

## CBDC OPPORTUNITIES AND CHALLENGES



### ULRICH BINDSEIL

Director General, DG Market Infrastructure & Payments - European Central Bank (ECB)

### Key considerations regarding scope, design and distribution of a digital euro

The Eurosystem is investigating the opportunities, challenges and design features of a possible digital euro. This investigation will run for 24 months and aims at analysing and concluding on key issues regarding the scope, design and distribution of a digital euro. The overarching objective of the work is to establish whether a digital euro could meet the needs of Europeans while at the same time help prevent illegal activities and avoid any undesirable impact on financial stability and monetary policy. The Eurosystem has not yet made any commitment or decision on its issuance.

There are a number of scenarios in which the Eurosystem could decide to issue a digital euro accessible to all citizens and businesses for their

payments. As many digital processes in communication, consumption, industry and commerce are closely interconnected with payment processes, a digital euro could be an option to make these processes more efficient and thereby facilitate the digitalization of the European economy and strengthen its strategic independence.

The digitalisation of payments has been accompanied by a declining use of cash. Thus, central banks need to be prepared to offer an alternative to cash to preserve the co-existence of commercial bank money and central bank money in retail payments. This co-existence - and the two-layer monetary system based on the promise to convert a deposit in commercial bank money "at sight" into central bank money has served societies well, and there is no reason to doubt that it should be preserved in a digital age.

Payments are a network activity with economies of scale. Thus, payment markets are typically dominated by a few large market actors. A digital euro available to individuals and businesses would establish an alternative to private sector market actors with a dominant market position and the potential to abuse their market power at the expense of consumers and merchants. Last but not least, a digital euro could also meet the challenges that may emerge from the issuance of private sector forms of money and/or digital currencies issued by other central banks.

The Eurosystem will work closely with the financial industry for the development of prototypes and more conceptual work regarding a digital euro. Close collaboration with the industry is also essential to ensure cohesion on the broader aspects of retail payments and ultimately ensure that Europeans are offered front-end payment solutions which can be used anywhere in Europe.

Overall, privacy is considered an important feature of a digital euro by both citizens and professionals. Users of digital central bank money may expect the same degree of privacy as with cash. However, in the digital sphere, privacy should not be confounded with full anonymity. Users will likely have to identify themselves when first accessing digital euro

services. Furthermore, regulations on anti-money laundering and combating the financing of terrorism are likely to imply restrictions on anonymity. The European co-legislator will have to clarify the applicable rules that have to be taken up in the design of the digital euro.

Central bank digital currencies (CBDC) have the potential to enhance the efficiency of cross-border payments. However, this requires co-ordination and agreement on technical usage and appropriate standards across central banks. As the cross-border use of CBDC might also facilitate capital flows, there must be common rules to enhance efficient international payments without undermining global financial stability.

To address financial stability risks and challenges to the role of banks in financial intermediation, both limits and tiered remuneration should be considered. The functional specifications which need to be established during the investigation phase should probably encompass several such tools.

I personally hope that if and when the digital euro will be issued in a few years, it would not have to be subject to strict individual holding limits but rely on tiered remuneration. Tiered remuneration would ensure that there are disincentives to large holdings of digital euro through a remuneration which makes digital euro less attractive than other liquid and highly rated investment assets. The central bank must not become a large-scale investment intermediary. At the same time tiered remuneration could ensure that a basic stock of digital euro held by citizens to cover their payment needs is never remunerated less attractively than banknotes.

Finally, it has to be stressed that there are no monetary policy intentions behind the investigation of a digital euro. The potential introduction of a digital euro is not intended as a monetary policy tool to move beyond the effective lower bound. In conclusion, a digital euro should be designed in such a way that it becomes an attractive means of payment, while its use as a form of investment and the associated large shifts from private money (for example bank deposits) to digital euro are discouraged.



## DENIS BEAU

First Deputy Governor –  
Banque de France

### Setting the course for sound digital innovation in financial and payment markets

Central banks have a key role to play in promoting sound and sustainable innovation, particularly in the field of payments and market infrastructures, where digitalisation brings both opportunities and risks.

In this context, the Banque de France is actively working within the Eurosystem on a Central Bank Digital Currency (CBDC). This work aims at assessing whether and how a new, digital, form of central bank money can help in maintaining in the digital era the critical role central bank money plays as the stabilising anchor of our financial system both in the wholesale and retail space. Following the 2007-2008 Financial Crisis, this critical role was set in stone in the Principles for Financial Market Infrastructures at international level, with the strong encouragement to use central bank money to settle financial transactions to avoid credit and liquidity risks.

