Guest article

Towards a Fiduciary Digital Currency

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Abstract: *Shortly after the first financial crisis of globalization (2008-2009), a number of changes started to dominate the financial and banking world. Households and companies were confronted with a series of new rules and procedures aimed at protecting both the banks and the public. In most cases they led to an increase of the lending cost, and new requirements for money laundering avoidance and prevention of terrorist financing made access to money onerous and hungry for paper. Technology and AI brought an alternative to the market, which proved to be faster, cheaper and with less hurdles. They are all private initiatives, spun up by startups and the wisdom of putting IT knowledge to the service of young entrepreneurs. The crypto assets, blockchain, fintech, digital payments and digital currencies are all part of the new developments. The emergence of technology as the new layout for banking led major financial powers and the international financial institutions to look closer at the challenges they face, and decide that the launch of an official digital currency should not be postponed for too long. Currently, more than 70 central banks of the world are engaged in the process of preparing for the near future, among which ECB is a front runner.*

Keywords: *blockchain, fintech, digital currency, crypto-assets, central banks, artificial intelligence, banking, finance, open banking, startup.*

1. The need for boldness

In the first quarter of the 21st century, the financial world goes through what appears to be one of the boldest changes in history. The process can be somewhat likened to the industrial restructuring of the late last century: we are also contemporaries with a banking restructuring against which the magnitude of the resistance is given not only by the shareholders' concern for profit, but also by the supervisory authorities' perception regarding the alleged attack on the pillars of financial stability. Now we are not only witnessing a change in practices or the introduction of new securities, investment or saving instruments, which developed and became sophisticated over time, but a real change of assessing risk, the level of tolerance, for the control of operations and rules. The confrontation of banks with new technologies, under conditions of resistance to shocks, includes the exploitation of information extracted from the data collected by the bank, the need to control the algorithms that make use of data, as well as the need to accommodate the banker profession, putting more emphasis on the targeted skills. If we tried to set in time the moment when the world has changed course, abandoning the old and embracing the new, that would be the coronavirus pandemic, which, through teleworking, has favored not only the emergence of new actors, new professions, but also of new habits for making payments or saving.

Fintech, for example, cannot be considered a mere financial innovation, because

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it sheds new light on the social role of the financial intermediation profession, just as the blockchain-backed "flash trading" puts the algorithms of mathematics back in the preferred order of freedom of choice of people who suffered, after the tragedy of Hiroshima and Nagasaki, from the most perverse forms of surveillance and control of freedom. "Big data is the new oil"[2] is the expression that translates as synthetically as possible the effect that digitalization brings to the economy and society. But fintech is more than just digitalization, because it connects – on an intermediation platform – providers of service with consumers, under conditions of quasi-instantaneousness, bearing costs close to derisory, compared to those of banks. A similarity of the transformation with which Fintech is pressing on universal banks may be the change occurred to cab market through the advent of Uber services (faster, simpler, cleaner, no back-office).

Banks are the mirror of the society: they comply with its requirements and reflect its dysfunctions (for example, failure to combat terrorism or control migration). That is why many of the investments made by banks on their IT systems are costs, which will only be eliminated along with the increased use of the IoT (internet of things) at the level of society, which is quite reluctant in accepting new forms of freedom.

Far ahead of the industry, the banks have invested heavily in IT systems, because of safety reasons, KYC (know your customer) and compliance with the requirements to prevent money laundering and terrorist financing. The banks' data is, for the time being, to an insufficient extent used to conclude business faster and diminish costs. The banks' data repositories enable them to maintain, with the help of artificial intelligence and machine learning techniques, their position of market leader of financial intermediation, but only on condition that all market surveillance regulations keep the pace with the technology applied to banking. It is natural that algorithms employed by artificial intelligence to be free of subjectivity, as well as of any top to down intervention in decision making, especially since they will substantially cut the appetite for overvaluing of causality (a hobby of statisticians), which will be replaced by the strength of correlations, thus making things possible.

The emergence of bitcoin (the first de-materialized "currency") and other crypto-assets is just the tip of the iceberg that threatens the current perception of reference currencies, in which the public confidence gradually fades away as monetary policies standing behind them strive to excuse their own low performance by euphemisms of "non-conventional interference." Although there are many cases, it is sufficient to look at Germany, recognized for its rigor for consumer protection of financial services, as well as for the sustainability of institutions active in the financial market: the recognition of crypto-tokens as an effective form of financing start-ups and small and medium-sized enterprises has led the Financial Supervisory Authority (BaFin) to authorize banks to open custody operations, manage and transfer crypto assets on behalf of clients, and financial investment companies (with total funds estimated at $1,800 billion) were entitled to sell securities that include crypto assets up to 20 p.c. of the overall value.

The technological advance provided by companies with no connection to the state turns to be more credible than the authority of the latter. Like any novelty, since crypto-assets were the first to use DLT (distributed ledger technology) and blockchain, along the intermediation of payments and securities, an important volume of transactions defined by banking standards as money laundering or terrorist financing made their way through. This made necessary an international process to search for high-performance channels to control crypto-asset transactions. While the purpose of such regulation is common on both sides of the Atlantic, being linked both to the aforementioned concerns and to the wish to tax an increasing volume of financial operations, the periodic repression

[2] "The world's most valuable resource is no longer oil, but data", *The Economist*, May 6, 2017, https://www.economist.com/leaders/2017/05/06/the-worlds-most-valuable-resource-is-no-longer-oil-but-data (October 10, 2021).

of the intermediation of crypto-assets in China is primarily linked to the protection of the centralized payment system and control of transactions.

