

Central Bank Digital Currencies and the Evolving International Payment System

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Digital innovations impact all aspects of human life, and the restriction of mobility during the COVID-19 pandemic intensified the digitalization process. In the domain of money and payments, the impacts are so meaningful that the International Monetary Fund (IMF, 2022) has referred to them as a “money revolution”. At least 130 countries are currently studying the possibility of implementing a Central Bank Digital Currency (CBDC), and many analysts believe this will be the future of money. While some central banks indicate that CBDCs are for domestic use, several international forums, including the G20 (BIS *et al*, 2021), have discussed extending the digital currencies to the international arena because of a general perception of dysfunctionalities in the global payment system (e.g. the exorbitant fees paid by immigrants when transferring funds for their families).

With discussions about cross-border payments in CBDCs still in their infancy, it is appropriate for participants to try to ensure that the new infrastructure would serve as a *global public good*. For that purpose, it is necessary to analyze the domains where actors can take decisive influence on CBDC-design. This policy brief focuses on three crucial domains: i) The technology embedded in these digital currencies and cross-border payment systems; ii) The definition of the regulatory framework; iii) The access that actors and countries will have to data flows – and databases – related to CBDCs transactions. The objective is therefore to bring light to the decisions that monetary authorities have to take in regard to the design of their CBDCs and the cross-border payment systems to which they will adhere. In particular, the paper aims to contribute to decisions that Global South countries will have to take in the face of these transformations.

Technological setting for CBDCs and cross-border payment systems

The crucial concern in defining technological standards for CBDCs is embedded in the degree of technological sovereignty that central banks would have over their digital currencies. In fact, most initiatives to develop CBDCs involve central banks

working with private institutions. This partnership is understandable since private institutions possess valuable technical expertise that can aid in the development of new technologies. However, if the design of CBDCs relies entirely on private technology, it could jeopardize a country's sovereignty over its own digital currency

Decisions related to the various layers of the technology stack are therefore necessary. According to Schumacher (2024), the relevant layers are:

- (i) The *server* that hosts the CBDC system. This can be set up in secure data centers or in a private cloud infrastructure. The Eastern Caribbean group of states is developing the DCash, to be used across the Eastern Caribbean Currency Union (ECCU). The storage system will be Google Cloud. But having such crucial data stored in a privately-owned repository could be considered a serious risk to the sovereignty of this group of nations. Schumacher (*op. cit.*, p. 210) has suggested these servers should ideally be run “within the country’s borders to maintain sovereignty, control, and security.”
- (ii) The software for operating the CBDC system. In-house software development certainly would provide greater sovereignty and security than commercial software. Commercial software, developed by foreign companies, may be considered a point of vulnerability, especially in the current climate of geopolitical tension. According to Schumacher (*op. cit.*, p. 147), “the appropriate open-source/FLOSS [free/libre open-source software] license can prevent dependence on software vendors managing critical infrastructure and can provide substantial freedom.”
- (iii) The *network infrastructure* that connects the components of the CBDC system. It can be open (internet) or closed (intranet), but it must enable safe and reliable communication between servers, applications, and end-user devices.
- (iv) The *consensus-building mechanism*. Especially if a distributed ledger technology (DLT) is used, the consensus protocols will safeguard the

integrity and immutability of the transactions. Many CBDC projects rely on blockchain technology provided by Hyperledger Fabric, a private permissioned blockchain. Yet, there are important exceptions. For instance, the investigation phase of the digital euro indicates that it will unlikely use blockchain technology; instead, it will probably be based on a centralized infrastructure hosted by the ECB. The e-CNY is also not based on blockchain (Xu, 2022).

- (v) The *end-user devices* (smartphones, tablets, and computers) through which users will make transactions with CBDCs.

Central banks, therefore, should seek out technologies that allow reliable and secure performance, but avoid extreme dependency on private companies and/or third countries. While there is no general rule related to the optimal place in the trade-off between economic feasibility and state control, national governments should always be attentive to maintain control over the crucial layers of technology. The key factors for national sovereignty are the first two above: the *servers* and the *software*.

But even if central banks are careful not to lose control of the technology that defines their CBDCs, there may be disputes over the technologies underlying the cross-border payment systems being developed. According to Bilotta (2025, p. 34), “mapping existing experiments can help shed light on how global powers are trying to position themselves in shaping the future of this technology.” It is still impossible to predict the future CBDC cross-border payment system. Yet, in all possible scenarios discussed in the literature (e.g. Auer, Haene, and Holden, 2021), countries may have reason to try to define the international framework enabling communication between the various national systems, the technical interface or the single set of technical systems, aligned with their own technological standards. Historically, the setting of technological standards has been an important element in settling geopolitical disputes, and this will certainly be the case for any CBDC-based cross-border payment systems.

