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TOWARD A NEW ECONOMY: DIGITAL CURRENCY AND INTERNATIONAL DEVELOPMENT

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ABSTRACT

This research paper aims to examine the role of digital currencies in international development. Through a comprehensive analysis of current trends and future prospects, the paper evaluates the potential of digital currencies to revolutionize economic systems by offering technological, economical, and secure benefits. Methods used include analysis, synthesis, comparison, scientific abstraction, and statistical analysis. Results indicate that while first and second-generation crypto assets do not fully meet modern economic requirements, the introduction of Central Bank Digital Currency (CBDC) could offer a viable solution. The paper concludes with recommendations for future research and policy implications

Thanks to the Internet, digitalization is taking an increasing place in our lives to the extent that thanks to Metaverse projects, in which significant funds are currently being invested, we are invited to live in a world of “augmented reality”. Payments, currency, and finance cannot escape this movement, as crypto asset advocates well understand. Based on the current state of the relevant sectors and an analysis of short- and medium-term prospects, this research paper examines long-term issues arising from current events and those that are predictable. The purpose of this scientific article is to review crypto assets and their ability to become a tool of a modern economic digital system that meets all requirements, such as technological, economically profitable, and of course secure, as well as regulated by the state. Methods: analysis, synthesis, comparison, scientific abstraction, analytical grouping, methods of typology and generalization, quantitative statistical analysis, qualitative textual analysis, deduction and induction. During the study, the authors concluded that the existing first and second generation crypto assets do not meet all the requirements of the modern economic system, and also do not have a legal framework in the field of security and market regulation. In this regard, two forms of government intervention are being considered: regulatory in nature and industrial in nature. The production approach considers the development and implementation of the Central Bank Digital Currency (CBDC) at the national and/or international level.

Key words: *digital economy, digital currency, crypto assets, bitcoin, stablecoin, CBDC*

1. INTRODUCTION

Digital currencies have rapidly gained prominence in the financial landscape, driven by advancements in technology and shifts in consumer behavior. Their potential to reshape the global economy is significant, impacting international relations and economic development. This paper explores these dynamics, focusing on the integration of digital currencies into the modern economic system and their implications for future growth. The rapid changes that have occurred in recent years in the field of payments, mainly as a result of changes in consumer behavior and innovations in the public sector, do not prevent the situation in this sector from remaining unsatisfactory and payments from remaining slow compared to what digitalization allows. On the other hand, access to the banking and financial system can be improved, including its functioning, although the public seems to trust it more than other industries in protecting the confidentiality of personal data.

The changes most noticeable to the public, of course, affected domestic retail payments, in particular, the widespread use of remote, contactless and smartphone payments, as well as the launch of applications (ApplePay, GooglePay, PayPal, SamsungPay, etc.) relying on existing systems for settlement.

For comparison, in Brazil, the Central Bank launched the Pix real-time payment system in November 2020, and fifteen months later two thirds of the population made or received transactions through this system. In fact, instant payment systems that appeared back in the early 2000s were first mainly implemented in emerging market countries, especially in Asia: South Korea in 2001, Taiwan and Iceland in 2003, Malaysia and South Africa in 2006, Chile and the United Kingdom in 2008, China and India in 2010. In China, as well as in the Scandinavian countries that adopted them later (Denmark and Sweden), the spread of this payment method was especially rapid, to the point that instant payment via Alipay and WeChat Pay in China or via Swish in Sweden became the payment method in these countries as the most common payment among sellers (Ozili, 2022). The latter are even increasingly refusing to pay in fiat currency, offering them instant payment with the same advantage of immediate settlement with less risk of loss or theft and less time spent managing their cash flows.

Thus, over the past twenty-five years, the payment sector has undergone rapid changes, which, however, have not led to overcoming certain shortcomings or significant changes in the monetary and financial spheres. Private initiatives using a common technological framework came to point this out, but did not receive support because they themselves were not able to meet all the expectations they raised, and could even lead to other difficulties. Thus, a response from the State authorities was required, which, however, in some respects could turn out to be ambiguous.