On the wholesale side, the Eurosystem has been spearheading innovation and the integration of financial markets in Europe in the past twenty years, notably

through the Target services. Nowadays, growing market interest for new technologies, such as DLTs, along with the emergence of tokenised versions of tradable assets, raise the question of the availability of central bank money in a tokenised form directly on a distributed ledger to optimise settlement. As part of a learning by doing approach to understand new technologies' implications for the financial system, the Banque de France is conducting an experimentation programme, whose first part was completed at the end of 2021.<sup>1</sup> The programme involves a variety of actors from the private sector (banks, Fintechs, post-trade industry actors, etc.) as well as public institutions (other central banks, public issuers).

Among the lessons learned so far from that programme in the field of securities settlement and cross-border payments, new technologies can improve the efficiency of financial markets with wholesale CBDC maintaining safe settlement in central bank money and preventing market fragmentation. Secondly, interoperable CBDC arrangements across jurisdictions can help make cross-border payments faster and cheaper, provided there is a fruitful international cooperation. The upcoming second phase of the experimentation programme will focus on international transactions and address remaining questions, such as scalability and operational resilience of a DLT infrastructure or the complementarity with current market infrastructures.

---

#### New technologies can improve the efficiency of financial markets with a wholesale CBDC.

---

On the retail side, the issuance of a CBDC suited for everyday payment needs could help ensuring that the growing digitalisation of payments develops in a secure and efficient way without jeopardising an open, level playing field in payments, and monetary sovereignty. The Eurosystem has started working in that perspective on a digital euro, with the launch of an investigation phase last July. It will provide the Governing Council with all the necessary analysis to make an informed decision on opening a realisation phase at the end of 2023, including a proposal for the design of a digital euro and a comprehensive view on all the implications inferred by its issuance.

In any case, a digital euro should complement, not take over, existing

and future payment solutions, being public or private, and be interoperable with them. It should also leverage the private sector's role and expertise as part of the distribution of a digital euro and the provision of value-added services, while ensuring that a digital euro does not trigger disruptive effects for financial intermediaries with financial stability risks and impediments to the conduct of monetary policy.

It should however be clear that issuing a digital euro is not the only and the most pressing public policy tool to activate, in order to create a confidence-prone framework in which the opportunities brought about by digitalisation can be reaped in a sustainable way.

A regulatory framework that is clear, fair and balanced to foster both innovation and stability should indeed be seen as a priority. In that context, *Markets in Crypto-Assets Regulation and Digital Operational Resilience Act* are timely, welcome, should be implemented swiftly and complemented in due course to address new risks stemming from emerging ecosystems, such as Decentralised Finance.

*1. Wholesale central bank digital currency experiments with the Banque de France, report by the Banque de France, 8th November 2021.*



## MARCEL HAAG

Director, Horizontal Policies,  
DG for Financial Stability,  
Financial Services and  
Capital Markets Union -  
European Commission

### A digital euro: digitalisation of EU economy to enhance pan-EU retail payments

Digitalisation is profoundly transforming financial services in many ways. Crypto-assets, i.e. assets that depend primarily on cryptography and distributed ledger technology (DLT), have a significant potential in that respect. While they come in many forms and functions, they may be used for payment purposes in particular. The rapid development of stablecoins has further bolstered this potential. Stablecoins aim to stabilise the value of the coin against an underlying asset. By aiming to address the traditional weak point of other crypto-assets – significant volatility – they may accordingly become particularly widely used for payments. These privately issued coins raise the question of the role and form of money in a digital economy.

In parallel, the pandemic has further accentuated the trend of a decreasing use of cash and an increased demand for digital payments in all Member States

and globally. These developments have therefore triggered a debate on how a digital currency issued by a central bank – such as a digital euro issued by the European Central Bank – could help people have ready access to a simple, safe and trusted means of payment in a digital economy. The European Central Bank and the national banks of the Eurozone are currently investigating a digital euro project.

A digital euro could have several benefits. It has the potential to maintain the supply of public money in digital form in the face of the declining use of cash, to enhance pan-European retail payments, to support the digitalisation of the European economy, to protect Europe's open strategic autonomy and to increase the international role of the euro. However, the extent to which a digital euro would achieve these objectives also depends on its design.