In a world where polymorphic competition set the speed of the winning bid - often curbed by the bureaucracy under the search for prudence - it has become necessary to find solutions faster than the "next day". Hence, the emergence of virtual representation of value has become both a promise for the finances of the future, but also the most destabilizing factor for today's perception of finance. Those in charge must be aware of the rift that will characterize the world very soon: China has set itself the goal of becoming the world's first Artificial Intelligence innovation hub by 2030. To get there, in addition to the developments already in place, China has an annual AI investment program of $20 billion by 2025 and $60 billion each year after that date. Already in the World's top 20 AI patent-generating universities, 17 are Chinese[3].

The financial and banking sector is an area where AI applications are present and expanding. Or, in the last decade, 80 p.c. of AI investment has been concentrated in two countries only (US and China), while Europe has accounted for 7 p.c. only[4]. The above quoted report, prepared for the European Commission, points out that in Europe, both companies and governments are very little aware of the importance of AI and blockchain, investing very little in those areas and only in the early stages of a project, while in the US and China the bulk of the financing addresses growth and expansion. It becomes an urgent need for the heads of public institutions themselves to go through permanent training stages that will bring them up to date with the need to exercise the decision-making function by understanding the dynamics of the market and its tendencies.

In the first 8 years after the financial crisis triggered in 2008, 42 directives were introduced at European level to strengthen the safeness of the banking system, including the requirement for banks to increase their own funds. The measures were justified and they gave the banking system greater confidence. But it's not just the rate of return on capital that has diminished, but also the cost of lending has increased, as well as the duration of approval of applications. The multiplication of these requirements has paved the way for FinTech and crowdfunding, where little by little resources accumulated for investing in smaller projects, or to place few (low-risk) savings which, associated with others of the same kind, developed a parallel market for saving and lending.

Parallel developments to banks' initiatives to ensure the continuity of the financing of the economy, requires consistency of the regulatory framework with the principles of the Single Market. For the time being, we take note of the concern of Europe to create common and universally valid rules, regardless of whether member states belong to the Euro area or not. It is a proven fact that just as cross-border bank financing has provided firms with the best access to finance, similar is the case in the area of fintech financing, so that national regulations must be accommodated to not disturb business, become consistent with pan-European rules, and non-contradictory to each other. Market will push for national norms in various jurisdictions to make more room for European approach, based on the rule of principles, more pragmatic, and which requires financial institutions to favour dynamic risk analysis in establishing precautions towards customers.

The development of techniques and means of financing is adjusting more than ever with the age of the customers: while still many of the managers of the financial and banking institutions belong to the generation of baby boomers, who are the end of the line of the vertical system of the institutional organization, the clients overwhelmingly belong to the generations Y and Z, which favour the full and instantaneous knowledge of

[3] Charles Thibout, researcher at the Joint European Disruptive Initiative, quoted by *Alternatives Économiques*, no. 416, October 2021.
[4] Innovation Finance Advisory - European Investment Bank: *Artificial intelligence, blockchain and the future of Europe. How disruptive technologies create opportunities for a green and digital economy*, June 2021.

the factors of influence of the decision in horizontal regime and which do not pay much attention to traditional information sources (TV, newspapers, magazines), but to instant and global communication of social media. Baby boomers are contemporary with the advent of the Internet, which at the age of their full maturity counted 1,000 computers in the network (1984), while millennials (Y) and generation Z are surrounded by an approximate number of up to 50 billion of various globally interconnected IT devices. Between these generations there is an area full of suspicions, on the one hand, and of boldness on the other. Today's entrepreneurs have heard about the danger of inflation, of the depreciation of the exchange rate, which they put on the policies of baby boomers, but which they do not want to continue. That is why, before rejecting crypto-assets as a means of refuge, hoarding or payment and investment, it is appropriate to note that their value is not eroded by inflation. The hold-back attitude against their acceptance in one market or another is given by the delay of the national authorities in updating the legislation for the control of money laundering and the financing of terrorist operations.

The transformation of the banking industry and the relationship between the bank and the customer will be expensive and will take longer than the consequences of the speed by which fintech and blockchain will grow. Unfortunately, despite the massive investments in cybersecurity, people are more often warned about the multiplication of forms of hacking to which banks and their customers are targeted, which make them have a relatively high dose of distrust in mobile banking and in the safety of deposits. This danger transcends the national space and cyber-attacks can hardly be assumed to target simple customers, when their effects are felt at the level of State's institutions or are aimed to create malfunctioning of the economy or the medical system. Overcoming this stalemate calls for international and inter-institutional collaboration, assumed with political responsibility.

2. The need for fintech

The change that the pandemic has accelerated is seen primarily in the dynamics of startups and the number of companies classified as Unicorn, with a market value of over $1 billion[5]. Since the beginning of 2021, the world has seen the appearance, on a daily average, of two companies in the Unicorn category (444 in total, of which 279 in the USA). For the first time since 2016, Europe has surpassed China in the total number of these companies (297 vs. 276), which proves that the concern for Deep Tech and FinTech in Europe is growing with the types of financial support for the creation of startups. At the moment the largest European Unicorn is BioNTech (the creator of the mRNA vaccine), a startup begun with the support of European funding of Euro 9.4 million which reached in the second half of 2021 a market value of $ 88 billion (four times more than at the beginning of the year).

