

# The Importance of Where Central Bank Digital Currencies Are Custodied: Exploring the Need of a Universal Access Device

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## Abstract

*Distributed Ledger Technology (DLT) is out to change our future. Its scope is not limited to tokenizing physical objects. In the case of Central Bank Digital Currencies (hereinafter, CBDCs), they can change the way we look at money, one of the earliest inventions of humanity.*

*As soon as digital asset trading evolved into a market, developers started releasing digital wallets for their storage. While these attempts are the recognition of users' needs, their technical level still leaves some space for improvements. Among CBDC related issues, the development of a secure wallet infrastructure is gaining recognition as one way to solve key problems like ensuring equal access to banking facilities. Also, it can offer a novel way to approach digital identity and other functional problems connected to digital assets.*

*Whenever we are executing a financial transaction, its consequences are not restricted to the monetary realm: issues about fair competition, ownership, and management of our personal information come into play. An infrastructure is needed to protect and support our digital rights. Technology is ready to support the development of a secure Universal Access Device (UAD), a single key tool for protecting and representing us, and the organization for supporting it from a network. This paper aims to explore the arising legal and economic issues following the adoption of UADs.*

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## 1. Introduction

### 1.1. *The Idea Behind CBDCs*

The creation of a crypto space can help overcome established economic and political patterns that have, in many cases, proved inadequate to ensure economic and financial stability and social progress. However, in order for the process being set in motion to produce the expected results, it is necessary to be immediately aware that the emerging prospects require a thoughtful and functional transformation of the legal institutions on which the new reality rests. Consider, for instance, the distinction between a physical portfolio and a 'wallet'. Both can contain payment instruments, identity documents, health cards, and the like. But in the first case, the content can be independent of the container, in the second one they are dependent each other.

Digital wallets, indeed, were already a phenomenon before adopting blockchain technology, but, in the previous context, their function was exclusively related to the need for digital representation of physical goods - including currency and payment instruments - to facilitate online transactions. The possibility of managing goods not having physical alter egos - like certain types of cryptoassets - creates the need for accessible, usable, secure forms of custody. Therefore, we are faced with a new need other than increasing the efficiency of payment systems linked to web 2.0. In web 3.0, digital wallets transform their function, and, with it, the technical, economic, and legal aspects are destined to change<sup>3</sup>.

A first situation in which the need for a custody system with characteristics distinct from those of digital wallets is related to the management of CBDCs.

The project to issue digital currencies using distributed ledger technology is not new.

About seven years ago, when bitcoin emerged, and the first FinTech rose, the Bank of Canada activated the Jasper project. It aimed to verify how to improve the efficiency of the payment system through the new technology, although aware that such opportunities go hand in hand with the difficulty of pursuing its mandate not only in terms of price stability but also of maintaining confidence in the payment system. The study also includes CBDCs issuance accessories like the so-called 'Universal access device'<sup>4</sup> (hereinafter, UAD). It is questionable whether the central bank should entirely manage such an instrument or, instead, some private entities involvement is possible or desirable. The second critical aspect concerns the instrument usability also by those who escape financial inclusion, not surveyed by the traditional banking system by choice, personal,

<sup>3</sup> Abeba N Turi, 'Currency Under the Web 3.0 Economy' in Abeba N Turi, *Technologies for Modern Digital Entrepreneurship* (Apress 2020).

<sup>4</sup> John Miedema and others, 'Designing a CBDC for Universal Access' (Bank of Canada, June 2020) <<https://www.bankofcanada.ca/2020/06/staff-analytical-note-2020-10/>> accessed 18 August 2020.

social, or economic condition. For this reason, the UAD solution should be extendable (universality), low cost (accessibility) and different from those currently adopted for cryptoassets (smartphones, and similar) (dedicated device). Finally, universality requires that this type of tool is perceived or managed from a legislative view as a necessary and identifying tool of the person and, together, able to ensure full compliance with the rules on protecting personal data. This issue is pivotal for the development of UAD solutions. These types of devices should guarantee concurrently a high level of privacy and a low risk of illegal use of CBDCs (AML and CFT compliance). One solution could be to adopt multi-party computation and zero-knowledge proof. However, other proposals are coming.

The difference between CBDCs and stablecoins is not only in the modalities of issue and custody but, through them, also on the role of money in the economic and financial system, on disintermediation, on the modalities of data management related to monetary transactions. Relevant legal issues arise, which, even before the UAD, closely concern the CBDCs legal architecture and the questions of how it is adopted within the distinct individual money systems<sup>5</sup>. However, the UAD definition is already becoming strategic in the light of the profound economic and legal changes taking place, and that is prospective at the geoeconomic level. The transformation of the monetary systems, the erosion of the fiat coins' monopoly, and the evolution of technology are three factors that require the attention of the public authorities to converge on the UAD. Probably, in the new world, the currency will no longer represent sovereignty. Instead, it will be the monopoly of the infrastructures that hold it. Therefore, the UAD will no longer be only digital wallets, and their function may be much more relevant than the accessory one reserved to them today.

### *1.2. UAD and CBDC: Union of Necessity or Convenience?*

So, the idea of a form of digital money is not recent. Even in the 'prehistory' of cryptocurrencies, the traceability of payments was raised<sup>6</sup>. DigiCash (Ecash), E-gold, Liberty Reserve are the significant examples of the attempts made before Bitcoin and cryptos focused on privacy like Monero, Zcash, and Mimblewimble.

Beyond the legal framework, cash allows a method of payment and custody only partially superimposable from a technical view with cryptocurrencies. Unlike cryptocurrencies, cash can

<sup>5</sup> Tommaso Mancini-Griffoli and others, 'Casting Light on Central Bank Digital Currencies' in Chris Brummer (ed), *Cryptoassets: legal, regulatory, and monetary perspectives* (Oxford University Press 2019).