The development of a digital euro takes place against the backdrop of implementing already agreed policy initiatives set out in the Commission's Retail Payments Strategy<sup>[1]</sup> and Digital finance strategy, both adopted in 2020.<sup>[2]</sup> The actions set out in those strategies will further improve the efficiency and competitiveness of European payment and digital financial services. They would notably promote the development of safe, efficient and secure payments, support innovation and the roll-out of instant payments across the EU, and as such, would reduce Europe's reliance on foreign players.

---

**A digital euro could support digitalisation of EU economy to further enhance pan-EU retail payments.**

---

A digital euro would further spur innovation in the financial system and beyond in a digitalised economy. A digital euro could possibly over time support automated machine-to-machine payments, smart contracts, streaming and micro-payments that support innovative technologies. Furthermore, it could be explored to combine a digital euro with the future European digital identity. This would lay the foundation for the European digital economy and new and innovative digital financial services.

In retail payments, a digital euro could reduce the fragmentation of the EU payments market, while

being designed in a way that avoids crowding-out private sector investments and solutions. The design of the digital euro should therefore ensure complementarity and a high level of synergy between private and public initiatives.

A digital euro could also support the euro area's monetary sovereignty and the EU's open strategic autonomy by providing a European public digital money alternative to private digital assets such as stablecoins or foreign central bank digital currencies.

Furthermore, to protect users, the digital euro would need to ensure privacy and comply with the existing *acquis* for example in terms of data protection and anti-money laundering (AML). Users should benefit from a high protection of their personal data. At the same time digital public money must not become a safe haven for money laundering and terrorism financing.

To safeguard financial stability and competition in the financial sector, the design of the digital euro should also address concerns related to disintermediation, i.e. large shifts of deposits to digital euro.

The digital euro could potentially also support financial inclusion in offering access to digital payments to the broadest public possible, including groups for whom commercial and legal limitations prevent the access to some of the existing digital means of payment.

A digital euro cannot be created in a day. It needs to be well-designed and stand on solid legal ground. The Commission is cooperating closely with the European Central Bank in analysing the related legislative implications.

[1] [https://ec.europa.eu/info/business-economy-euro/banking-and-finance/consumer-finance-and-payments/payment-services/payment-services\\_en](https://ec.europa.eu/info/business-economy-euro/banking-and-finance/consumer-finance-and-payments/payment-services/payment-services_en)

[2] See text and factsheet.



## ANNA BREMAN

Deputy Governor -  
Sveriges Riksbank

### Sweden: the role of a CBDC in a near cashless economy

Sweden is becoming a cashless economy. A majority of Swedes use cash a few times per year or not at all. Instead, cards dominate and innovative mobile payment services are growing, with some 80 per cent of the adult population subscribing to the most popular one. Demography fuels this development, as younger generations rarely use cash. Even banks are becoming cashless, in the meaning of not handling cash at their branches. Covid-19 and e-commerce have accelerated these developments further.

The transformation to a cashless economy is not without friction and some groups in society suffer from it. Without strengthened legal support for the acceptance of cash and related withdrawal and deposit services, access to central bank money will, in practice, be restricted to banks (reserves). As a result, the general public would only have access to private bank money. This implies a limited convertibility of privately issued krona into krona issued by the Riksbank. Limited convertibility may threaten the unified monetary system where all types of Swedish krona have the same value.

Another aspect of the emerging cashless economy is that the new

digital payments landscape is highly concentrated and fragile. The backbone consists of a limited number of centralised IT systems managed by a few agents such as the central bank, clearing organisations, commercial banks, FinTechs, IT service providers, etc. These systems are often interconnected. As a consequence, there are single points of failure where technical problems or cyber attacks can lead to severe disruptions.

The Riksbank has been exploring a central bank digital currency, the e-krona, since 2016. Currently, a proof of concept is being developed to assess and test the functionality of a possible e-krona. With an e-krona, the general public would have access to a new form of central bank money even in a cashless scenario. However, it is important to emphasize that an e-krona is not a substitute for cash, rather a complement.