The purpose of this scientific article is to review crypto assets and their ability to become a full-fledged tool of a modern economic digital system that meets all requirements, such as technological, economically profitable, and of course secure, as well as regulated by the state.

2.METHODS

In addition to the methods mentioned, the study employs qualitative interviews with industry experts and policymakers to gather insights on the practical implications of digital currencies. These interviews provide a nuanced understanding of the challenges and opportunities presented by digital currencies in various economic contexts.

In the process of working on the research, general scientific methods were applied: analysis, synthesis, comparison, scientific abstraction, analytical grouping, methods of typology and generalization, quantitative statistical analysis, qualitative textual analysis, deduction and induction.

3. RESULTS

The study reveals several critical insights into the role of digital currencies in international development. For instance, countries like El Salvador have adopted Bitcoin as legal tender, aiming to boost economic growth and financial inclusion. However, the empirical data suggests mixed results, with challenges in regulatory compliance and market stability. Detailed case studies of Brazil's Pix system and China's Alipay highlight the transformative potential of digital currencies in enhancing payment systems. Nevertheless, the lack of a comprehensive legal framework remains a significant hurdle.

As in the Middle Ages, the vast majority of cross-border payments in terms of volume, whether wholesale or retail payments, are still carried out in accordance with the model of "correspondent banks" (correspondent banking). In this model, the so-called "correspondent" bank manages accounts opened by other so-called "responsible" banks and provides them with internal services and currency exchange, which avoids their representation in the recipient's currency country. However, for reasons that are mainly related to compliance with customer information procedures and the application of anti-money laundering and terrorist financing (LCB/FT) regulations, this model lags far behind the recent period.

Thus, the number of correspondent banks decreased by 20% between 2011 and 2018, despite the fact that the cost of payments increased during this period. This event is worrisome because it may encourage users to switch to parallel, less secure systems and reinforce the well-known shortcomings of correspondent banking. These disadvantages, especially evident in the implementation of small payments, such as remittances from immigrant workers to their countries of origin, are mainly as follows:

- slowness: cross-border payments take significantly longer than domestic payments;
- opacity: it is difficult for the payer to track step by step how his payment procedure is progressing and the remuneration of each intermediary;
- high cost: As of June 2021, according to an assessment conducted by the World Bank based on information received from 48 countries sending money transfers from 105 recipient countries, and for four categories of service providers (banks, money transfer operators such as Western Union or Wise, mobile operators and others), the average cost of one The transfer rate was 6.30%. This cost was even 1.3 percentage points higher than the goal set by the G20 in 2014, but has been steadily declining since 2013, when it was about 8%. The most expensive money transfers were made through banks from South Africa and to sub–Saharan Africa, the cheapest through fully digital operators (3.41%) and between G8 countries, with the exception of Japan as the issuing country (Calle & Eidan, 2020);
- limited accessibility: especially in destination countries for reasons related to both less widespread digital culture and less financial accessibility.

In order to take into account, the requests of the international community, in particular the G20, to partially eliminate these shortcomings, the Swift international messaging service launched the global payment innovation (gpi), by the beginning of 2022, more than 4,200 banks from 141 countries joined it. This initiative, which was initially

aimed primarily at corporate payments, aims to make a payment during the day, allow real-time tracking of the payment status and billing for each payment. It seems that payments using gpi tend to be executed quickly, with an average processing time of less than two hours. However, there is a strong heterogeneity, with some routes, especially to Africa, taking up to two days, in particular due to strict capital controls and the time taken by the receiving institution to make funds available to the recipient (Banna, H., & Alam, 2021).

In general, the picture that is emerging in the field of payments is the lack of use of the opportunities offered by digitalization, especially in terms of instantaneity.