<sup>6</sup> David Chaum, 'Blind Signatures for Untraceable Payments' in David Chaum, Ronald L Rivest and Alan T Sherman (eds), *Advances in Cryptology* (Springer US 1983).

be used 'offline', is fully fungible, does not entirely escape fiscal controls, and is resistant to accumulation. However, both physical and digital currency as cryptocurrency assure bearers that a potential transaction will be successful regardless of custody or third party relationship that could block or delay it or require verification before it can take place<sup>7</sup>. This last aspect would lead to a move towards DLT-based solutions rather than centralized solutions. Here, a preference for a token-based system rather than payment accounts might be natural<sup>8</sup>. Regardless of the DLT system architecture, the portability and custody of digital coins in the various forms they may take today (CBDCs, stablecoins, cryptocurrencies) emerges in all its economic and legal relevance<sup>9</sup>. In a token-based payment system, where tokens have a different economic function from cash, together with an uncertain legal definition, the custody issue is no longer marginal<sup>10</sup>. It involves aspects referable not only to the business activity alone but also to the dimension of sovereignty, understood in its broadest sociological conception rather than resorting to a purely political one. The CBDC issuing projects can be interpreted according to a 'conservative' ideological vision if it is opposed to the idea from which Bitcoin originates and 'first-style' Libra is promoted. The neutral-like solutions risk being more political than those that were so since origin. However, the process underway, it must be recognized, is valuable because it brings back the attention to the debate started after the imminence of the 2008-2009 global financial crisis and dormant until now. Currency is not randomly central to economic law. It brings with it a vital economic function of modern economies, namely the promotion of exchange. So, from a legal view, money is defined in each legal system only from a functional view, i.e., in terms of guaranteeing trade and the stability of its value. The international dimension of exchanges, first, and then globalization, so as not to forget the monetary agreements that have followed one another over time, have given currency a meaning that goes well beyond that regarding economic function and civil law issues. The realization of a DLT-based system for digital coins as tokens is in line with the world geoeconomic framework's evolution. In the ongoing context, the digital currency goes beyond sovereignty issues because it tends to take effect other than the jurisdiction in which it is issued and regulated. Tackling the issue from an economic-monetary view deflects from an understanding of what is happening, even

<sup>7</sup> Geoffrey Goodell, Hazem Danny Al-Nakib and Paolo Tasca, 'Digital Currency and Economic Crises: Helping States Respond' [2020] arXiv:2006.03023 [cs, econ, q-fin] <<http://arxiv.org/abs/2006.03023>> accessed 26 August 2020.

<sup>8</sup> Raphael Auer and Rainer Boehme, 'The Technology of Retail Central Bank Digital Currency' [2020] BIS Quarterly Review.

<sup>9</sup> For a detailed recent proposal of money taxonomy, see Tobias Adrian and Tommaso Mancini-Griffoli, *The Rise of Digital Money* (International Monetary Fund 2019), 3.

<sup>10</sup> Since its nature has not yet been tackled from a civil law view, but only for the regulatory aspects and for a few jurisdictions. See Filippo Zatti, 'Entangled in Cryptoassets' Legal Nature and Governance: Searching for Clear Boundaries or Working for Their Removal?' (Social Science Research Network 2019) SSRN Scholarly Paper ID 3335793 <<https://papers.ssrn.com/abstract=3335793>> accessed 26 August 2020.

though the pandemic has further accentuated it: an increase in the public debts of nation-states; an international financial system once again facing a deep economic recession; and the US - People's Republic of China diarchy. It is no coincidence that the oldest and most advanced project of CBDC (which in China is named DCEP), to date, is the Central Bank of the People's Republic of China which aims to increase the weight of the renminbi in the international payment system at the expense of the US dollar<sup>11</sup>. And it is not equally accidental that also in the United States, in recent months, there has been an acceleration, on various fronts, on the digital currency<sup>12</sup>. In particular, in a bill presented to Congress last April, as a measure in the face of the COVID-19 pandemic, the 'Automatic Boost to Communities Act'<sup>13</sup>, 'digital dollars'<sup>14</sup> and the 'digital dollar account wallets' are introduced as well as the 'digital dollar cash wallets'<sup>15</sup>. The solution proposed in the bill seems to follow only partially the one most commonly used for digital money, i.e., as a direct credit to the Central Bank and with private intermediaries. Here, the proposed model creates an indirect claim against the US Treasury, which issues digital dollars by recording them as liabilities in each bank's accounts in the Federal Reserve. However, this model's peculiarity lies in the creation of state wallets authorized and regulated by the US Treasury and operationally managed by the Federal Reserve. In the models proposed so far, the focus regards the type of infrastructure underlying digital money and the aspects related to the management of the monetary policy shown by a recent interesting study by the Bank for International Settlements comparing the approaches followed by the People's Bank of China, the Swedish Central Bank and the Bank of Canada<sup>16</sup>. To date, the wallets' management modalities' question, not only operational but also legal, does not sound perceived as primary. However, for what has been said so far, the wallets constitute a vital and relevant aspect of digital currency. In the Chinese project, as far as it is known, various types of wallets are considered on multiple forms of identification to have different types of anonymity

<sup>11</sup> Henny Sender, 'China's New Digital Currency Takes Aim at Alibaba and Tencent' Financial Times (3 August 2020).

<sup>12</sup> See Digital Dollar Project and Senate Banking, Housing, and Urban Affairs, Hearings to examine the digitization of money and payments, including S.2563, to improve laws relating to money laundering, and S.3571, to require member banks to maintain pass-through digital dollar wallets for certain persons.

<sup>13</sup> HR 6553 IH

<sup>14</sup> *Ib.*, art. 2 (4): "The term "digital dollars" means dollar balances consisting of digital ledger entries recorded as liabilities in the accounts of any Federal Reserve Bank and digital coins or currency instruments issued by the United States Treasury as legal tender, and held as bearer instruments in any digital dollar cash wallet approved by the United States Treasury'.

<sup>15</sup> *Ib.*, art. 2 (6): "The term digital "digital dollar cash wallet" means any software program, whose standards, specifications, and functions are authorized and regulated by the United States Treasury, which stores, sends, and receives digital coins or currency instruments issued by the United States Treasury as legal tender, and which are considered bearer instruments in the possession of the individual or entity on whose behalf the wallet is managed and administered'.