The combined value of the companies active in the Deep Tech segment and whose start was financed from European funds exceeded Euro 700 billion at the end of 2020, the most attractive fields being biotechnology, robotics, digital therapeutics, neuro-biology, process automation, cybersecurity, automotive engineering[6].

An area with high attractiveness for those who decide to set up a startup is fintech, i.e. companies able of providing technology-based financial and payment solutions, algorithms and blockchain. No matter how conservative one may be, he cannot avoid the evidence that a new form of banking is growing with fintech. In the second half of 2020, at least seven of the top 10 fintech startups in Europe (excluding the UK) were classified as Unicorn, which emphasize both the digitalization of the single market for financial services, but also to the fundamental and irreversible change of banking infrastructure,

[5] Dealroom.co, August 19, 2021.
[6] European Startups, 2021 - The Year of Deep Tech, Dealroom.co, Sifted, FT, EC, EP.

as well as the fall of cross-border barriers. The most representative companies of this kind are in Germany, Sweden, the Netherlands, France, Switzerland and the United Kingdom. The simple observation of the fact that ZINSPILOT, a subsidiary of the German FinTech *Deposit Solutions*, has been nominated 4 years in a row the "Best Deposit Marketplace", an award granted by the market arbitrator – BankingCheck – for the quality and remuneration of deposits offered to customers of over 200 partner banks in more than 20 countries, must give thought both to the competition from the traditional banking sector, as well as to regulators and supervisors of financial markets everywhere[7].

Recently, the British Financial Market Supervisory Authority (FCA) approved that a startup named "Keebo" can start issuing credit cards operating in open banking. Starting in October 2021 Keebo puts into practice an innovative concept of building personal credit, based on attracting customers to subscribe for part of new securities issued, so that the responsibility for strengthening the financial position of the client grows, even under conditions of the lack of a credit history, which opens the opportunity to access financial resources including by expatriates or freelancers.

What makes fintech so attractive? First of all, it should be remembered that the initiators of such startups are, according to various international surveys, professionally mature people, most of them having a fruitful experience in banking, finance and IT, aged 35-40 years, with a solid university training and independence lovers. This generation polarizes the greatest trust for the generational colleagues, but also for the younger ones, who are at the beginning of their careers. These entrepreneurs have the ability to use information and communication technology to provide financial services more effectively and less expensively. In addition, and not insignificantly, the fintech startup is perceived by startups at the beginning of the road as a partner capable of offering them innovative solutions faster, easier and with greater openness to traditional financial service providers. FinTech has become a landmark of modern society.

In full expansion, fintech has the ability to respond promptly to the basic needs of the customers: payments, credit, saving, robotic counseling, asset management. The fundamental difference between the way fintech mediates these operations and the traditional face-to-face approach lies in the ability of the former to put computer technology to work, the result of which is quasi-immediate and the transactions are verified and approved by putting mathematical algorithms to work, instead of the subjectivity of the front office clerk and the hierarchical approvals. Fintech and blockchain, as a intermediation platform, have made possible smart contracts, preferred for the opening of loans and crowdfunding and high frequency trading, capable of generating orders to conclude contracts on the financial market without human intervention, but only on the basis of computer algorithms.

FinTech's contribution to the development of the financial market cannot be questioned or stopped. There is a high concern of public authorities on the risk that uncontrolled technology may rise to the stringency of customer knowledge, the prevention of money laundering or terrorist financing (currently identified as threats to the stability of companies). The wish of those who argue that societies must not be allowed to become run by robots can be fully understood and humans must retain control over technology. However, no one has the right to ignore the fact that Amazon has a larger annual research budget than NASA! The subject is delicate because the association of technology with democracy and the prevention of its seizure by authoritarians have not yet been solved in the sense of reaching a global balance. With all due respect for supervisors and regulators, we must accept the reality that they are lagging behind at least two decades from the impact that information technology is having on the financial market. Let's note that it was only recently that BIS (Bank for International Settlements) imposed as mandatory

[7] Ibid.

the IT qualification for its new staff. FinTech is not the adversary of financial stability and economic security. It is also not an opponent of traditional banking. On the contrary, all fintech operate in interaction with universal banks, have accounts opened with them and many have among their shareholders classic banks. There is nothing to prevent the commercial banks from converting some of their activities towards those that are now the performed by the FinTech.

The degree of bank's openness to fintech operations (which prioritizes speed) depends on their ability to accept RegTech (regulatory technology) and make it friendly to the market supervisory authority (in the sense that it does not contradict its instructions). It is proven that the classic forms imposed by regulators for meeting know-your-customer requirement, scoring (credit risk assessment), protection against money laundering and limitation of the risk of terrorist financing add a lot to the cost of credit, often up to deterrent levels for applicants of banking services. RegTech, which appeared in 2015 as an avatar of fintech, puts forward technological solutions to manage regulatory compliance issues by replacing manual, time-consuming reporting by automated database screening solutions, provided that national database on population record, tax, social security and criminal systems are digitized and interactive. The alternative is to resort to blockchain, where the data becomes non-falsifiable and open to audit, by registering all the authenticated information of the counterparties (documents in digital format, electronic signature, certifications, etc.).

Blockchain is a paradigm shift: if until recently the payment operating infrastructure was based solely on trust levels supervised by people – which in all cases leads to centralization – the blockchain operates on the basis of a multiple of data registers, shared between participants, which allow the automation of transaction registration processes in a secure manner, transparent and less expensive. One of the most important features of this system of financial intermediation is the lack of corruptibility and, consequently, of political manipulation. In order for the two essential functions of the blockchain – that of authentication register and decentralized automation of operations – to be legally protected, the legislation applicable to commercial contracts (including the Civil Code) must be brought into line with technological developments that are already making the trend of the market. The lost bet of the Internet, to place the man at the core of his technology with the hope of giving him more power and freedom, seems to get new chances through a smart use of blockchain[8].