Indeed, as noted in the introduction, digitalization is gaining an increasing share in society, while it marks a step forward in the field of payments, where the opportunities it offers are not being fully exploited. This situation may be all the more unexpected because in the payment sector, developed countries have long been leaders in digitization, as expected, was either with the introduction of Real Time Gross Settlement (RTGS), or, in the case of retail payments, with the computerization of mass transactions on checks, transfers and debit notifications, and also with the distribution of maps.

According to the definition given by the World Bank, Financial accessibility means that individuals and businesses have access to useful and affordable products and services that meet their needs in transactions, savings, lending and insurance. Access to these products and services is important because they make everyday life easier and enable families and businesses to plan their long-term projects as well as cope with unforeseen emergencies. The first step towards financial accessibility is usually to have a transactional account that can be opened through a bank or other intermediaries, such as postal operators, mobile operators – the latter are widely represented in Africa – or microfinance organizations.

According to data released by the World Bank in 2018, 69% of adults worldwide had an account, but almost a third of adults – or 1.7 billion people – did not have a "bank account", that is, some of them have a transactional account, but not in a bank, and thus do not use their account for save money or gain access to a wider range of financial products and services (Borup& Schütte, 2022). Of course, the situation in developing countries is the most difficult. Of course, significant progress has been made in countries that actively pursue digitalization-related policies, such as policies aimed at universal digital identification (an example is the Aadhaar program in India), or that have promoted the introduction of mobile financial services, such as Kenya with M-Pesa. However, it seems that just under half of the population living in developing countries does not have a bank account. On the other hand, the availability of banking services is not a problem in richest countries: in Gupta France, the level of banking services for the adult population is 99%, and therefore it can be assumed that all French adults who want it have a bank account (Gupta, 2021).

Given the difficulties with payments described above, developing economies are thus doubly disadvantaged, since the availability of financial services remains underdeveloped in countries heavily dependent on remittances. Again, in this case, the benefits of digitalization do not seem to be fully exploited.

Thus, the need for high-quality and fast transactions is obvious, and in this regard, market initiatives have emerged from the general technological basis, emphasizing the insufficient use by traditional participants of the banking and financial systems of the

opportunities offered by digitalization. These initiatives are based on the foundation of a common distributed ledger technology and on the blockchain.

These market initiatives took different forms. For the first time, money-oriented cryptocurrency assets, mainly Bitcoin, appeared in early 2009, which did not fulfill their promises because they do not serve, except in cases established by government authorities, as a currency.

Stablecoins, attempts to reconcile Distributed Ledger Technology (DLT) and the provision of a stable value asset, appeared later. Raising funds through the issuance of tokens (initial coin offering or ICO), apparently, was only a help in 2016-2018. Decentralized finance (decentralized finance or DeFi) has since offered a number of peer-to-peer financial services related to crypto assets. Finally, non-interchangeable tokens (non-interchangeable tokens or NFT) have been developing since 2020, and it is too early to say whether they will become effective or whether after the ICO they will cause a new surge of speculative fever (Garratt et al., 2020).

As part of the study, the authors consider it necessary to make a brief overview of the listed crypto assets. Their common technological basis is an electronic register, the so–called electronic file, which can be simultaneously accessed, registered and synchronized by authorized entities, and which develops by chronologically adding up information previously confirmed by all entities. This information is immutable, so it should never be changed or deleted. DLT itself allows you to create and manage a distributed registry through a network of computers ("nodes") that synchronize, manage and protect distributed registries, transaction blocks are added using a verification mechanism, also known as a "consensus mechanism". The latter allows the checking nodes to approve a new block of operations. There are various verification mechanisms, the most well-known of which are currently Proof of work (PoW) and proof of stake (PoS).

Proof of work is the first consensus mechanism to appear on the blockchain, first used by Bitcoin. The verification nodes there are competing to solve a cryptographic problem that requires a lot of "brute force" (the cost of specialized equipment and, above all, energy) and, thus, adding a new block of operations to previously verified ones. Proof of interest is based on linking crypto assets to the verification nodes of the public block chain; thus, it introduces an element of centralization into a priori decentralized organization. Finally, DLT allows you to resort to "smart contracts" (smart contracts or programmable or self-fulfilling contracts), which are computer programs capable of automatically fulfilling the terms of the contract, potentially making the currency "programmable" (Arner et al., 2020).