Regulatory framework for CBDCs and cross-border payment systems

With CBDCs, countries will have to adapt national regulations to govern this new form of money. Central banks will have to amend legislation to

officially recognize CBDCs as money, on a par with cash. When this happens, the technological possibilities around CBDCs will open a range of new possibilities, demanding regulations to define which are desirable and which are not. Regulation, therefore, will be crucial to the *modus operandi* of the adapted national monetary systems. Not by chance, rule-making discussions for CBDCs have drawn intense lobbying from the private sector.

A key topic of discussion about CBDC regulation has centered on the effects they might have on commercial banks and their role in the new monetary system.

This means that each country will have to establish rules defining the extent to which commercial banks will handle CBDCs and whether this will be the same as conventional banking money. Would CBDCs have interest rates? Would these be positive and negative? The ECB has already declared that the digital euro will not have interest rates, a statement apparently issued in direct response to pressure from commercial banks. So far, there is no binding regulation on that, so in theory, that leaves open the possibility for the ECB to make procedural changes later. Will households be allowed to hold wallets directly at the central banks? For the digital yuan, the answer is yes, but for the Brazilian Drex and the digital euro, no. For the latter, access to the platform will require intermediation of an authorized financial institution. What are the maximum amounts allowed for storing CBDCs? The limit for the digital euro might possibly be 3,000 euros – a low limit set to placate commercial banks’ concerns about losing their savings systems.

The examples above show the extent to which the private sector, commercial banks in particular, can exert influence on the design of CBDC regulation.

In addition to the regulation of boundaries between central and commercial bank activities, there is the question of non-residents’ accessibility to CBDCs. Some central banks aim to use the CBDCs to foster the internationalization of their currencies. Yet, it is important to guarantee that this international usage of CBDCs will not result in instability and illicit usage. The People’s Bank of China has already made an overseas version of its digital RMB wallet available to non-residents. The ECB, meanwhile, is indicating that it will ban its digital euro from non-residents.

Programmability of payments (e.g., recurring payments) has been established practice for some

time, but in regulating CBDCs, one has to consider that the technology enables not only programmable payments but programmable money. CBDCs open possibilities such as the disseminated use of smart contracts. However, the programmability of money itself is a radical new possibility, which could even affect the properties of money. For instance, CBDCs could be customized for purchasing only specified goods or services, and they could have an expiration date; the specificities are dazzling. They could have virtuous use for, say, the design of public or social policies (e.g., cash-transfer programs could issue CBDCs limited to the purchase of food and clothes). They could also be used for counter-cyclical policies, such as the cash transfers of the COVID-19 pandemic, set to expire in months, thereby encouraging quick expenditure to revamp the economy. Many monetary authorities are keen to explore the possibilities of CBDC programmable payment, particularly in the area of smart contracts and synchronization of “payment on delivery.” But many central banks balk at the possibility of programmable money. The ECB states that “the digital euro will never be programmable money.” This reluctance stems mainly from the general belief that money should provide universal purchasing power; designing it for specific purposes or specific periods may harm its very essence.

While national regulation is the purview of national monetary authorities, a cross-border payment system raises questions of multi-national interests. A supranational body would seem to be the best option for setting international regulations for CBDC cross-border transactions. Should this be an entirely new or an existing institution? The BIS comes to mind as a likely candidate because of its existing mandate to supervise banks and promote international cooperation in matters of money and finance, and also because of its experience in recent years of participation in, and coordination of several projects for cross-border CBDC payments. Yet, the BIS would have to be open to meet the desire of many countries of the Global South to take benefit of these new cross-border payment systems to foment transactions in their national currencies. Whichever option emerges, countries of the Global South should therefore be attentive to new regulations and their possible effects on power dynamics in the International Monetary and Financial System.

Another multilateral body that might influence CBDC cross-border regulation is the International

Organization for Standardization (ISO), which established a CBDC Study Group in 2021 with the objective “to provide support to the broad financial services market by determining and advising where international standards would facilitate and make more efficient the inclusion and use of both CBDC and non-FIAT digital currencies” (ISO, 2021)..