<sup>16</sup> Raphael Auer, Giulio Cornelli and Jon Frost, 'Rise of the Central Bank Digital Currencies: Drivers, Approaches and Technologies' (2020) No 880 BIS Working Papers, 21 ff.

of the user and access modalities according to the restrictions in terms of KYC. This approach allows users of digital assets to remain anonymous in peer exchanges. However, it allows the central bank to track data for prudential regulation, money laundering, and other criminal offenses. In the Swedish pilot project, there is use of payment accounts with intermediaries. However, in case of a modest amount of money, an alternative option remains open: prepaid cards through which tokens can be used<sup>17</sup>. However, both the Chinese and the Swedish approaches do not address caps management and how to identify these thresholds. Moreover, in both cases, anonymity is ensured vis-à-vis the central bank on the traditional regulatory model where intermediaries are entrusted with the responsibility to verify the KYC and supervise the correct use of CBDCs. Finally, as reported in the introduction to this paper, the Canada's central bank, although considering both models, is also oriented towards a two-tier solution that also meets the needs of unbanked, through a specific low-cost solution that allows using CBDCs even without a smartphone. It is the proposal of a UAD that, specifically, is considered here in this paper. A solution of this type would allow a series of advantages for the end-user of no small importance. These advantages would be both in terms of a lower burden for making payments and the possibility of not excluding any citizen from the current digital revolution's applications. Simultaneously, it could be a critical issue for the banking system and, more generally, for financial intermediaries. What and how many advantages and disadvantages will depend on the type of architecture chosen in the respective monetary areas. However, it is interesting to note both the Italian Banking Association and the German counterpart are pushing to create a programmable digital Euro, backed by the European Central Bank, in stablecoin or CBDC.

The reasons for suggesting the adoption of the programmable digital euro include cross-border payments, particularly payments outside SEPA and micro-payments, and the automation of payments.

Suppose on what the recent study of the Bank for International Settlements concludes. In that case, the type of architecture of the CBDC varies according to the type of economy served. It is equally likely, considering the cases taken into consideration so far, that the regulation of wallets is instead related to the type of regulatory model of the economy. Such a correlation may appear more understandable by resorting to the Libra project's transformation since its inception. The concerns showed from the outset about a money project that raised serious questions about the pursuit of stability in the financial system where there would be a risk of a private monopoly of

<sup>17</sup> Both the Chinese and Swedish approach do not solve the problem of caps management and how to identify these thresholds: Ulrich Bindseil, 'Tiered CBDC and the Financial System' (2020) No 2351 ECB Working Paper Series, 21-22.

corporate money (corporation-sovereignty). Together, we would have the potential to create as many wallets as Facebook account holders. The data conveyed by the social network would have been further increased by the information resulting from Libra's use. The digitization of currency and, more generally, of the economy brings to policymakers, regulators, and academics the need to measure the compatibility of a global private monetary system with a limited dimensional expression of political sovereignty<sup>18</sup>. In the future currency, a battle is played out that goes well beyond the purely technical aspects. Digital currency is technically aligned to any other asset (to be understood in a broad and physical sense) that can be represented through digital assets. Therefore, in that economic and monetary system, the provision of token custody and deposit services is not considered if it is for any other asset, financial or not, that can be dematerialized. Therefore, the wallet passes from being considered an accessory service of payment, as it happens for the instruments in which the legal tender currency and the bank currency can be deposited or transformed, to a must custody device. In the token-based system, the wallets play a central role because through them, the direct exchange of currency can proceed, avoiding the passage through intermediaries. It makes sense no more thinking of a regulatory model like the one currently in force for dematerialized currency means having grasped the potential changes taking place together with the crucial function of wallets within the system. The system proposed in the bill 'Automatic Boost to Communities Act' (aka ABC Act), although aimed in the first instance at introducing the Universal Basic Income, is emblematic not only for the aspects related to the distribution of authorization and control powers of the wallets and the private configuration of the instrument. But also for the aspects inherent to the operation of the instruments introduced. The bill provides operations may be consolidated at the end of the current pandemic emergency. The Digital Dollar Accounts Wallet, called 'FedAccounts' will be available together with the associated financial services (debit cards, access to online accounts, automatic debit notes, mobile bank, ATM) physically managed through the postal service. At the latest, from 1 January 2021, the Treasury will offer those entitled to so-called BOOST payments a second option: to receive payments in digital dollar wallets or through temporary cards that will give the possibility to activate the digital dollar account wallets. Digital dollar account wallets will not be subject to any commissions, minimum or maximum balances, and may not be closed or tied based on profitability. The postal services will provide access to digital dollar account wallets and related services to US citizens, residents in the United States, and businesses. All they should be located in the most disadvantaged areas of

<sup>18</sup> Katharina Pistor, 'The Right Response to the Libra Threat | by Katharina Pistor & Co-Pierre Georg' (Project Syndicate, 5 August 2019) <<https://www.project-syndicate.org/commentary/regulating-private-money-facebook-libra-by-katharina-pistor-and-co-pierre-georg-2019-08>> accessed 28 August 2020.

the country, either due to income or for a disaster area, or in metropolitan areas with medium income, in difficulty or poorly served, as indicated by the Federal Financial Institutions Examination Council. The ABC Act also provides for reasonable cover against losses resulting from fraud or security breaches. Besides, digital dollar wallets must comply with the Bank Secrecy Act and the Privacy Act, which reflect the applicable federal tax and Internal Revenue Code of 1986. Once the stimulus plan is over, the Treasury will develop and administer a digital dollar cash wallet system, named eCash. It will be available for those who request it to store, send, and receive digital coins or other digital currency instruments issued by the legal tender Treasury. Also, integration and interoperability between the digital dollar account wallets managed by the Federal Reserve and digital dollar cash wallets shall be promoted. The latter should also be hosted on 'easy-to-find, inexpensive digital devices, including smartphones, and managed through software with any necessary open-source licensed software or hardware'. With regard, then, to issues concerning privacy protection, the Secretary will set up a Digital Financial Privacy Board with the task of supervising, monitoring, and reporting on the architecture and implementation of the digital dollar cash wallet system. Then, once it is fully operational, it will ensure the continuous supervision of the system's management itself. This system must be designed in such a way as to reproduce the characteristics of transactions with physical currency.

The relationship between cryptocurrencies and wallets is based on distinct assumptions from the one between CBDCs and digital wallets in UAD. This relationship reproduces the legal and economic criticalities that underlie the legal nature of cryptocurrencies and blockchains' governance. As long as the private monetary systems to which cryptocurrencies give rise are satellites of the 'monetary planets' - if we are allowed this daring metaphor - the consolidated schemes on which modern financial systems are based are not affected, except in extreme cases. When we move to a fiat digital currency, the issue is complex for both technical aspects and emerging economic criticalities and inevitable legal reforms. Perhaps, as said, we are facing a further transformation in the concept of sovereignty. The homogenization of goods and rights resulting from transforming computer data shifts necessarily the spotlight on the instrument that allows its custody and use. The objective of this work is to start a discussion on the critical issues simply highlighted, essaying to give a solution that can be reconciled with all the issues raised. What we will try to bring out is that dematerialization is something distinct from digitization. Digitization creates an exchange system based not on representations of reality but codifications of it. If we accept this idea, even before the type of architecture of CBDCs the regulation of the instrument with which rights and assets are managed takes on new importance.