From the risk point of view, fintech differ from "shadow banking" because they are not a currency issuer, being a technological channel for putting together the borrower with the lender, the investor with the recipient of the investment, namely P2P (peer to peer) and B2B (business to business), with a tendency to increased interest for B2B because the investment offer is broader. The risk of the operations does not belong to the intermediary and cannot be caused by him (FinTech), but belongs to the parties at the two ends of the transactions. B2B, which provides about 80% of the revenues of European startups[9] has become a true engine of economic growth, primarily for small and medium-sized companies, and, from a sectoral point of view, for those areas where cash flow is less predictable (IT software, hardware, technology for the green economy, bio-, nano- and medical technology) and, consequently, are less attractive to banks due to their traditional prudential practices.

3. The need for blockchain

For most of us, the unknown is a source of fear. Incomprehensible has long been synonymous with distrust. When technology outperforms the inherited baggage of

[8] Laurent Leloup, *Blockchain. La révolution de la confiance [Blockchain. The Revolution of Trust]*, Eyrolles, Paris, 2017.
[9] EU Startup Monitor, 2018.

knowledge, we either need continuous education or we give up hope and open freely to the risk of becoming easily manipulated.

This is also the case of blockchain (the chain of nodes through which the distributed ledger ensures a fast flow of payments or investments). Younger than bitcoin or other crypto-assets, blockchain is often believed to be their tool, and for most people it looks as a scarecrow.

Wrong. Here's a summary of blockchain definitions, as drafted by Laurent Leloup[10], founder of Finyear Group and co-founder of Blockness startups, France Blocktech and Blockchain Valley formation center.

- The simplistic definition of blockchain could be "a large ledger of accounts, open and accessible to all, for record and reading, divided on a large number of computers around the world."
- Another basic definition could be "a software that stores and transfers values or data over the internet, in a transparent and secure way, without any interference of a central control entity."
- In a literal expression, the blockchain "designates the chain of blocks (numerical nodes) in which information of a multiple nature is stored – transactions, contracts, ownership certificates, art works, etc."
- A more elaborate definition would be that blockchain is "the technology of a new generation of transaction applications which, due to the consensus mechanism coupled with the use of a large public ledger, decentralized and shared, provide trust, accountability and transparency, simplifying business"
- Technically, blockchain is "a new database technology that makes full use of the internet, free protocol, computing power, and cryptography. This database of distributed transactions is comparable to a large book where each new transaction is recorded, following others, without the possibility of modifying or deleting any of them. The register is active, chronological, divided (between blocks), verifiable and protected against forgery by a trust system based on consensus among the participating members (nodes). Each member of the network may access in real time a copy of the register of his transactions with any other participant in the system."

What else does the blockchain do? It allows the automation of transactions by suppressing intermediaries, provides trust and acts as a notary certification and authentication infrastructure. If that is the case, then the reluctant attitudes of many public authorities may also be explained by the fear of loss of significant parts of their duties.

What is created by the man remains vulnerable to his deeds of felony. The blockchain has not been avoided. Proof are the attacks of cybercrime, resulting in losses, such as the one in August 2021, worth about $ 600 million, of which only a part was recovered in the first instance. It is true that innovation of means of protection has reduced the volume of the stolen amounts by about seven times in two years. However, the risk maintains mistrust.

Nevertheless, blockchain is a great opportunity for banks. A report of Banco Santander[11] claims that, globally, since the start of a blockchain operation banks can save annually between $15-20 billion in infrastructure costs of across the border payments, reduced compliance expenses and counterparty risks, due to fact that each payment operation made via blockchain is preceded by a check of the debtor's availabilities, done

[10] Laurent Leloup, *Blockchain - La révolution de la confiance [Blockchain. The Revolution of Trust]*, Eyrolles, Paris, 2017.
[11] FinTech 2.0: rebooting financial services, June 2015.

in real time.

The development of blockchain applications for banking activity brings together today company names from the front line of the business: IBM, Cisco, Goldman Sachs (Lloyd Blankfein, Senior Chairman, called the bank he leads as a "technology enterprise" (2017) where 1/3 of the employees are engineers and IT specialists), Deutsche Börse, SWIFT, Intel, Fujitsu, Mitsubishi UFJ Financial, LSE, J.-P. Morgan, ANZ Bank, Accenture, Wells Fargo and the list continues.

The uneasiness about blockchain is due to its association with the bitcoin, the dynamics of the latter being stimulated by blockchain technology. In fact, blockchain opens the possibility to be employed in many areas: for developers of IT systems blockchain can be considered as the most spectacular innovation since the advent of Java (1995); for a blockchain company it is a powerful catalyst for the reorganization of commercial operations and external relations; for an entrepreneur blockchain makes it possible to conclude some business models and develop others without fear of restricting the number of customers. In other words, blockchain is not a unique product, as it offers an extremely wide range of applications. That's why many analysts refer to blockchain as the most spectacular invention of the first quarter of the 21st century.

Blockchain is the practical answer to the "dilemma of the Byzantine generals"[12] where several army corps, each commanded by a general, have as common goal the siege of an enemy fortress and, for the coordination of the attack, they communicate through messengers who are likely to convey to each general the same information; but some generals are traitors and wish attack to fail; hence, to act in concert requires the production of a proof of work between all generals that would make the consensus possible.