It is important to note that digital cross-border payment systems could empower countries to control the degree to which they integrate their financial systems with those of other countries. The new technological frameworks would enable selective control and regulation so that they would not have to blindly submit to financial integration. They would be able even to strengthen capital controls (e.g., it is difficult for the ECB to prevent non-residents from holding euro bills but it will be able to prevent non-residents from buying the digital euro). There will certainly be pressures for deregulation (such as those currently on the traditional operations of financial accounts), but countries will at least retain their autonomy to choose how to respond.

Of course, cross-border payment systems will still have to comply with existing regulations, such as those combating money laundering and the financing of terrorism (AML/CFT). But the new technologies should not be incompatible with such regulations, and could even speed up the necessary checking time, increasing the economic efficiency of the system.

While the biggest economies of the world will be possibly competing for the determination of international regulation standards, Global South countries should be ready to deal with the disputes, and strive for a regulatory framework that aligns with their national objectives. A key is for regulation to enable international usage of diverse national currencies while respecting the degree of financial integration each country prefers in the global economy.

Digital information flows

For the CBDC payment systems under development, a crucial question concerns the viability and desirability of accumulating massive amounts of information related to cross-border payments. ISO has established ISO20022 as an international standard for the messaging of financial institutions. Full implementation is expected in 2025, and should regularize payments data.

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As discussed above, it is still not clear whether the CBDC cross-border payment initiatives will give rise to a single, unified system or regionally integrated systems. Nevertheless, if a degree of standardization is achieved, the new technologies will enable massive data compilation. The question then arises whether these repositories would be accessible and if so, by whom and to what purpose. Murphy *et al.* (2024, p. 4) states that CBDC “technology can help protect privacy through the adoption of privacy-by-design approach but needs to be complemented by rigorous regulatory requirements and institutional safeguards”. Under a regulatory framework protecting personal privacy, it is reasonable to want to use such huge stores of information in an aggregated manner, as a “public good”.

Central banks have been keen to show that CBDCs will not infringe on privacy. While certainly important, this should not mean that anonymous data should not be collected and used for public-oriented purposes. According to Murphy *et al.* (2024, p. 28),

“Central banks may be well positioned to strike a good balance between CBDC data use and privacy protection as CBDC systems could start as a clean slate.” In designing CBDCs, central banks may wish to offer a variety of CBDC privacy settings to cater to the privacy needs of different users. In setting up the CBDC ecosystem, central banks should focus on addressing externalities that may exist in CBDC data use, and on shaping the incentives of the stakeholders in such system.

Reset of cross-border payment systems is an opportunity for rigorous discussion on the purpose and use of data at all levels, while being mindful that a rich database could also be misused by those seeking to wield power. It is technically possible to design a system that allows specified use of the database, in an aggregate form, by multilateral institutions; the challenge lies rather in the political and geopolitical arena. It is entirely conceivable that powerful countries, openly or secretly, will compete for access to this priceless database, and this competition should be avoided.

Final remarks

CBDCs have potential to elicit important transformations in the monetary system, both domestically and internationally. These changes will depend at the national level from design choices of the monetary authorities in their

interaction with private actors participating in the process; and at the global level from the infrastructure that will prevail either as a result of geopolitical disputes or as a supra-national construction. Since CBDCs and the corresponding cross-border payment systems are still under development, it is a proper moment for discussions aimed at erecting this new system as a “global public good”.

At the national level, the development of CBDCs should not imply dependence on private and/or foreign technology that at the end may engender serious vulnerability for the country. One of the reasons for the development of CBDCs is assuring monetary sovereignty, but this should not be done to the detriment of technological sovereignty in the monetary system. In particular, sovereignty over the server and the software used for CBDCs should be assured. Second, even if private entities are taking part in the development of CBDCs, the regulation should be defined in accordance with public interests. In other words, the regulatory framework should allow for the exploration of the possibilities provided by the new technologies, even if they interfere in some of the ordinary activities of commercial banks. Third, without infringing the privacy of the population, the compilation and use of information flows related to CBDC operations should be used for public policies.

At the international level, a possible scenario involves the dispute of major economies for the settlement of technological standards and the erection of a global regulatory framework. Concerning the access to information flows related to payments in CBDCs, disputes may also appear, but this potentially gigantic data source should be rather accessed and used by multilateral institutions, for supranational purposes.

Last, but not least, in this uncertain context, Global South countries must reinforce their participation in projects, discussions, and decisions around CBDCs and international digital payments, and try as best they can to navigate the geopolitical pitfalls to their best advantage. In particular, these countries should seek for the implementation of cross-border payment systems which facilitate international payments in their own national currencies.

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