INTRODUCTION*

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This issue of the *Revue d'économie financière* is devoted to digital currencies, a concept that first needs to be presented.

Digital currencies are distinct from existing forms of money, some of which (fiat money, i.e. banknotes and coins) have a physical representation, while others (deposits) are already digitized. They are also distinct from unsecured cryptoassets, the prototype of which is provided by Bitcoin. It was launched in early 2009 and has the following main features, which are often shared by other cryptoassets:

- The combination of a public key and a private key, which defines the asset in the absence of an issuer and allows the user to use a pseudonym. The absence of an issuer is certainly the feature that most differentiates Bitcoin from digital currencies. In particular, it means that the asset is unsecured;
- An exchange mechanism using Distributed Ledger Technology (DLT) for the decentralized validation of transactions. Most setups do this through "blocks" linked to each other, hence the name "*blockchain*". Furthermore, the term "decentralized" should be understood as "carried out by the users, or at least by some of them without opposition from the others and without the intervention of a trusted third party such as a bank". However, in the case of some cryptoassets, such as Ripple or those issued through ICOs[i] (*initial coin offerings*), the validation of transactions is not decentralized;
- The use of cryptography. This is systematic for cryptoassets, hence their name, but it is also increasingly found in the use of legal tender, in order to continue making transactions more secure;
- An issuance which is *a priori* limited to 21 million units, a number that should be reached by 2140, with just over 19 million in circulation by the end of 2022.

These characteristics were supposed to allow Bitcoin to serve as a currency and even to supplant the legal currencies (the euro, the US dollar, etc.). In particular, Bitcoin's programmed scarcity was supposed to protect it from the decline in purchasing power characteristic of those currencies over the long term. In reality, Bitcoin has failed to establish itself as a currency, even when legal force has come to its rescue, as in El Salvador, where it has been granted legal tender status, compelling merchants to accept it, but where its use in transactions has remained minimal. The reason for this failure lies in the very high volatility of Bitcoin's value: the lack of security for Bitcoin makes it impossible to give it an objective value, and the rigidity of its supply makes its price depend solely on changes in demand, guided by speculative motives. Since fall 2021, the increase in central bank interest rates, and with it the higher yield for safe assets such as government bonds, has been accompanied by a collapse in Bitcoin's value, which

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* Only articles marked with an asterisk are available in English.

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has dragged down the prices of other cryptoassets (at the end of 2022, Bitcoin still accounted for 40% of the total market capitalization of cryptoassets).
However, there is a category of assets that, while using the same technologies as Bitcoin (blockchain and cryptography), is clearly different in that they aim to maintain a stable price (usually parity) against a reference (usually a legal tender, almost always the US dollar). These are called stablecoins.
Aurore Lalucq provides a diagnosis of the functioning of cryptoasset markets, including stablecoins. She points out that, while cryptoassets have often been presented as innovative solutions to address the failures of the banking and financial systems, they have ultimately failed to deliver on this promise. For example, they do not behave as a currency, due to their volatility, nor do they represent a new asset class decoupled from other financial markets as they have collapsed with the rise in interest rates. Moreover, the cryptoasset sector has been marked in recent years by multiple scams and bankruptcies. The article thus looks at the French and European regulatory framework governing cryptoassets and denounces certain provisions of the PACTE law, which abusively claims to protect investors but only requires registration of digital asset service providers. While MiCA, the forthcoming European regulation, introduces some useful provisions, according to the author it remains very insufficient. The article concludes by calling for regulation that would truly protect European consumers and the public interest.
In addition, many central banks are exploring the possibility of issuing, or in rare cases have already started issuing, central bank digital currencies (CBDCs). As *Nicolas de Sèze** explains in this issue, "CBDC is a liability of the central bank, made available to economic agents in digital form and fully fungible with the other components of central bank money (banknotes and reserves, the latter being the banks' deposits with the central bank). Issued by the central bank, CBDC is free of credit risk and can be exchanged without limit for banknotes and reserves". CBDC can take two forms: wholesale CBDC, intended for exchanges between authorized banking and financial actors and circulating in a DLT environment, and retail (or "general purpose") CBDC, which is the primary focus of these articles and which is intended for the general public. Retail CBDC does not necessarily use DLT and therefore can present itself to those holding it as simple central bank electronic money.
In this issue of the *Revue d'économie financière*, CBDC and stablecoins are estimated to be the two forms of digital currencies whose use could develop over the next few years provided that—in the case of CBDCs—central banks decide to issue them and—in the case of stablecoins—a regulatory framework is put in place and a perfectly secure settlement asset is available, with a wholesale CBDC. The first section of this issue presents the current situation, the second part points out the perspectives opened up by digital currencies and the questions they raise, and the third part discusses the macroeconomic and societal stakes they raise.