Blockchain is a form of DLT that allows you to store and exchange crypto assets using a distributed system without the intervention of a trusted third party. The blockchain uses an encryption system instead of a trusted third party, which makes it extremely difficult to fake it, thereby solving the problem of "double spending", that is, a fraudulent action in which the same crypto asset is used simultaneously in several transactions (the exception is the "51% attack", when an attacker or a group of attackers manages to capture most nodes, involved in the verification mechanism, which is very expensive).

Thus, a crypto asset is an element of the intangible heritage, the main part of which belongs to DLT. There are two main forms of blockchains: public and private. In a public blockchain, participants' access to the verification mechanism is not regulated, since all nodes that have the same role a priori, the same rights to read (view) and write

(enter new transactions, therefore, participate in the verification mechanism and the right to allow the addition of a new block), without any dominant node. In a private blockchain, all nodes belong to an organization or group of organizations (consortium) that control access, recording, and consensus.

An authorized blockchain is a private blockchain, access to which is reserved for authorized participants. A crypto asset designed to be monetary, like bitcoin, which is based on its own blockchain technology, is called a coin. We also talk about altcoin to refer to a currency other than Bitcoin. If it is linked to an existing blockchain (for example, Ethereum), the crypto asset is called a token. This does not prevent the fact that in the blockchain, contrary to the usual use of the term, the token most often represents only itself (this always applies to the coin). The exceptions to this lack of external value of coins and tokens are, in principle, tokens issued on time by the ICO, and by their nature, the cryptographic representation of assets within existing categories, such as securities or currency, which are then "tokenized" (Ozili, 2022).

The advantages of the blockchain are that it allows you to quickly, constantly and globally exchange information that has the following properties:

- it is secure through the use of cryptography, the use of a consensus mechanism and the resilience provided by its distributed nature, protecting it from failures at a single point (single point of failure), as can happen in centralized organizations prevailing these days;
- it is transparent, all nodes have access to the same information, although in private or even public blockchains, access to certain information can also be shared to maintain confidentiality.;
- it is unchangeable.

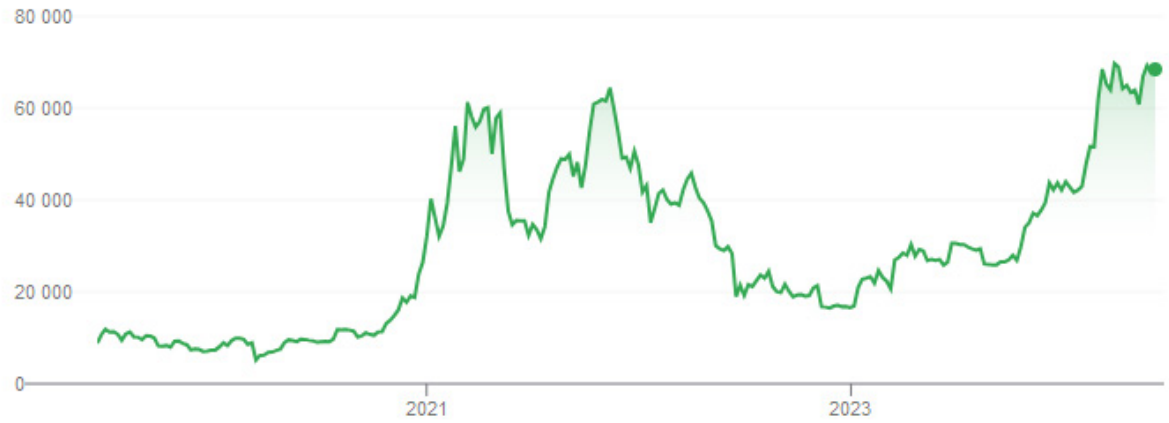
One of the consequences of this is that the blockchain allows you to do without certain operations, such as transactions by agreement, and trusted third parties. In the blockchain, the difference between the concepts of the external interface and the backend, clearing and settlement operations are erased, and the infrastructure offers the opportunity to conduct all these operations, moreover, very quickly, however, taking into account certain arbitration proceedings. In addition, the introduction of this technology allows the creation of new products and players, promoting competition and innovation.