## 2. Exploring UAD about Technical Design

Several trends are driving the development of a Universal Access Device: while physical

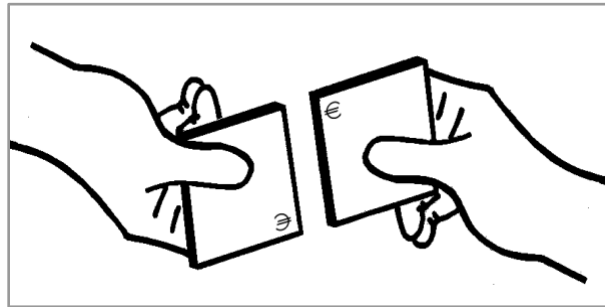


Figure 1: NFC-based UAD.

movement of cash is becoming expensive, paying with plastic is getting fashionable. More seriously, as natural calamities (floodings, earthquakes, or pandemics<sup>19</sup>) can impair cash distribution and credit card payments, people need a robust and reliable way of exchanging money.



Figure 2: Multi-Use of UADs.

A UAD-based Infrastructure should handle low-value transactions through NFC (Near-Field Communication) even when banking services are not available. The same infrastructure should be used for delivering money to the needy in a secure way. A pan-European UAD infrastructure should rely on two components: a standard hardware platform and a secure management network. The hardware will support multiple applications running simultaneously, almost in the same way a smartphone does, but in a highly secured environment. Whereas to available e-wallets, a UAD could handle together with a CBDC wallet, applications for NFC payments, and store Self-Sovereign Identity artifacts too.

In contrast to common smartphones, the network will comparatively constantly monitor the UAD hardware and will operate only certified applications. From a functional viewpoint, a UAD is a state-of-the-art smartphone, less the (costly) multimedia components, and plus a ‘connected secure element’. This highly-secure component marks a major step in mobile application security

<sup>19</sup> Ledger Insights, ‘Bank of Japan Research: Offline Payments for Central Bank Digital Currency’ (Ledger Insights - enterprise blockchain, 3 July 2020) <<https://ledgerinsights.com/bank-of-japan-offline-central-bank-digital-currency-payments/>> accessed 29 August 2020.

and is presently installed only on top-level smartphones. It hosts on the same chip both network identification (the information usually stored inside a SIM-card) and secure storage and computing functionality. Any attempt to tamper with that chip would result in disabling the smartphone. As the secure storage facility can be used for storing digital certificates and SSI-related information, the whole chip is a secure way of linking network identification data with user personal information. Thanks to its functional specialization, the UAD will vastly improve on smartphone standards in terms of unit cost, weight, autonomy, and usability. Through careful design, the UAD shall guarantee equal access to state-issued money, even to people who do not own a smartphone or may find it difficult to use (the elderly, the unbanked, the digitally-impaired). With its limited weight and its square form factor, it will allow simple single-hand operation and thumbprint identification. Also, it will support different User Interfaces, according to national sensibilities: following the principles of User Interface (Ux) design, those 'skins' will be tested and refined by national focus groups.

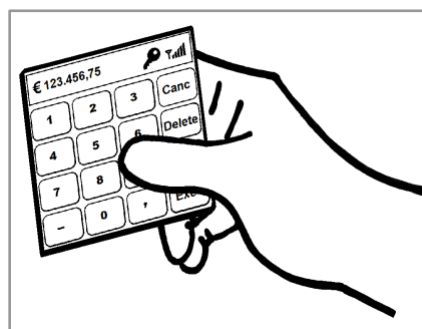


Figure 3: UAD User Interface.

Many of these features will be shared among all the citizens: as an example, an improved display designed for the visually impaired will benefit anyone using the device with insufficient illumination<sup>20</sup>. From a system engineering standpoint, the role of the secure management network is as relevant as the hardware architecture in ensuring reliable and secure operation of the device. It will track software releases from certified producers and will ensure automated and timely updates of the software. Tampered devices will be disabled automatically and, as in the case of mobile telephones, the Judiciary power (through an appropriate command chain) may request to monitor the activity of a specific device or to investigate its previous use.

<sup>20</sup> John Miedema and others, Op. cit.

### 3. Economic Aspects Affecting Use of the UADs

#### 3.1. *The Struggle for Digital Supremacy*

The conflict between the US and China has been part of the international scene for more than five years. While their battle for digital supremacy is only one aspect of this larger conflict, its outcomes are having a significant impact on the European Union. The European Commission has striven to safeguard the rights of its citizens in various ways:

1. International treaties: the EU-US Privacy Shield was signed with the Obama administration, establishing a legal framework for processing of sensitive data out of the European Union;
2. Investigations: the commercial practices of Internet Companies like Google and Apple have been investigated, and fines for anti-competitive conduct have been levied;
3. Technological innovation: fostering the development of start-ups by financing and other incentives.

These measures met with the approval of the European partners and were helpful to enforce laws and regulations approved by the European Parliament. On the other hand, international agreements can be invalidated by the European Court of Justice, after the judges established they are violating the Treaty on the Functioning of the European Union (TFEU). This happened on 16 July 2020 when the European Court of Justice invalidated the European Commission Decision on the adequacy of the protection provided by the EU-US Data Protection Shield<sup>21</sup>. This international agreement was through a voluntary self-certification scheme, whereby U.S. companies committed to complying with European data protection requirements, to store and process European residents' data in the United States<sup>22</sup>.

About the investigations on Internet companies, it is extremely difficult to restore a free market once they have reached a near-monopoly position. Also, there are few chances of reaching a verdict when dealing with corporations that can bear the cost of a multi-year dispute. For example, in August 2016 the European Commission established Ireland granted illegal State aid to Apple through selective tax breaks for the years 2003-2014, giving Apple 13 billion Euro in a tax

<sup>21</sup> Commission Implementing Decision (EU) 2016/1250 of 12 July 2016 pursuant to Directive 95/46/EC of the European Parliament and of the Council on the adequacy of the protection provided by the EU-U.S. Privacy Shield (notified under document C(2016) 4176) (Text with EEA relevance) 2016 [32016D1250].