Blockchain technology is the first, and perhaps the only solution given to the problem of Byzantine generals, making it possible, for the first time in human history, to maintain a register of decisions that is open to the general public and sufficiently secure. If we note that the authors of the above mentioned study enjoyed the support of NASA, the American Ballistic Missile Systems Combat Command and the US Army Research Department, and if we remember that the year when the work was completed (1982, in the midst of the Cold War), we realize that the project did not start from any intention to use IT for speculative purposes and not even for civilian use. The world has changed, military research has become to a great extent a public goods, like the Internet, and the benefits of technology transfer from the military to the civilian sector have proven to boost economic growth and the well-being of the public.

Those who fear the 58 alphanumeric characters that hide the identity of the client and avoid the classic KYC requirements (know your customer), should not forget that money, in its present form, is passive, unethical instruments that can be used – as life proves – both for good and bad purposes. Or, blockchain ensures the traceability of operations in an open and continuously accessed environment, preventing any deletion or modification of the past. On the other hand, public trust will be substantially increased once crypto-assets that make use of artificial intelligence appear and possess a predefined set of ethical principles governing the spending[13].

The principle of avoiding intermediaries or suppressing the trusted third party is the core of blockchain technology. Usually, in order to make any payment between two parties, at least one bank enters the process, which is the intermediary that verifies the availability of the payer's funds and gets into the relationship with the beneficiary's account or with the bank with which this one has opened the account. Obviously, not

[12] Leslie Lamport, Robert Shostak, "Marshall Pease - The Byzantine Generals Problem", *ACM Transactions on Programming Language and Systems*, vol. 4, no. 3, July 1982.

[13] Matthew E. Gladden, "Cryptocurrency with a Conscience: Using Artificial Intelligence to Develop Money that Advances Human Ethical Values", *Ethics in Economic Life,* Vol. 18, No. 4, November 2015, Georgetown University, Washington, DC.

only the duration of the transaction is longer, but it also entails for the payer a cost of intermediation, and sometimes the beneficiary's bank also resorts to a similar practice, especially if the transaction requires a currency exchange. The blockchain eliminates the intermediation and makes it possible to trade without intermediaries, the system itself being the one that verifies the authenticity of the transaction and the existence of funds.

Blockchain is most often attached to financial and crypto-asset operations. But it is a mistake to limit it to these areas alone. The most unexpected areas make a good home with blockchain: authentication of works of art, real estate registry, authentication of diplomas and other documents, smart metering of electricity consumption, authentication of medicines and protection against counterfeiting, management of real estate assets, administration of medical files and information, electronic signature, internet of things, public procurement, a.o. Scrutinizing the above areas it becomes obvious that blockchain can be public or private, in the public one the access being open to any participant to validate its transactions and be part of the consensus, while a private blockchain is subject to access control, i.e. each of participant in a network block has a right of approval for newcomers. Thus, while in a public blockchain the trustiness is provided primarily by the algorithm of processes, in a private blockchain it depends on the status of the participants. A private blockchain can be assimilated to a new type of database, without the central administrator of the classic formula.

If the economic effects of blockchain technology are increasingly obvious, the legal consequences are still fragile. The way legislators have understood blockchain is still volatile: two are the issues that require answers – the governance of blockchain and the legal force of the operations carried out through this technology. The issue seems, for now, to many central authorities, something like a distant world. With all due respect to professions, however, few lawyers understand a mathematical algorithm. The break between exact mathematical sciences and the interpretation "à libre volonté" seems to be final without the support of artificial intelligence that should fill in the gaps of lawyers stuck in old books. Blockchain is a technology, entirely new, but just technology. The challenge is establishing the legal force of the link between "crypto" contracts with "fiat" contracts. Or, if initially it was considered that crypto operations are only the responsibility of the parties, the opening of crypto accounts by more and more financial institutions, makes it necessary for regulators and supervisors to show full capacity to ensure their safe operations and guarantee.

Blockchain technology is the logical evolution of the computer revolution begun in the '70s with the emergence of "mainframes", followed in the '80s by the advent of PC, the Internet a decade later and social networks (social media) at the beginning of this century. According to British magazine *The Economist*[14], a Lithuanian startup (WePower) offers industrial and household contracts to provide electricity at stable prices in Ethereum through blockchain. It is just one example of the capacity for creative destruction[15], when the new emerges alongside the old, to which it competes with until it is ruined.

The mistrust that spread among people during the events of 2008-2009, when governments were unprepared to fight the first global financial crisis, gave rise to cryptocurrency and blockchain technology. From this moment on, an intense libertarian wind spread over the world of finance and the banks were the first to seize the opportunity to approach the technology which, otherwise, threatened to destroy them through its decentralized character, a technology that belongs to the participants, restores trust and brings in transparency. To assume that the economy and the societies will quickly transform, as a consequence, is illusory, but the contribution of blockchain to their future development is unstoppable.

[14] "The promise of the blockchain technology", *The Economist*, September 1, 2018, https://www.economist.com/technology-quarterly/2018/08/30/the-promise-of-the-blockchain-technology (October 10, 2021).
[15] Joseph Schumpeter, *Capitalism, socialism and democracy*, Harper & Brothers, New York, 1942.

Blockchain becomes the machine to create trust by providing asymmetric cryptography, information sharing, and the ability to provide consensus through the P2P (peer to peer) operating model without the intervention of a third party. Being based on an "open source" model, blockchain is a democratic technology, guaranteeing openness to its operation.