In addition, the term bitcoin simultaneously refers to the system of transferring a crypto asset and a unit of account. As of June 28, 2022, there were more than 20,000 crypto assets totaling about 20,000 outstanding obligations of $950 billion, despite the fact that its share had decreased significantly over the previous ten years, before that it was 100%, while bitcoin still accounted for 42% of this amount, compared to with 16% for Ethereum, 7% for Tether, 6% for USD Coin, 4% for Binance, and 2% for Binance USD, Ripple, Cardano et Solana. For this reason, since it is a kind of "progenitor" of crypto assets, and also because bitcoin has claimed to be a currency from the very beginning, the review here focuses on this crypto asset, and not on altcoins (Dell'Erba, 2021).

In addition to using blockchain, bitcoin, like altcoins, is characterized by a combination of public and private keys that identifies an asset in the absence of an issuer and allows the user to be anonymous or more precisely in order to protect himself using an alias. The absence of an issuer is certainly the characteristic that most distinguishes Bitcoin and altcoins from legal currencies, whether fiat money or bank deposits: thus, first-generation crypto assets are not asset-backed, while fiat money and bank deposits

are asset-backed through cryptocurrency, the balance sheets of their respective issuers (Central Bank and so-called "commercial" banks). This lack of support allows bitcoin to be mostly decentralized, although elements of centralization can be found in its ownership, which is difficult to assess due to the alias that allows the same owner to use different private keys or, conversely, multiple owners can be combined by an exchange under the same name.

Figure 1 - Bitcoin exchange rate dynamics over the past five years



First of all, this makes the bitcoin exchange rate extremely volatile, which is one of the obstacles, perhaps the most important, for the intended monetary use of its developer. Two other disadvantages afflict Bitcoin when doing the work, it was designed to do:

- inelasticity of his proposal: the pace of bitcoin creation is planned to be halved every four years (the so-called halving procedure) with a gradual approach to 21 million in 2140 (as of March 2022, about 19 million units were sold). In addition, units are created only in the form of rewards awarded to "miners" who manage to solve the cryptographic problem first, allowing them to link a new block of transactions into a chain (in case of a conflict when awarding a reward, the length of the received chain is proof), and not based on the value of transactions.
- Changing the creation algorithm would be both difficult and risky: allowing for a further increase in the limit, which until now was considered intangible, this change could lead to a sharp drop in the value of assets- bitcoins – the price of which mainly depends on the deficit;
- slowness of transactions: Bitcoin processes seven transactions per second, and it is believed that it takes an hour for a transaction to become irreversible, i.e. mining six blocks of transactions (the energy costs required to represent a fake blockchain for longer than others would then be colossal).

These difficulties create a problem of "scalability" with overload phenomena accompanied by unstable fluctuations in transaction costs, as a result of which miners request higher fees for processing some transactions before others. Of course, they can be overcome by increasing the speed of transactions by adding sidechains to bitcoin, such as the Lightning network, which allows only calculations on the blockchain to balance transactions made between two participants connected by a "channel" that they created on the network. However, in accordance with the "Buterin triangle", these solutions, in turn, create difficulties, especially due to the introduction of centralization and loss of security, since they resort to offsetting bilateral positions, which creates credit risk, aggravated by the specialization of certain nodes in the redistribution of liquidity, by

analogy with clearing houses grafted to the gross margin system calculations generated by bitcoins (Banna et al., 2020).