CURRENT SITUATION

Faustine Fleuret gives an overview of the French and European crypto industry as new developers of digital currencies. She reminds us that for more than a decade, blockchain technologies and cryptoassets have been at the heart of a general paradigm shift. While these new technologies are now impacting almost every part of our economy, she notes that the financial world has historically been the first to be affected. In the wake of Bitcoin, numerous applications have been developed to overcome the limitations of the traditional banking,

monetary, and financial system and to provide new services. She concludes that in the future, new and traditional finance will not develop in isolated and parallel ways, but will rather feed off each other. They must be able to contribute together to the democratization of an inclusive and transparent financial system.

Vivien Lévy-Garboua and *Gérard Maarek* present the characteristics of algorithmic stablecoins, i.e. those that are not entirely backed by reserves, distinguishing between those like Terra-Luna, whose reference asset has an endogenous value, and those for which the price of this asset is exogenous and independent of the protocol in place. They show that the Terra Luna scheme resembles a Ponzi scheme, due to the fact that the promise of a return on investment is impossible to keep. However, if this "false promise" is corrected, an algorithmic stablecoin can provide its holders with greater stability than Bitcoin, for example, making it more attractive. In spite of that, it remains a risky asset, whose stability cannot be guaranteed over the long term, even in the absence of speculative attacks.

In a complementary approach, *Louis Bertucci*, *Sébastien Choukroun*, and *Julien Prat* propose an economic analysis of stablecoins that highlights their ties to traditional finance. Even if there are stablecoins whose stability is guaranteed by a trusted third party (*off-chain*), their paper focuses mainly on stablecoins managed directly by an incentive system on a decentralized blockchain (*on-chain*). They highlight the governance and liquidation issues of decentralized stablecoins, which are at the heart of the system for maintaining their value. Finally, they discuss the risks associated with these stablecoins, including mechanisms that lead to a loss of stability. Their assessment is that after the emergence of many stablecoins over the last few years, with some resounding failures but also some successes, we are now entering a phase of consolidation. It is likely that for each legal currency, an oligopoly of stablecoins will emerge, with a few leaders holding a large majority of the outstanding investments, possibly competing with CBDCs.

In this connection, *Nicolas de Sèze* provides a historical and geographical perspective of central bank studies on CBDC. The historical perspective shows that some central banks initially focused on retail CBDC while others focused on wholesale CBDC, with Facebook's announcement of its Libra project helping to shift the balance in favor of retail CBDC. In the recent period, however, there has been a renewed focus of studies on wholesale CBDC. A geographical overview shows that today 90% of central banks report they are studying CBDC. A survey of this work illustrates the diversity of motivations, contexts, and approaches. For example, central banks in developing economies give more weight to the motivations of financial inclusion and the implementation of monetary policy. Nevertheless, there is some convergence on financial stability concerns, security, robustness, and efficiency of domestic and cross-border payments, as well as in the conception of CBDCs (collaboration with the private sector in the distribution of CBDCs; setting of individual use and possession limits; and protection of personal data).