If we search the values supporting blockchain, we probably could not omit at least five – value – how it is determined, currency – what it is for, work – what it means to produce, identity – how we define ourselves, and democracy – the model of governance.

The blockchain is not a revolution, but one of the tools of the revolution of a changing world, not only economically, but also of the societies and the values that we add to civilization.

4. The need for CBDC (*Central Bank Digital Currency*)

At mid-2021 at least 70 central banks displayed an interest over the issuance of fiat digital currencies, a preoccupation shared, also, by the multilateral institutions such as the International Monetary Fund, the European Central Bank, the Bank for International Settlements. Confronted with the development of alternative digital markets, payments and savings markets, central banks believe that monetary policy and financial stability can be severely distorted by the shift of public preference from traditional banking market institutions to operators that favor technology of high speed and low cost. There is an increasingly favorable attitude toward the adoption of digital currency issued by central banks, as a compliment to the traditional currency, as the mistrust of undisturbed operation of the digital mechanism persist, both at central banks and at the public, the latter being stormed with messages of account fraud, especially since the pandemic has greatly reduced the face-to-face meetings of customers with bank clerks. Even the GAFAM giants have not yet been able to ensure the full security of unauthorized access to their users' account data.

Are CBDCs emerging as a necessity arising from the evolution of the market and payment systems, are they a need or just a reaction to the (unfair) competition of crypto-assets, stable-coins and the effervescence of digital payments developed by banks? Do we fear what might happen if central banks could no longer exercise the control over inflation, the exchange rate and the insurance of deposits? Or do we simply think that in a crisis only money in their known form of cash is the escape?[16]

As much as we try to justify the need for CBDC by accommodating old fashioned institutions with modern technology, an unspoken fear stands behind the motivation that will make CBDC appear in the market. First, the fear of crypto-assets. As much as the exponents of the classicist current would like to minimize their influence, the crypto-asset market is growing and has already open to wholesale, in addition to retail customers. The argument of the number of bitcoin units is often called to express hope for a limitation of its impact on money supply, compared to currencies with international reserve status. But the effervescence of innovation of new crypto-assets shows no signs of slowing down. It is beyond doubt that people entrust their last hope to the public institutions that are, by Constitution, accountable to millions of voters, rather than preferring a private company. Or, by the credibility of its issuer and the guarantee provided by the legal framework, CBDC appears as a safe-haven currency, be it a digital Dollar, a digital Euro, a digital RMB, etc. The central bank's offer of a safe and fungible digital alternative to crypto assets, that does not lose its value by speculation, becomes an obligation.

The second fear is that of stable-coins (crypto assets 100 p.c. guaranteed with safe and liquid assets), and the greatest danger is represented by *Diem*, the renamed *Libra*

[16] Eugen Dijmărescu, Amalia Fugaru, Sorin-Nicolae Curcă, Monica-Iulia Oehler-Şincai, *Transformarea monedei fiduciare [The Transformation of Fiduciary Currency]*, CIDE, Bucureşti 2021.

of Facebook. The fear stems first from the huge number of potential users around the world, and on the other hand from the fact that the "issuance" by a private entity of a currency which might become a global alternative and rival to the USD, the Euro and several other currencies, whose initial value is guaranteed by safe assets, can raise serious stability problems to the international monetary system as soon as the rush for higher revenues for holders and issuers increases the pressure to invest in higher-risk assets. Facebook's "accidents" might not be just so accidental: since the number of its users rose from 500 million (2010) to 2.9 billion (2021), it may not be only the world of finance that feels the chill. Facebook's capitalization increased from $71 billion since May 2012 to $1.080 billion in September 2021. WWW does not retain any other social network to influence that much people's choices, including in the area of politics (Brexit, elections in the US, Germany, Myanmar, Australia, Ethiopia, the assault on the Capitol – January 2021). The Internet Research Agency (a company formed in 2014 in St. Petersburg) file stands as evidence for the use of Facebook in the manipulation of public opinion[17].

Along those concerns, the mutual fears of the US vs. Europe, as well as those of both vs. China are also strong, especially since ECB and China have increased their determination to issue their respective digital currency. The most advanced in the process is China, driven not only by the desire to increase financial inclusion for the largest population of the world and, soon, the world's first economy, but also by that of strengthening global power and influence.

The pros and cons debates about CBDC will continue, they will deepen, but the result will be the adoption of the fiat digital currency, with significant consequences for the financial system and the economy, for the role of central banks and governments in society. A comparison can be made with the impact of the Bretton Woods agreements on national economies and the international financial system. An IMF study[18] finds that the new (digital) currency can lead to transformations that affect the transmission of monetary policy, financial stability, intermediation by the financial sector, the exchange rate channel (CBDC facilitates currency management and can cause stronger and faster exchange rate movements for given market exchange rates), and the functioning of the payment system. This list answers the question of why the CBDC issue is not only an economic responsibility, of central banks, but primarily political, within the competence of national parliaments and relevant supranational institutions.

Without "money creation", synonym to heating inflation, a necessary consequence of the creation of CBDC is that of redirecting part of bank deposits towards digital cash. In other words, that amount – for example, a quarter of the total money supply – no longer remains with the banks to finance the economy or the Treasury : the result would be either less lending to the economy, or higher interest rates on deposits to encourage saving. In every case the financing cost of the economy increases, i.e. the growth rate of the economy can be curtailed. On the other hand, depositors, if they anticipate a critical situation, can order the withdrawal of deposits from banks and their conversion into CBDC.