Thus, in fact, despite the development of payment services based on crypto assets by major players in the payment industry (for example, PayPal, Visa, Mastercard, Worldline), bitcoins and altcoins are very little used directly in everyday transactions. In addition, their prices are too unstable to be used as reserves of value. In general, they are unsuitable for use in monetary form, since in fact, they mainly serve for four actions:

1. First of all, mainly for speculative investments;
2. For settlement transactions under pseudonyms aimed at protecting confidentiality, but also sometimes financing illegal transactions. Thus, it has been estimated that about a quarter of the volume of bitcoin transactions and almost half of their amount will be related to illegal activities. However, this assessment is already somewhat outdated, and law enforcement agencies have since made progress in tracking transactions on the blockchain. It is estimated that transactions involving illegal addresses will account for only 0.15% of transactions with crypto assets in 2021, while the amounts received by these addresses will amount to $14 billion.

As for this ratio, however, attention should be paid to the fact that most transactions with crypto assets occur between the latter. Considering only transactions involving goods, services and assets other than crypto assets, including legal currencies, would make more sense. In addition, legitimate addresses may also be involved in illegal transactions, which suggests that the $14 billion amount is probably the minimum estimate (Boar et al., 2020);

3. Circumvention of capital controls. However, these workarounds, which also constitute illegal operations, are effective only if goods are bought and resold with crypto assets that are invisible to controllers. They are also ambiguous, since, useful for regulating economic policy, they can contribute to improving social well-being;
4. For cross-border payments, preferably for large amounts, so that transactions are not overly burdened in percentage terms by the high fees themselves (purchase of crypto assets for legal currencies, payment for miner services, resale of crypto assets for legal currencies).

Thus, Bitcoin does not meet all the requirements and needs of the economic system. In this regard, the authors propose to consider the prospect of stablecoins. Stablecoins, which appeared together with Tether in 2014, are crypto assets that strive for a stable value relative to the benchmark, in practice, in almost all cases, to parity with the US dollar. Thus, conceptually, stablecoins are markedly different from first-generation crypto assets. Due to the stability they provide, they allow users to stay in the "digital universe", saving them from having to pay high transaction costs when making purchases and sales for legitimate currencies motivated, for example, by arbitration between crypto assets – there are markets between crypto assets that are not related to stablecoins, but their liquidity often leaves much to be desired. In addition, some cryptocurrency exchanges refuse payments in legal currencies, thereby freeing themselves from compliance with certain regulatory restrictions, while stablecoins, on the contrary, usually make it easy to switch from one exchange to another.

As of June 28, 2022, the total market capitalization of stablecoins traded in dollars amounted to about $150 billion, or 16% of the total market capitalization of all crypto assets. Tether, which strives for parity with the dollar and remained the only stablecoin

until 2018, accounted for more than 40% of the issued amounts, followed by USD Coin (one third), Binance Coin (one tenth) and DAI (about 5%) (George et al., 2021).

After the collapse of the Terra cryptocurrency, which had a capitalization of about thirty billion dollars, as of May 2022, almost all stablecoins are provided with an off-chain reserve, in the sense that the assets that make up it are not crypto assets and, therefore, cannot be stored in the blockchain.

DAI is the only example of a stable coin in the chain, units of which are created by supporting crypto assets. By their nature, off-chain stablecoins are more centralized (users have no idea about redundancy), and on-chain stablecoins have more transparency (users can check on the blockchain whether guarantees really exist).

However, due to the volatility of prices for crypto assets, the disadvantage of off-chain stablecoins from the point of view of users is that they rely on security coefficients exceeding one (150% for DAI), while positions are liquidated in case of non-compliance with the security coefficient, which can cause or increase market destabilization (Bordo, 2021). In any case, issuers of stablecoins mainly rely on market arbitrage to stabilize the exchange rate of the units they issue.