<sup>22</sup> Data Protection Commissioner v Facebook Ireland and Maximilian Schrems [2020] Court of Justice of the European Union C-311/18; Curia Press and Information, 'The Court of Justice Invalidates Decision 2016/1250 on the Adequacy of the Protection Provided by the EU-US Data Protection Shield' (2020) No 91/20 Press Release. For episodes on the fight for digital sovereignty, see Luciano Floridi, 'The Fight for Digital Sovereignty: What It Is, and Why It Matters, Especially for the EU' (2020) 33 *Philosophy & Technology* 369 <<http://link.springer.com/10.1007/s13347-020-00423-6>> accessed 1 September 2020.

advantage<sup>23</sup>. But on 15 July 2020 the General Court of the European Union (EU Court of the first instance) annulled that decision.

Conventional actions for encouraging a free market can prove inadequate to contain the expansion of Internet Companies. Whatsapp Pay obtained the authorization to launch a mobile service payment in Brazil by exploiting a flaw in a start-up friendly legislation. As there are more than 120 mln Brazilian users of Whatsapp, the new payment application would have reached a monopoly position in the payment services industry. Urged by commercial banks on 24 June 2020, the Brazilian central bank suspended the authorization, only one week after the launch of the service<sup>24</sup>.

In the end, European digital sovereignty should be safeguarded by more incisive actions, as the construction and protection of digital infrastructure.

### 3.2. *Digital Infrastructure Standards as Safeguards of European Digital Sovereignty*

It has been widely known that proprietary standards can hinder the development of the market and reduce the level of protection of privacy. We should develop digital infrastructure standards before proprietary approaches have taken control of our life. Market regulators can carry out their activities only after a fair playing field has been established, by building a European digital infrastructure, shared by all service providers.

Seeking again back to history, the European GSM phone standard was crucial in developing a global cellular phone market. It started in 1985 as a limited agreement on cellular technology between France, Germany, and Italy, and gradually evolved into a global standard. When ETSI (European Telecommunications Standardization Institute) was set up in 1987, membership was still limited to European organizations. The opening of ETSI to non-European members sent a clear message that GSM technology was to be shared and everyone could have their say in its specifications. After that, foreign phone manufacturers cooperated in developing the standard and a global market developed. As a further result, on 15 June 2017, roaming charges were completely eliminated in the European Union.

<sup>23</sup> Curia Press and Information, 'The General Court of the European Union Annuls the Decision Taken by the Commission Regarding the Irish Tax Rulings in Favour of Apple' (2020) No 90/20, Press Release; 'Statement by Executive Vice-President Margrethe Vestager' (European Commission - European Commission, 15 July 2020) <[https://ec.europa.eu/commission/presscorner/detail/en/statement\\_20\\_1356](https://ec.europa.eu/commission/presscorner/detail/en/statement_20_1356)> accessed 29 August 2020.

<sup>24</sup> 'Brazil Central Bank Ices Facebook's WhatsApp Payment Service' (Finextra Research, 24 June 2020) <<https://www.finextra.com/newsarticle/36083/brazil-central-bank-ices-facebooks-whatsapp-payment-service>> accessed 29 August 2020.

As an example of the problems created by a proprietary standard, last June the European Commission announced an investigation against Apple Pay<sup>25</sup>. According to the Commission, 'Apple is “abusing” its control of the wallet through a policy that blocks third-party payment services to access its NFC hardware, which enables contactless payments’<sup>26</sup>. The commission-supplied data showed Apple Pay's growing market penetration in mobile payment services, but Apple is opposing that claim, pointing to the COVID-19 pandemic as the cause of the switch in customers’ preferences.

As cryptography techniques are evolving, it appears that the FinTech sector will have to rely on some Universal Access Device, to store personal information in a secure and reliable way. The definition of a European Standard for such a device would enable fair competition between companies and will safeguard the digital identities of European citizens.

### 3.3. *From the Individual Right to Identity to the Concept of Digital Sovereignty*

The EU Charter of Fundamental Rights states everyone has the right to the protection of their personal data<sup>27</sup>. An analogy may explain further the concept of personal data as a not negotiable commodity. In almost any jurisdiction the trading of human organs is forbidden (both the selling and the buying of them), since this activity causes an irreparable consequence for the person involved. Following this analogy, as the loss of personal identity is irreparable, it should not be traded too. Once sensitive data (for example, one's socio-economic profile as a consumer) has been released, the activity of finding and deleting all their copies is virtually impossible. The need to proactively protect this personal right is the basis of digital sovereignty. Water and power have been granted public service status, as they are necessary to provide for the fundamental rights of the person. In the same way, the infrastructures needed to proactively protect the digital identity should be recognized as a public service.

According to Article 16 of the Treaty on the Functioning of the European Union (TFEU) ‘The European Parliament and the Council... lay down the rules relating to the protection of individuals with regard to the processing of personal data by Union institutions, bodies, offices, and agencies...’. In this respect, the Universal Access Device and comparable infrastructures should be recognized as tools for the protection of the digital identity.

<sup>25</sup> ‘Antitrust: Commission Opens Investigation into Apple Practice’ (European Commission - European Commission, 16 June 2020) <[https://ec.europa.eu/commission/presscorner/detail/en/ip\\_20\\_1075](https://ec.europa.eu/commission/presscorner/detail/en/ip_20_1075)> accessed 29 August 2020.

<sup>26</sup> Jaime Toplin, ‘Apple Pay Is Facing an Antitrust Investigation by The European Commission’ (Business Insider, 17 June 2020) <<https://www.businessinsider.com/apple-pay-faces-european-antitrust-probe-2020-6>> accessed 29 August 2020.

<sup>27</sup> Article 8 - Protection of Personal Data (EU Charter of Fundamental Rights).

## 4. Crucial Legal Issues to Face Before Introducing UADs

### 4.1. *Basic Compliance Analysis for UAD-based CBDCs*

Central Bank Digital Currencies (CBDCs), are digital assets issued by a central bank. Many arguments support the case for issuing a CBDC: lowering transaction costs and improving the efficiency of present payment systems while pursuing financial inclusion<sup>28</sup>.