#### Not a silver bullet

The e-krona should meet three main objectives: it should give the general public access to central bank money; it should strengthen the robustness and continuity of the payments market; and it should promote competition and innovation. This would involve the public and private sectors in a balance, in order to deliver the desired policy outcome. The Riksbank's current thinking on the e-krona is a two-tier model where the Riksbank should be responsible for the core infrastructure and the rulebook. Banks and FinTechs could act as intermediaries and distribute e-krona to their customers and build and provide e-krona payment services.

---

**An e-krona should be  
viewed as one tool  
among others that  
are complementing  
one another.**

---

An e-krona should be viewed as one tool among others that are complementing one another. While investigating the e-krona, the Riksbank is also arguing for a strengthened legal support for physical cash for two main reasons. First, an e-krona, being digital, may have limited potential to help those who today have limited access to digital technology, or have a limited ability to use it. Second, the robustness of the retail payment market needs to be strengthened in the digital era. Cash

is therefore a necessity in times of disruption and/or crisis. The e-krona team is also attempting to build functionality for offline payments. This would only work for a limited amount of time but could enable consumers to buy basic goods such as food and medicines in times of crisis.

In addition to the e-krona, the Riksbank is also developing new settlement services for both instant payments and for large-value payments. The Riksbank has also joined forces with other central banks and with international organisations to address the shortcomings in the market for international payments, e.g. the G20+ based Committee on Payments and Market Infrastructure (CPMI) that is investigating building blocks for more efficient international payments. As a possible tool among others, an e-krona must co-exist with privately issued money and not undermine the central bank's ability to conduct monetary policy and promote financial stability.



## MARION ROUSO

General Manager of Retail Banking, Deputy Managing Director of the Consumer and Digital Branch - Le Groupe La Poste & Member of the Management Board - La Banque Postale

### Is a digital euro really a must-have and if yes, which “persona” should it have?

There is nowadays a conundrum related to CBDC for most central banks around the world.

We are facing a fad similar to the dot.com era in the early 2000s, so that no central bank today can escape having a CBDC project ongoing. More seriously, the threat on monetary sovereignty and structural evolution of usages stemming from decentralized finance, BigTech’s experiments like Diem/Libra and the rise of the mighty e-Yuan need truly to be accounted for. Unfortunately, it is unlikely that the digital euro may solve all the issues that are wishfully assigned to it from finding an alternative to the decline of cash, tackling monetary sovereignty concerns, and supporting the digitalization of the economy along with cross-border money transfers and financial inclusion.

Due to multiple constrains, the digital euro cannot be a one-size fits all solution. Hence, the question for Europe is which digital euro “personae” are we looking for?

A CBDC for the euro zone could have, at least, three different personae:

1. Digital euro persona #1 is a true retail replacement to cash and allows citizens to continue using cash-like payments in a digital way.
2. Digital euro persona #2 is the currency of choice for cross-border payments and to potentially extend the influence of €uro beyond geographical Europe.
3. Digital euro persona #3 is innovative, programmable and allows to pay in specific situations that were not possible before.

Still, when looking at the features of a digital euro, these three personae are not compatible with one another in terms of privacy, time-to-market, reuse of existing payment infrastructures, geographical reachability, scope, ambition, KYC procedures, impact on financial stability, contribution to innovation and financial inclusion, technical architecture and, last but not least, ECB’s influence and relevance.

### The digital euro cannot be a one-size fits all solution.

Persona #1, the true digital retail euro, would require anonymity and could become, thanks to the banks’ KYC, a quasi-cash equivalent in the euro area as early as 2024. However, its impact on banks’ deposits and ultimately on financial stability would be significant, weakening further European banks versus their worldwide competitors, thus adding complexity in a low interest rate and Basel-regulated environment... for very little added value compared to existing payments means and services.

Persona #2 would need some kind of traceability features and could not leverage much of existing payment infrastructures. It could probably not be launched before the late 2020s and while it may strengthen the overall global influence of the euro and the ECB, it would require somewhat of a global interbanking network both for KYC and distribution of this cross-border digital euro.

Last but not the least, while innovative persona #3 would have to build on a

new type of DLT architecture (such as blockchain) and infrastructure and its impact on financial stability would remain marginal, its “niche” positioning would certainly fall short of any grand ambitions for the European CBDC.

While we need to remain concerned about the loss of sovereignty and/or influence of the Euro, we must not let the fear of a potential risk hasten the threat to our already challenged European banking system. Even if they are not yet fully unified, payments in Europe are truly affordable, reachable, efficient and secure. If the ECB were to launch a digital euro tomorrow, a prominent question would be to which extent would it make the life of European citizens easier. There is also a risk that it would not simply affect the P&L of banks but also the coverage of their cost of capital, which today may prove difficult to meet (mainly due to negative interest rates).