Nicolas Kozakiewicz reviews the technologies underlying cryptoassets and more specifically stablecoins and CBDCs. He emphasizes that we are witnessing a real revolution in the field of payments with the rise of these technologies that are changing our approach toward exchanges between economic players. The growing use of DLT has opened the way to many new applications in the field of financial services. *Nicolas Kozakiewicz* reviews the main technological approaches to DLT and discusses their individual options and merits. For each of them, he illustrates the new ways to use them that have become possible, based on comparisons with the means of payment that currently consist of cash, checks, and cards. The characteristics presented are programmability, i.e. the way in which transactions can be automated, stability,

i.e. the guarantee of the storage value of these new assets, interoperability, i.e. the way in which they can be exchanged with each other, and the general use of this new infrastructure. The author shows the new possibilities opened up by these technologies, access to which is now made very simple by standardized interfaces, which are open to both banking players and Fintechs.

PERSPECTIVES AND QUESTIONS

The creation of a CBDC should also be considered from a legal point of view. From a European perspective, *Hubert de Vauplane* asks the question: "Is a digital euro legal?" In order to answer this question, the author examines the conditions for the legality, under European law, of the European Central Bank issuing a digital euro. He recalls and examines the various texts that could potentially be used and discusses the legal nature of a digital euro and the notion of legal tender with regard to the same texts. He concludes that it would be preferable to at least amend the ECB's statutes and ideally to amend Article 128 of the Treaty on the Functioning of the European Union, in order to avoid the judicial risk of the legality of the ECB's power being challenged.

Also framing their approach within a European perspective, *Nathalie Aufauvre* and *Pierre-Alexandre Aranega* examine two other very important aspects in the conception of a CBDC: how to organize the public-private partnership and the complementarity with cash. Indeed, the introduction of a CBDC, whether retail or wholesale, raises the question of the disruption that this new form of central bank money could bring to the payment ecosystem. Using the example of the Eurosystem's retail digital euro project, the authors show that the traditional model of money and its two-tier architecture, with central bank money (cash and commercial bank deposits at the central bank) and commercial bank money, would be preserved with the retail digital euro. With the appropriate distribution of roles and arrangements for its implementation, this new form of central bank money will be complementary to other forms of money. The introduction of a wholesale CBDC is intended to continue to provide the most secure settlement asset in tokenized finance.

Isabelle Martz presents the view as seen from banks, both as economic agents in the foreground to witness the changes underway in connection with their customers, and also as potential actors of certain transformations. To this end, she outlines the emerging contours of a new economy known as the "tokenized economy", where certain assets will be represented digitally and recorded on blockchains. Secondly, she shows what the universe of possibilities in this new economy may be in the field of financial markets and payments, both wholesale and retail, and the major uncertainties that remain, particularly in terms of technology, regulation, and competition. The conclusion of this review is that, in the new world of blockchain-based finance, banks will be legitimate and useful as regulated and trusted third parties, capable of helping their customers understand the issues, simplifying and securing access to this new economy, bridging the gap between the traditional and the new digital world, and enabling the interoperability of the new infrastructure elements both with each other and with those yet to be created.

Olena Havrylchyck considers how to regulate stablecoins and looks in particular at the nature of the assets backing the main stablecoins, such as Tether (USDT), Circle (USDC), and Binance (BUSD). After comparing the respective natures of commercial money, money market funds, e-money and stablecoins, her article analyzes the allocation of reserves that support these

stablecoins. It shows that the asset allocation of USDC and BUSD relies heavily on sovereign bonds, which are stable and liquid in nature, whereas the reserve asset mix of USDT, which includes money market fund shares, is riskier in nature. The Markets in Cryptoassets (MiCA) Regulation extends the scope of the Electronic Money Directive to stablecoins. However, none of the issuers of the main existing stablecoins would currently meet the criteria it sets out, as they do not permit individual redemptions, do not meet and are unlikely to meet the 2% capital ratio, and do not hold 30% of their funds in a segregated account with a credit institution.