Until now, the European Central Bank has not disclosed any plans to issue a CBDC in the near future. However, the CBDC issue has been addressed in many publications of the ECB<sup>29</sup>, and for the sake of our discussion, the role of the UAD will be described in a European context. Among the many design options for implementing a CBDC, the most popular approach is to complement physical cash in supporting citizens in their day to day expenses: a retail-oriented, legal tender CBDC<sup>30</sup>, distributed by Bank intermediaries. A wholesale-oriented CBDC, on the contrary, would target the more specific issue of inter-bank settlements. Following this (hypothetical) indirect model of emission, the Central Bank will issue CBDC money to Commercial Banks and Payment Interface Providers (PIPs) and only these two organizations will supply that money to citizens.

The introduction of the Universal Access Device may illustrate the legal issues underpinning the operation of such a retail CBDC. From a practical standpoint, the UAD is a secure, physical object, carrying the identification of its owner (it is so flexible that specific users may be provided with ad-hoc versions of the software). All the events the UAD may encounter during its life-cycle must be managed in accordance with the basic Anti Money Laundering, Combating the Financing of Terrorism<sup>31</sup>, and customer Data Protection<sup>32</sup> (GDPR) regulations. “The CBDC design should

<sup>28</sup> Raphael Auer, Giulio Cornelli and Jon Frost, Op. cit.

<sup>29</sup> Ulrich Bindseil, Op. cit.; ECB, ‘Unleashing the Euro’s Untapped Potential at Global Level’ <<https://www.ecb.europa.eu/press/key/date/2020/html/ecb.sp200707~3eebd4e721.en.html>> accessed 29 August 2020; ECB, ‘ECB Welcomes Initiative to Launch New European Payment Solution’ <<https://www.ecb.europa.eu/press/pr/date/2020/html/ecb.pr200702~214c52c76b.en.html>> accessed 30 August 2020.

<sup>30</sup> Raphael Auer and Rainer Boehme, Op. Cit. On CBDC legal tender status see Christian Pfister, ‘Central Bank Digital Currency’ <<https://publications.banque-france.fr/en/central-bank-digital-currency>> accessed 29 August 2020, 31.

<sup>31</sup> Directive (EU) 2015/849 Of The European Parliament And Of The Council of 20 May 2015 on the prevention of the use of the financial system for the purposes of money laundering or terrorist financing, amending Regulation (EU) No 648/2012 of the European Parliament and of the Council, and repealing Directive 2005/60/EC of the European Parliament and of the Council and Commission Directive 2006/70/EC 2018.

<sup>32</sup> Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) (Text with EEA relevance) 2016.

find a new balance between allowing for data portability, safeguarding the privacy, and mitigating the risks of money laundering and illicit financing<sup>233</sup>.

Also, that solution should be robust enough to withstand fraud and cyber-attack and to accommodate the usual judicial proceedings like a seizure, bankruptcy, auditing and monitoring of accounts, etc. Replacement of lost, stolen, or malfunctioning units must be supported too. To support the operation of a UAD-based CBDC, six roles may be identified:

1. The European Central Bank, as the issuer of CBDCs;
2. The Judiciary Power, as the issuer of judicial proceedings;
3. An Independent Authority as a link between the ECB and the Judiciary power tasked with monitoring and investigation;
4. The Executive Power (usually the Ministry of Interior) as the custodian of the citizens' identities and issuer of ID cards;
5. Commercial Banks and Payment Interface Providers (PIPs) as the executors of the customer identification (KYC, Know Your Customer) process;
6. The UAD Management Network, executing orders received from the previous five.

As already described, a UAD is a secure way of storing in the same place a network identification (an irreplaceable SIMcard) and some User Personal Data (a set of Self-Sovereign Identification artifacts guaranteed by the Ministry of the Interior).

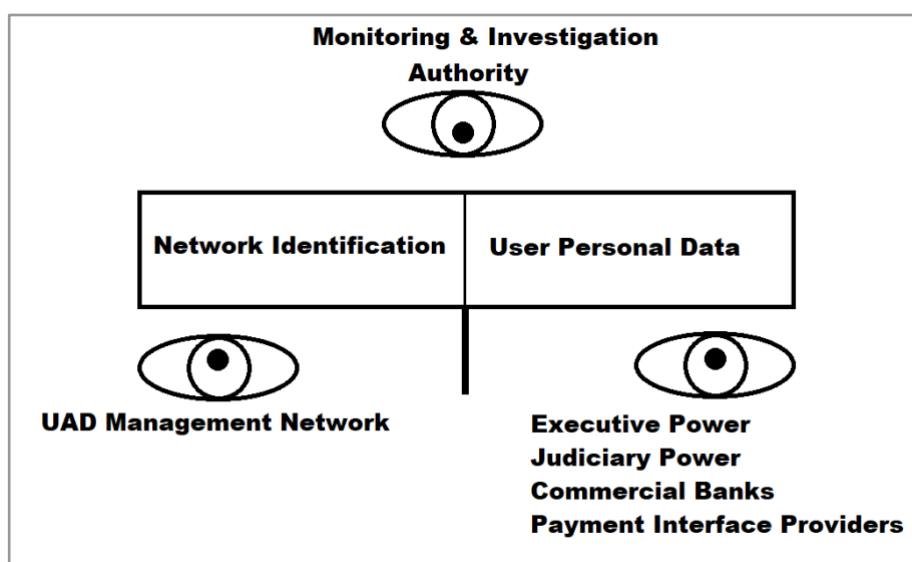


Figure 4: UAD Supervision System.

<sup>33</sup> BIS, 'Central Banks and Payments in the Digital Era' [2020] Annual Economic Report. For a US AML compliance regime on CBDC see Howel E Jackson and Margaret E Tayhar, 'Fintech Law - The Case Studies' <[https://projects.iq.harvard.edu/files/fintechlaw/files/fintech\\_law\\_the\\_case\\_studies.pdf](https://projects.iq.harvard.edu/files/fintechlaw/files/fintech_law_the_case_studies.pdf)> accessed 29 August 2020, 267.

The Executive Power, Judiciary power, the Payment Interface Providers (PIPs), and the Commercial Banks identify the users by their Personal Data (in the same way they are doing now). The suggestion to delegate the KYC process to commercial banks and Payment Interface Providers (PIPs) is in accordance with a proposal from the Bank of England<sup>34</sup>.

The only organization that will manage both network identification and personal data will be an Independent Authority: a renewed European-level organization will be tasked with the monitoring of the network and AML/CFT investigations. This in accordance with a study published by the ECB itself: "That authority checks the identities of users involved in large-value transactions and prevents CBDC from being transferred to embargoed users"<sup>35</sup>. At the lower level, the UAD Management Network has only access to the network identification data stored on the SIMcard.