Commercial banks are already fully involved in making sure that the euro zone is a seamless and user-friendly payment area. They will undoubtedly continue to both cooperate and distribute a potential future CBDC if the relevant economic and operating conditions are met and if their existing payment assets and infrastructures are not jeopardized overnight.

Obviously, their involvement would be most useful for the KYC, distribution and monitoring of a future true digital retail euro (persona #1) to their clients both during the launch and the run phases. Still, the ECB would need to propose strong mitigation measures to counterbalance the loss of deposits and the resulting shrinking of credit offering.

Lastly, as far as competition is concerned, commercial banks need that level playing field be applied across the whole spectrum. Innovation should not become a synonym for recklessness and institutions distributing digital euros should all be treated at arms’ length, be it “bankable” systemic banks, fancy unicorns or fintechs.



## KRISTINE BRADEN

Europe Cluster Head & Chief  
Executive Officer -  
Citigroup Global Markets  
Europe AG

### CBDCs, bank coins, stablecoins – is fragmentation at the end of the journey?

With the growth of digital assets and, more recently, stablecoins, Blockchain is building its proposition to offer a 24/7 global settlement infrastructure. With its ability to store and transact on the same infrastructure any digital assets such as tokenised money, securities, art in the form of non-fungible tokens (NFTs) etc., blockchain provides the financial services industry the opportunity to breakdown legacy operational friction currently existing between the various financial instruments and their settlement systems.

Looking only at the payments landscape, more than 80 central banks are now exploring blockchain technology and its promises for issuing a central bank digital currency and some, like Nigeria, are already live. Banks are working on tokenised commercial bank money to facilitate internal processes but also to offer better service to their corporate and retail customers. The total market capitalization of stablecoins, despite the

uncertainty in regulatory frameworks, is now USD 150 billion and growing, with some social media platforms and credit card companies gearing up to be the next issuers.

There is an emerging risk, however, that the enthusiasm leads to fragmentation and ironically undercuts the benefits blockchain offers. The explosion of independent and bespoke tokenised money offerings coupled with competing and often domestically driven regulatory approaches, is giving rise to the risk of liquidity, regulatory and infrastructure fragmentation.

To counter this potential risk, some initiatives have emerged to promote interoperability and harmonisation. The Bank of International Settlement Innovation Hubs are, for example, bringing central banks together to experiment on multi-CBDC constructs such as m-Bridge, involving the central banks of China, Hong Kong, Thailand and United Arab Emirates, or Dunbar with the central banks of Singapore, Malaysia, Australia and South Africa. Regulator forums such as the Financial Stability Board (FSB) or the Financial Action Task Force (FATF) have been working on harmonized regulatory recommendations. The International Standardization Organization (ISO) community is also establishing standards around blockchain and digital assets. These global efforts should be continued and supported.

---

**The RLN is an invitation  
to embrace the future of  
money in an orderly way.**

---

We must ask ourselves, however, will these efforts be enough? Unregulated or more lightly regulated alternative financial ecosystems such as Decentralized Finance (DeFi) networks are booming, now representing a staggering USD 250 billion dollars of total value. These alternatives are introducing interesting new financing and asset exchange models that all banks should explore. But they are today largely fueled by unregulated stablecoins running on multiple bespoke ecosystems. Considering the speed at which the DeFi industry is growing, regulated liabilities such as central bank money and commercial bank money are at risk of being challenged by private alternatives run by non-regulated entities.

Now is the time for the regulated community to work together in

leveraging the promise of blockchain and tokenisation through the building of a Regulated Liability Network (RLN). A RLN is a global blockchain or set of interoperable blockchains where central bank money, commercial bank money, e-money and regulated stablecoins can co-exist in a fungible way. Within the payments industry, there is recognition of the value the can and should be realized by building a global 24/7 settlement system that banks, payment providers and financial institutions operating within regulatory perimeters can leverage to issue and transact regulated assets. Establishing an RLN platform to enable domestic and cross-border flows, in compliance with each country's respective and hopefully harmonized rules would make digital money and other regulated liabilities fungible across issuers or exchangeable with one another instantly.