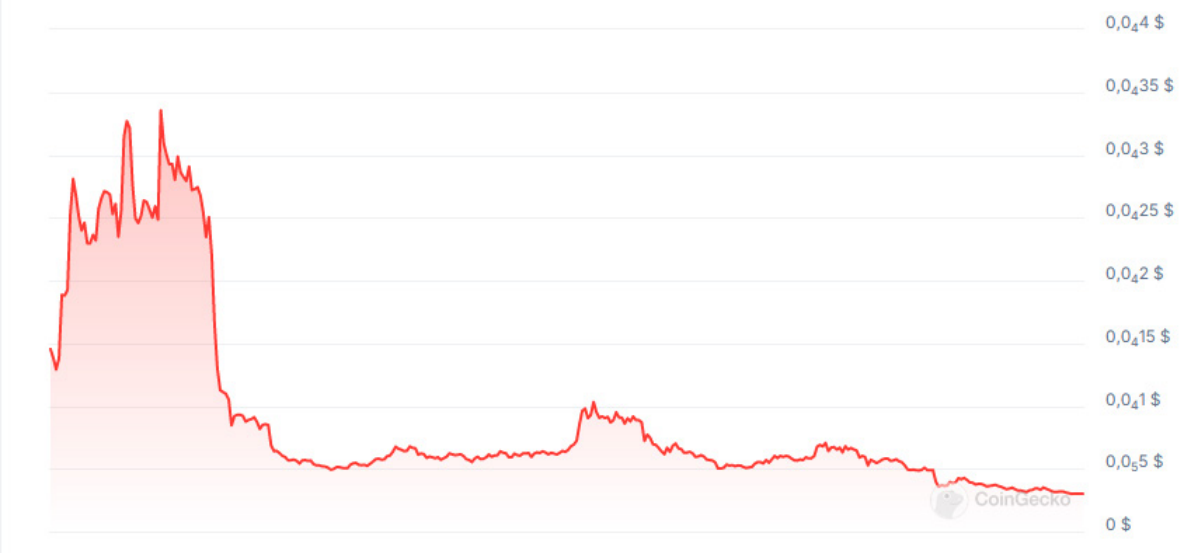
Thus, market participants are expected to buy a stablecoin if it has a rating below par, and that they sell it otherwise, in both cases without the intervention of the issuer, a device that obviously can only work if the parity commitment is trustworthy, hence the reserve is managed wisely and it is transparent, which is not always the case.

Stablecoins are advertised as offering four potential benefits:

- make payments at a low price and in real time, which is certainly a more realistic advantage in their case than in the case of first-generation crypto assets, due to the high price volatility of the latter;
- make the currency programmable. In fact, it would be more correct to say "make means of payment programmable", since stablecoins, strictly speaking, are not a currency, and this is for two reasons: on the one hand, they are not autonomous, like legal currencies, since they are referenced in legal currencies and linked to official currencies; on the other hand they are imperfectly stable with respect to their reference. However, if this last restriction were eliminated and the use of stablecoins in transactions expanded, the outstanding funds held by residents in various referrals could be included in the corresponding monetary aggregates according to their definition (for example, euro stablecoins owned by residents of the eurozone would be included in the monetary aggregates of the eurozone M1, M2 and M3 as well as deposits in euros currently);
- promote the availability of financial services, especially in emerging and developing economies, which could be the case if they were distributed on a large scale and at a low price, but what remains to be demonstrated;
- serve as the preferred tool in Decentralized Finance (DeFi).

By far, this is currently the most common use of stablecoins. Indeed, stablecoins play a role in DeFi similar to that of "safe assets" such as treasury bills or central currency in traditional finance: they can be used as security rights and serve as a liquidity reserve and a safe asset there. The stablecoins in the chain are themselves an example of using DeFi. Thus, stablecoins can currently be considered as an addition to the markets of other crypto assets.

Figure 2 - Stablecoin exchange rate dynamics over the past year



Decentralized finance (DeFi), a set of financial services based on crypto assets DeFi seeks to provide some functions of the traditional financial system in a decentralized way (transactions are carried out peer–to–peer, without involving trusted third parties) and without permission (management in it potentially belongs to users) and relying on blockchain - in particular, Ethereum - and cryptocurrencies.