Xavier Lavayssière takes a closer look at the use of stablecoins in payments and how they can be regulated. Stablecoins open up important new opportunities for payments on a global scale, both because of the underlying technologies and because of the open nature of their infrastructure. While many public and private initiatives have been launched, stablecoin projects are still at a limited stage of development in terms of overall payment flows. Nevertheless, they have the potential to quickly be widely adopted by consumers and thus to become systemically important. Regulating them is therefore a major challenge in order to ensure economic and financial stability and to protect their users. The article proposes two levels of analysis for this purpose. The first level, which is often used, is the implementation of progressive regulatory frameworks, which evolve in function of how stablecoins are adopted and ensure that they do not impose constraints that could penalize their development. A second level consists of a regulatory approach dedicated to these new technologies, making it possible to better take account of their specificities, to preserve their advantages, and to achieve the goals of preserving the integrity of payments and protecting the interests of consumers. In general, the author believes that financial institutions, technology players, and public actors should work together on solutions that meet users' needs, facilitate interoperability, and control compliance costs.

MACROECONOMIC AND SOCIETAL ISSUES

*Ulrich Bindseil** examines the financial stability implications of digital currencies. Recalling that these implications have been widely discussed in the literature in recent years, the author summarizes this literature and draws his own conclusions regarding the nature, extent, and mitigation options of these risks to financial stability. In particular, it is found that CBDC may initially be seen as the most important risk factor (at least in the context of a financial crisis, since stablecoins can themselves suffer from a crisis). However, central banks usually plan to mitigate this risk by adopting disincentives or limiting individual holdings. Furthermore, stablecoins should be subject to capital and liquidity regulation similar to that of e-money institutions, which should be strengthened when their issuance becomes systemic. The author also believes that granting stablecoins access to central bank accounts to deposit their reserves would not be a good solution, as it would blur the distinction between central bank money and private money.

*Christian Pfister** examines the implications for monetary policy of the issuance of digital currencies, which are broadly similar, whether they are CBDCs or stablecoins. These consequences are likely to especially affect the transmission mechanism, with risks of disintermediation in all economies and increased asymmetries and dollarization in emerging and developing economies. In addition, the interest rate channel could be strengthened by remunerating CBDC at a rate pegged to the policy rate. With regard to monetary policy goals,

inflation, economic growth, and the money supply could temporarily increase. More importantly, the exchange rate could become more volatile, hampering the pursuit of a monetary policy goal. In normal times, the implementation of monetary policy would be little affected overall, unless there were to be a shift to real-time monetary policy.
Looking at the consequences of digital currencies for the international monetary system, *Mariana Rojas-Breu* and *Catherine Lubochinsky* see a geostrategic challenge. With regard to stablecoins, the authors believe that they should ultimately strengthen rather than weaken the dominant role of the dollar, as most stablecoins are currently pegged to it. Concerning CBDCs, the mechanisms of international dissemination and their implications for monetary sovereignty differ between wholesale and retail CBDCs. Wholesale CBDCs could thus be used for cross-border payments—whether for goods and services or financial assets—and significantly alter the balance with the use of currencies for such exchanges. This impact will depend both on how these CBDCs are conceived and on the respective importance of countries in such cross-border trade and payments. Retail CBDCs are less likely to have a direct impact, but could eventually have an indirect impact, notably through their effects on the banking sector and the relative performance of economies. Finally, these developments will depend on a number of factors that are still difficult to anticipate, in particular the potential importance of certain stablecoins on a global scale and the possible interoperability between CBDCs.

The confidentiality of payments is an issue of major economic and societal importance. *Rosa Giovanna Barresi** examines it from a historical perspective, from the 18th century to the digital euro. At the beginning of the period under review, the issue was simply looked at from the penal point of view. Later attempts to integrate it into corporate security or to provide cryptographic solutions proved inadequate. When retail banking discovered how to extract revenue from operational data, payment privacy was eventually defined as providing basic protection for consumers and investor data. The privacy issues raised by the digital euro project are examined from this perspective, as well as from a microeconomic point of view. One conclusion is that payment privacy is an evolving concept, requiring continuous investment and justifying the inclusion of an introduction to the subject in financial education programs.

An ICO is a mechanism for financing a project through the issuance of tokens that are subscribed by contributing cryptoassets.