SWIFT demonstrated in the 1970s that commercial banks and later other financial institutions could work together toward a common non-competitive goal. The RLN initiative calls for similar collaboration, this time involving central banks and the whole regulated community. Dozens of banks, central banks, and major technology providers have already endorsed the RLN. The European banking community would be welcomed to join these efforts.

The RLN is an invitation to embrace the future of money but in an orderly way to avoid fragmentation and worse, an inability to seize the benefits this new technology offers the global financial system.



## ALEJANDRA KINDELÁN OTEZAZA

Head of Research,  
Public Policy and  
Institutional Relations -  
Grupo Santander

### CBDCs: finding the right way forward

Different central banks might have distinct reasons to issue a CBDC depending on the efficiency of their payment systems, economic and financial development in its jurisdiction or even their citizens preferences. Central banks might decide to issue CBDCs as a response to other central banks or bigtechs issuing digital currencies that could compete with its sovereign currency, challenging monetary sovereignty and financial stability.

Central banks should examine the case for creating a CBDC of their own. But as they do this, they must be crystal clear what the purpose of CBDC is; what tangible benefits it offers; and ensure that its design is appropriate to meet those goals and avoids any negative impact.

Focusing on Europe, I believe there is not an immediate need in terms of payments that would require the issuance of a retail CBDC. We have a well-functioning payments market; financial services – especially payments – are being transformed by innovation. It is on cross-border retail payments

where there is the greatest room for improvement, but the issuance of isolated domestic CBDCs does not seem to be the optimal way for improving its efficiency.

Neither is financial inclusion a problem. According to World Bank data, more than 95% of the Eurozone's adult population have a bank account. Many in Europe argue, however, that a digital euro is needed to ensure the sovereignty of the euro, as cash is going out of use and the euro can lose its monetary anchor role. However, cash remains the main payment method in the Eurozone (73% of payments were made by cash in 2019 and despite some decrease due to covid, it remains being the main method). Before embarking on creating a single currency, it should be ensured that there are no other means to safeguard the sovereignty of the euro.

Regarding competition with private stablecoins, there are many regulatory initiatives on the way that should prevent those that become systemically important from enjoying a better regulatory treatment, in detriment of competition. With respect to other CBDCs, as the BIS has highlighted, multilateral collaboration to agree on design principles will be key to avoid an “hegemony competition.” Wide political commitment is also needed to make them credible.

---

#### CBDCs must have a clear purpose, offer tangible benefits and avoid any negative impacts.

---

If it is decided that a CBDC is required, the ECB should work closely with the financial sector and others to carefully consider the profound implications a retail CBDC would have on the financial system. This is especially important for the Eurozone, due to the importance of the banking sector. Banking assets represent 220% of GDP in the Eurozone, compared to 95% in the US.

Fabio Panetta is right to say that the digital euro must be successful enough to be adopted by users as a means of payments but not so successful to crowd out private solutions if it becomes a widely used store of value. Yet this is a very difficult balance to strike. To reach this, I see four issues that should be considered and that will condition the design of the digital euro:

- The digital euro should not become a new form of investment or store

of value. CBDCs could be easily understood as a safer store of value than the money held in commercial banks, particularly in times of uncertainty or crisis. Could CBDCs end up becoming an alternative to bank deposits? Imposing limits on the amount that each citizen could hold, negative remuneration rates and central banks providing alternative sources of funding, could mitigate the potential impact to banking intermediation. However, there is a clear risk of increasing the funding costs of banks and, therefore, increase the cost and reduce the amount of available banking credit.

- According to the ECB's consultation, privacy is the most important feature of a digital euro for both the public and professionals. However, as the ECB correctly points it should not be confused with anonymity. It is key that any CBDC design protects the system with anti-money laundering controls, even if it limits its comparison with cash.
- Access to payments data is essential to analyse risks better and provide credit to customers more accurately and at better price. Intermediaries should be allowed to use data in a responsible way and in accordance with customers' consent.
- The digital euro should be competitive compared to other CBDCs or private stablecoins, but this could present trade-offs between being competitive and minimize financial stability risks. Within the design features of CBDCs I see programmability as one of the most promising opportunities to innovate.

I believe that the opportunity for CBDCs in wholesale markets is much more significant than for retail markets for example in terms of liquidity management. That is one of the reasons why Santander is one of the founders of and shareholder in the Fnality International consortium.