In countries where central banks' role is broader than just controlling inflation, overseeing financial stability or the exchange rate, the CBDC may lead to a more active role for central banks in the process of financial intermediation. They may confront a situation to accept as collateral or buy not only sovereign, but also private assets, with a higher degree of risk if they are faced with a demand for high liquidity, which equals with

[17] Vlad Barză, „Mai poate fi „reparat" Facebook? Complicatul drum al companiei care a ajuns azi în cel mai important moment al istorie sale" [Can Facebook still be "fixed"? The Complicated Journey of the Company that has reached Today the Most Important Moment of its History], *Hotnews*, (October 10, 2021), https://economie.hotnews.ro/stiri-it-25094451-analiza-mai-poate-reparat-facebook-complicatul-drum-companiei-care-ajuns-azi-cel-mai-important-moment-istoriei-sale.htm.

[18] John Kiff et al. – A Survey on Research of Retail CBDC, IMF WP20/104.

a direct influence on asset prices, interfering with the functioning of the market. This may lead to longer-term maturities, injection of liquidity and, implicitly, alteration of credit risk, both for banks and for customers. Thus, central banks are exercising and influencing the credit conditions[19].

On the other hand, since CBDC is a safe investment, in a situation where the central bank conducts a zero bound interest rate policy, the Treasury's desire to launch CBDC-denominated bonds is severely limited, becoming an unattractive offering - except in crisis situations.

As long as we understand that CDBC will only complement the traditional currency, we can assume that an interest-bearing CBDC facilitates the transmission of monetary policy. However, the transmission of monetary policy may be affected by changes in the demand and composition of the money supply, in direct correlation with the sensitivity of the demand for currency to interest rate changes. Also, it cannot be entirely ruled out a dual market behaviour: since banks will continue to accept deposits from households and corporations, a split of the money supply into a remunerated part that preserves the banks' traditional lending capacity may occur, and a smaller digital part, for which the interest is not relevant, will play its attractiveness driven by instant access to liquidity and transfers.

A feature that makes CDBC attractive is the high level of credibility it gives to cross-border and inter-banking payments, as it offers zero counterpart risk, anonymity and accessibility 24 hours a day. Since the operation of the CBDC cannot be detached from the blockchain, it follows implicitly that the security of the transactions is high and the payment capacity verified by the system in advance of the operation itself.

Many central banks are exploring the role that the CBDC can play for financial inclusion, and help those who do not have a bank account, but could get faster access to the resources they are entitled to, including social or emergency benefits. In Eastern Europe there are big discrepancies of the degree of population relation with the banks: while more than 90 p.c. of mature population living in Estonia and Latvia have a constant relation with the banks, in Romania the rate is under 60 p.c.[20] This is a common situation where there are rural areas far from cities or with low economic activity and where banks do not find sufficient motivation to settle there. For central banks, the CDBC is a way of reducing the costs of managing and issuing cash, but the effectiveness of inclusion depends on the degree of financial education and how the responsible authorities will have the ability to do so in order to encompass the ignorant or reluctant part of the population.

CBDC can bring a direct contribution to de-dollarization or de-euroization, if central banks, supported by proper fiscal and financial policies, will have the ability to encourage payments in local fiat digital currency so that the policy mix can stabilize the macro-economic framework. For EU Member States, which are not yet members of the Eurozone, the process could play the other way around, of increased digital Euro-isation, and those countries should rigorously assess the consequences of the delay in adopting the single currency, since the shock arising from the functioning of the single market for goods, services and capital on the periphery will be more difficult to manage, and it is hard to believe that the largest inter-corporate payments or the payment of their employees will be settled otherwise than in digital Euro, preferred for stability and versatility.

The issuance of CBDC can have an important influence on a central bank's balance sheet, depending on how the digital currency is converted. If the de-intermediation materializes, the central bank can lend the funds diverted from the deposits of commercial banks back to them so that they continue lending at previous parameters. This implies

[19] Gregory Baer – *Central Bank Digital Currencies: Costs, Benefits and Major Implications for the US Economic System*, Bank Policy Institute, April 2021, Washington D.C.
[20] FintechOS – Detail Retail onboarding in CEE, 2021.

a departure from what we knew as the typical mandates of a central bank, and they will have to decide how to allocate funds to commercial banks, thus opening the door to political interference with the central bank decisions. This process will be more delicate where members of the central bank's board are appointed by Parliament on the basis of the political algorithm at the time of their appointment. CBDC is, therefore, less disruptive if it is issued only within the limit of physical liquidity, as would result from the conversion into digital currency of the cash part of the central bank's liabilities. Another way to reduce the impact of issuing CBDC on central banks' balance sheets would be that of transforming part or all of the reserves that commercial banks have hold in the central banks, this formula provoking only a reduction in the balance sheet of commercial banks.

The issuance of CBDC must be decided on considerations that relate primarily to the broad context of national payment systems, needs, objectives and management capacity, and only ultimately to those related to technology. The CBDC issuing central banks must take into account the operating conditions in the environment to which they are intended to, namely the degree of public acceptance, use, the nature of the response of the market operators and the dynamics of consumption. If political superstructure, the government and the central bank do not trust the fiat digital currency and prove by their deeds, it is an illusion to hope that CBDC would be received openly by the public. Before experiencing a failure, the authorities should do what is necessary to create to the public the feeling of comfort towards the use of a new currency.

