcoin may not have a legal designation as a currency.

21 BIS,"Central bank digital currencies: foundational principles and core features," 2020, pg. 3. https://www.bis.org/publ/othp33.pdf

Distributed ledger technology (DLT)

A type of cryptotechnology that distributes data using a cryptographically secured consensus mechanism.

Fiat currency

A government-issued currency that is considered legal tender in a specific jurisdiction. Fiat currency can include both physical banknotes/coins as well as electronic reserves made available to financial institutions with a reserve account at the central bank. Fiat currency is fully backed by the government that issues it and is not backed by another commodity such as gold.

Smart contract

A protocol that enables a cryptocurrency to automatically execute a function stipulated in a contract once a trigger event occurs. For example, the exchange of ownership of an asset could occur automatically once a payment is executed. Smart contracts allow legally enforceable stipulations to be automated as part of the design code of a cryptocurrency or DLT network.

Smart payment

A form of payment that leverages smart data and that can be made autonomously in real time without manual intervention. A smart payment can be based on DLT/blockchain or on a centralized database model.

Stablecoin

A cryptocurrency whose value is tied to one or more fiat currencies or another stable asset to ensure a stable value.

Third party

An entity providing financial services that is neither a central bank nor a registered financial institution.

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