#### 4.2. *The Management of the UAD as a Conflict of Competence Issue*

Should a Universal Access Device be adopted for supporting a retail CBDC, in which European institutions should be responsible for its operation? This thought experiment may help clarify the more general question of whether the European legal framework specifies who should manage any sensitive infrastructure.

According to the Art. 127, par. 2 of TFEU the ECB, through the Eurosystem, has the responsibility 'to promote the smooth operation of payment systems'. So, it could be assumed the legislation would grant to the European Central Bank/Eurosystem the authority to manage the UAD as a payment system. According to a ECB study, 'the central bank is the only entity allowed to issue CBDC units and remove them from circulation'<sup>36</sup>.

However, in the analysis of conflicting competences, it is important to identify the overriding goal among all those assigned to the conflicting institutions. From this view, the Universal Access Device life-cycle goes way beyond the CBDC circulation process, touching on personal data. This involves, as pointed out, Art. 16 of the TFEU for 'The European Parliament and the Council... lay down the rules relating to the protection of individuals with regard to the processing of personal data by Union institutions, bodies, offices, and agencies...'. In this respect, the guidelines for the

<sup>34</sup> Bank of England, 'Central Bank Digital Currency: Opportunities, Challenges and Design' [2020] Discussion Paper. This architecture could avoid 'disruptive disintermediation of the existing banking system', see Sarah Allen Prasad James Grimmelmann, Ari Juels, and Eswar, 'Design Choices for Central Bank Digital Currency' (*Brookings*, 23 July 2020) <<https://www.brookings.edu/blog/up-front/2020/07/23/design-choices-for-central-bank-digital-currency/>> accessed 29 August 2020.

<sup>35</sup>ECB, 'Exploring Anonymity in Central Bank Digital Currencies' (2019) 4, Issue no 4 IN FOCUS.

<sup>36</sup> *Ib.*, 4.



deployment of the Universal Access Device should be probably set at a higher level. This may open the way for cooperating with many European institutions also with the private sector.

As a first example, the European Blockchain Partnership (EBP)<sup>37</sup> was established on 10 April 2018. Later, other nations (including Italy) have joined the initiative, aimed at creating EBSI (European Blockchain Services Infrastructure)<sup>38</sup>, a European digital infrastructure for a secure and reliable data transfer between European-based institutions and organizations. ESSIF, the European Self Sovereign Identity Framework<sup>39</sup> is a special use case of EBSI.

ENISA, the European Union Agency for Cybersecurity, established in 2004, is a center of expertise for cybersecurity in Europe<sup>40</sup>. While its focus is to prevent, detect, and respond to information security problems, it also helps in drafting EU policy and law on data protection and network security.

Europol (European Union Agency for Law Enforcement Cooperation), was established in 1998 'to handle criminal intelligence and combat serious international organized crime and terrorism'<sup>41</sup>. In the US, the mission of safeguarding the financial and critical infrastructure is mandated to the Secret Service (now a Federal Agency under the Department of Homeland Security). As Europol acts as a worldwide contact point, the two agencies cooperate on counterfeiting and financial crimes<sup>42</sup>.

### 4.3. *The Galileo experience*

Galileo is the European Global Navigation Satellite System (GNSS)<sup>43</sup>: it became operational in 2016 and is presently operating 26 satellites<sup>44</sup> for civilian use. The Galileo project contributed to

<sup>37</sup> European Commission, 'European Countries Join Blockchain Partnership' (Shaping Europe's digital future - European Commission, 10 April 2018) <<https://ec.europa.eu/digital-single-market/en/news/european-countries-join-blockchain-partnership>> accessed 29 August 2020.

<sup>38</sup> CEF Digital, 'Introducing the European Blockchain Services Infrastructure (EBSI)' (CEF Digital) <<https://ec.europa.eu/cefdigital/wiki/cefdigital/wiki/display/CEFDIGITAL/EBSI>> accessed 29 August 2020.

<sup>39</sup> CEF Digital, 'European Self-Sovereign Identity Framework (ESSIF) (CEF Digital)' <<https://ec.europa.eu/cefdigital/wiki/pages/viewpage.action?pageId=262505360>> accessed 29 August 2020.

<sup>40</sup> ENISA, 'Smart Infrastructure' (*IoT and Smart Infrastructure*) <<https://www.enisa.europa.eu/topics/iot-and-smart-infrastructures/smart-infrastructure>> accessed 29 August 2020.

<sup>41</sup> European Commission, 'Europol - Union Agency for Law Enforcement Cooperation' <[https://ec.europa.eu/knowledge4policy/organisation/europol-european-union-agency-law-enforcement-cooperation\\_en](https://ec.europa.eu/knowledge4policy/organisation/europol-european-union-agency-law-enforcement-cooperation_en)> accessed 29 August 2020.

<sup>42</sup> Europol, 'Euro Counterfeiting' (Europol) <<https://www.europol.europa.eu/crime-areas-and-trends/crime-areas/forgery-of-money-and-means-of-payment/euro-counterfeiting>> accessed 29 August 2020.

<sup>43</sup> European Commission, 'Galileo Goes Live!' (European Commission - European Commission, 14 December 2016) <[https://ec.europa.eu/commission/presscorner/detail/en/IP\\_16\\_4366](https://ec.europa.eu/commission/presscorner/detail/en/IP_16_4366)> accessed 29 August 2020.

<sup>44</sup> European Commission, 'Space: 26 Galileo Satellites Now in Orbit for Improved EU Satellite Navigation Signal' (European Commission - European Commission) <[https://ec.europa.eu/commission/presscorner/detail/en/IP\\_18\\_4603](https://ec.europa.eu/commission/presscorner/detail/en/IP_18_4603)> accessed 29 August 2020.

the principle that satellite navigation should rely on the interaction of many satellite systems working together. The Global Positioning System (GPS), was the first satellite-based radio-navigation system to be developed: it went operational during 1993. While it started as a purely military project (the U.S. Space Force still manages it), GPS originated significant civilian applications. On 1 May 2000 President Bill Clinton signed a directive ending a previous policy that reserved the highest-precision signal to military uses.