References

- Adrian, T., Mancini-Griffoli, T. (2019), "The Rise of Digital Money", *IMF FinTech Notes* No. 19/01, https://www.imf.org/en/Publications/fintech-notes/Issues/2019/07/12/The-Rise-of-Digital-Money-47097.
- Auer, R., Cornelli, G. Frost, J., (2020), "Rise of the central bank digital currencies: drivers, approaches and technologies", *BIS Working Papers, 880*, Bank for International Settlements, Basel.
- Baer, Gregory, "Central Bank Digital Currencies: Costs, Benefits and Major Implications for the US Economic System", *Bank Policy Institute*, April 2021, Washington D.C.
- ***, Bank of England, *Central Bank Digital Currency. Opportunities, challenges and design*, Discussion Paper, March 2020, https://www.bankofengland.co.uk/-/media/boe/files/paper/2020/central-bank-digital-currency-opportunities-challenges-and-design.pdf?la=en&hash=DFAD18646A77C00772AF1C5B18E63E71F68E4593.
- Barză, Vlad. „Mai poate fi „reparat" Facebook? Complicatul drum al companiei care a ajuns azi în cel mai important moment al istorie sale" [Can Facebook still be "fixed"? The Complicated Journey of the Company that has reached Today the Most Important Moment of its History], *Hotnews*, October 10, 2021, https://economie.hotnews.ro/stiri-it-25094451-analiza-mai-poate-reparat-facebook-complicatul-drum-companiei-care-ajuns-azi-cel-mai-important-moment-istoriei-sale.htm.
- Bonneau, Thierry, Verbiest, Thibault, *Fintech et Droit [Fintech and Law]*, RB Edition, Paris, 2020.
- Curcă, Sorin-Nicolae, Dijmărescu, Eugen, Fugaru, Amalia, Oehler-Șincai, Monica-Iulia, *Transformarea Monedei Fiduciare [The Transformation of Fiduciary Currency]*, CIDE, București, 2021.
- ***, Deutsche Bank Research, *The Future of Payments: Part II. Moving to Digital Wallets and the Extinction of Plastic Cards*, January 2020, https://www.dbresearch.

com/PROD/_RPS_EN-PROD/The_Future_of_Payments_-_Part_II__Moving_to_Digita/RPS_EN_DOC_VIEW.
- Eonnet, Yves, Manceron, Hervé, *Fintech. Les banques contre-attaquent [Fintech. The Banks Counter-Attack]*, Dunod, Paris, 2018.
- ***, Financial Stability Board, (2019), *FinTech and market structure in financial services: Market developments and potential financial stability implications*, Basel.
- Frost, J., (2020), "The economic forces driving fintech adoption across countries", *BIS Working Papers 838*, BIS Monetary and Economic Department, Basel.
- Guo, S., *Central Bank Digital Currencies and Blockchain. Exploring new technology solutions*, Digital Monetary Institute, August 2020, https://www.omfif.org/wp-content/uploads/2020/09/Central-Bank-Digital-Currencies-and-Blockchain-1.pdf.
- Gevaudan, C., Lederman, D., (2020), "Stages of Development of Payment Systems: Leapfrogging across Countries and MENA's Place in the World". *Policy Research working paper no. WPS 9104* Washington,D.C.: World Bank Group: http://documents.worldbank.org/curated/en/284091578403310061/Stages-of-Development-of-Payment-Systems-Leapfrogging-across-Countries-and-MENAs-Place-in-the-World.
- ***, G7 Working Group on Stablecoins (2019), *Investigating the impact of global stablecoins*, October: https://www.bis.org/cpmi/publ/d187.pdf.
- ***, Group of Thirty's Steering Committee and Working Group on Digital Currencies, *Digital currencies and stablecoins. Risks, opportunities and challenges ahead*, Washington, D.C., July 2020: https://group30.org/images/uploads/publications/G30_Digital_Currencies.pdf.
- Houben, R., Snyers, A., "Crypto-assets Key developments, regulatory concerns and responses, Policy Department for Economic, Scientific and Quality of Life Policies" Directorate-General for Internal Policies, *European Parliament*, Luxembourg, April 2020.
- Kiff, John et al (2020), "A Survey on Research of Retail CBDC", *IMF WP20/104*, Washington D.C.
- Lagarde, C., *Payments in a digital world*, Speech by the President of the European Central Bank at the Deutsche Bundesbank, online conference on banking and payments in the digital world, September 10, 2020, Frankfurt am Main.
- Le Cercle Turgot, *Les Banques face a leur avenir proche [The Banks Facing their Near Future]*, Eyrolles, Paris, 2018.
- Leloup, Laurent, *Blockchain, La révolution de la confidence [Blockchain, The Revolution of Trust]*, Eyrolles, Paris, 2017.
- OMFIF, (2019), *Retail CBDCs: The next payments frontier*: https://www.omfif.org/wp-content/uploads/2019/11/Retail-CBDCs-The-next-payments-frontier.pdf.
- Schumpeter Joseph, (1942), *Capitalism, socialism and democracy*, Harper & Brothers, New York, 1942.
- ***, The Economist, *The world's most valuable resource is no longer oil, but data*, May 6, 2017, https://www.economist.com/leaders/2017/05/06/the-worlds-most-valuable-resource-is-no-longer-oil-but-data.
- ***, The Economist, *The promise of the blockchain technology*, September 1, 2018, https://www.economist.com/technology-quarterly/2018/08/30/the-promise-of-the-blockchain-technology.