By 2002 the European Union was ready to enunciate its first EU law on the issue, a Regulation establishing the Galileo Joint Undertaking, by the European Commission and the European Space Agency (ESA)<sup>45</sup>. The European Commission still jointly manages Galileo and the ESA. Despite its name, the latter is not an Agency of the European Union: Switzerland, Norway, and Canada hold ESA memberships, but some EU partners (Romania, Slovak Republic, and Cyprus) are missing. On 26 June 2004, a US-EU agreement was signed to harmonize GPS and Galileo satellite navigation systems<sup>46</sup>, originating four joint technical work groups addressing national security issues, interference, synchronization, and methodology. Chips manufacturers started supporting Galileo signals improving the quality of smartphones location services.

Since 2007, the Lisbon Treaty article 189 and now the Treaty on the Functioning of the European Union mandates the European Union to develop a space policy but states the Union should establish 'appropriate relations' with ESA. This heterogeneous character of Galileo's governance has drawn several criticisms. In 2010, the European GNSS Agency (GSA)<sup>47</sup> was finally established as a Community Agency.

On 12 December 2018 the European Commission passed a regulation for all new smartphones to implement Galileo for Emergency support 112<sup>48</sup>. Before that, emergency services used cellular infrastructure to locate the position of the caller within a range of several kilometers. By using satellite systems, callers are now pinpointed to a range of a few meters.

<sup>45</sup> Council Regulation (EC) No 876/2002 of 21 May 2002 setting up the Galileo Joint Undertaking.

<sup>46</sup> European Commission, 'GALILEO and GPS Will Navigate Side by Side: EU and US Sign Final Agreement' (European Commission - European Commission, 28 June 2004) <[https://ec.europa.eu/commission/presscorner/detail/en/IP\\_04\\_805](https://ec.europa.eu/commission/presscorner/detail/en/IP_04_805)> accessed 29 August 2020.

<sup>47</sup> Regulation (EU) No 912/2010 of the European Parliament and of the Council of 22 September 2010 setting up the European GNSS Agency, repealing Council Regulation (EC) No 1321/2004 on the establishment of structures for the management of the European satellite radio navigation programmes and amending Regulation (EC) No 683/2008 of the European Parliament and of the Council as amended by Regulation (EU) No 512/2014 of the European Parliament and of the Council of 16 April 2014.

<sup>48</sup> Commission Delegated Regulation (EU) 2019/320 of 12 December 2018 supplementing of Directive 2014/53/EU of the European Parliament and of the Council with regard to the application of the essential requirements referred to in Article 3(3)(g) of that Directive in order to ensure caller location in emergency communications from mobile devices 2019 [32019R0320].

## 5. From the 'Bancor' to the 'Universal Wallet': Two Different Monetary Systems, the Same Ontological Concept of Sovereignty

Historically, reforms of banking systems have followed severe political or economic upheavals. The mind quickly turns to Bretton Woods and the idea of a currency as a unit of account that would allow a trade to be tracked by taking into account the assets and liabilities of balances of payments. It is not by chance that the idea of a 'Bancor' came back into the debate among economists after the global financial crisis of 2008-2009. However, in that context, the international financial system has shown resilience in managing a severe crisis. The COVID-19 pandemic is once again putting the Bretton Woods set-up to the test. This time, resilience may not have the same outcome considering that the non-conventional monetary policy instruments already in place have to be confronted with a size jump in national public debts. The time has probably come to imagine a new structure for the monetary system. The emerging monetary system still shows a predominance of the dollar, supported by the so-called C6<sup>49</sup>, and, then, cascading, bilateral swaps, regional pooling, IMF, national currency and national credit. Looking ahead, as we have seen, this could be a transition from the dollar to some other currency, for instance, the renminbi<sup>50</sup>.

Another hypothesis could be taking advantage of the effects of the introduction of the DLT in the payments' system, while taking note of different types of currencies, with different functions, public and private. In that context, it might be possible to imagine a super-sovereign currency that could be the new global monetary system foundation. As an effect, we will find different governance for crisis management and control of global liquidity, disengaging sovereign currencies from international trade, and balance of payment consequences. A complicated political address to pursue but that DLT application could facilitate for its transparency and decentralization features.

The ongoing acceleration towards the experimentation of projects leading to the digital currency, in particular CBDCs, in a short time, not only creates the conditions for a more efficient monetary circulation but also for the definition of a monetary system with the characteristics just outlined. For this efficiency to be exportable to international transactions, the access that operators may use to store and use digital currency will be applicable. In this context, the 'wallet' will be more relevant than its contents. The regulation object will move from currency to the wallet into which any type of digital currency and any other information of this nature can necessarily flow. It might

<sup>49</sup> Being the Fed, ECB, Bank of England, Bank of Japan, Swiss National Bank, and Bank of Canada.

<sup>50</sup> Paul Jenkins and others, 'China's Engagement with an Evolving International Monetary System: A Payments Perspective' (2014) Special Report Cigi and Institute for New Economic Thinking.

be possible to go beyond regulation and imagine situations in which monetary policy is transmitted directly to the wallets.

The scenarios that can be opened up are many and deserving of a thorough investigation by policymakers, regulators, academicians, and industry. This paper aims to start the debate and show a direction as well as a specific solution: Universal Access Devices.

Universal Access Devices would enable the full benefits of distributed ledger technology; solve financial inclusion issues; put the separation of payment institutions and investment banks back at the core of political agendas; facilitate micro-payments, and address using of money for illicit purposes more effectively. Of course, all this requires careful work to identify UAD management issues and feasibility analysis in terms of cost/benefit ratio. In the same way, it would be essential to carefully verify the legal issues that we have only mentioned in this work. With a specific focus on the EU, the issues would cover both the regulatory framework and the link with existing legislation on GDPR, AML, CFT, PSD2<sup>51</sup>.

However, it should be noted that within the EU, there are resources in technical, design, legal and economic terms, capable of developing and implementing this project. However, there could be other positive effects if there were a convergence of interest in this type of solution outside the EU.

So far, we have dealt with crises 'making money', issuing money. Experience has given us this lesson: liquidity proved to be effective but not resolute because it evokes sovereignty. Separating state currencies from sovereignty ('breaking money') and transferring it to the infrastructures through which liquidity is held and used could represent an effective and resolute solution for the world's governance of the monetary system that will come after the pandemic.

It is worth checking it out.

<sup>51</sup> But, not only this legal framework. See Hossein Nabilou, 'Testing the Waters of the Rubicon: The European Central Bank and Central Bank Digital Currencies' [2019] *Journal of Banking Regulation*.

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