In the case of DeFi, we are talking exclusively about crypto assets, which still account for only a small fraction of all available assets in the world. Like the stablecoin market, with which it maintains a close relationship, DeFi is an addition to the crypto asset market.

DeFi projects appeared back in 2017, but the industry did not really begin to develop until the summer of 2020. The amount of fixed assets (total value locked) in DeFi applications increased from $2 billion in early July 2020 to more than $100 billion in early 2022, but then fell with the fall in prices for two major crypto assets (Bitcoin and Ethereum). The DeFi architecture is based on a set of "layers" that give the set its three fundamental characteristics: "composability" (various "bricks" belonging to different layers can be combined into a product or service, which makes DeFi a kind of Lego financial constructor for crypto assets); compatibility, this is facilitated by the dominance of the Ethereum protocol as well as opacity for a novice investor, despite the use of blockchain. The markets covered by DeFi are mainly of two types: as of mid-2021, they account for more than 85% of fixed assets (Fuchs, 2022):

- decentralized exchanges: Compared to centralized exchanges, which are still the most widely used in transactions with crypto assets, but involve trust and require storage fees, they have the advantage that users do not need to deposit their assets before sending them to trade. In addition, another advantage is that transactions are performed atomically (both "legs" of trading occur in an indivisible manner and form only one transaction, the blockchain:
- the equivalent of payment for payment-payment-against–payment or PVP-in traditional finance;
- decentralized credit platforms: they allow you to conduct transactions anonymously and earn income from owning stable coins. To guarantee itself, the lender can resort to two options. In the first case, as with transactions through decentralized exchanges, it is compressed atomically. In this case, it is an instant loan (flash loan),

which has not yet been sufficiently developed and is used mainly for the purposes of cross-platform arbitration. In this regard, the low rates on these loans, from the lender's point of view, should not cause illusions: we are talking about operations that almost all "sell out" in a matter of seconds. The second solution is to provide a loan secured by the latter (often stablecoins, but also crypto assets, in particular ether), concluded in a smart contract and issued only after repayment of the loan.

However, DeFi also creates interdependencies between crypto asset markets such as stablecoins (this is especially true when stablecoins are online), as well as with some players in traditional finance who invest in them, such as hedge funds and family offices.

In addition, building most DeFi applications on unauthorized blockchains, which are accessed and transactions are carried out under pseudonyms, opens up opportunities for tax evasion and other illegal practices. The latter point is even more worrisome, since DeFi can lead to a double form of regulatory arbitration. In the first form, if DeFi is not regulated, traditional financial activities can be transferred to Defi through the "tokenization" of the relevant assets. However, since in this case such activities will lose the trust and protection associated with regulations, such a scenario is unlikely. In the second form of regulatory arbitration, as in other types of activities related to crypto assets, the nature of the global DeFi standard would allow its developers to transfer their activities to jurisdictions that would impose the least restrictions on them, perhaps even if they protected users worse or shifted the costs associated with disruptions to the global the financial system. This risk highlights the need for international coordination.

However, this situation could have changed if, despite the fact that the Diem (formerly Libra) project of Meta (formerly Facebook) was terminated due to hostility from regulatory authorities, other global projects for the production of stablecoins appeared. This could include, in particular, the case in the field of wholesale payments, where two projects are known: Utility Settlement Coin (USC), supported by a group of banks and institutional investors (Fnality), and JPMCoin, supported by JPMorgan bank.

While stablecoins may have benefits, they can also pose risks. This is especially true for global stablecoins. Indeed, as noted in the report of the G7 working group on stablecoins, global stablecoins combine two types of risks (Piliyanti, 2019):

- risks characteristic of any stablecoin device, often common to other crypto asset issuance devices: the temptation to invest in risky assets and practice "maturity modification" in order to increase profitability, in which assets have a longer maturity than resources whose owners may require liquidation at any time;
- lack of legal certainty, in particular with regard to the rights that users have;
- deficiencies in management, including risk verification and control;
- business risk, as financial integrity in the frequent absence of LCB/FT checks;
- protection of user transaction data;
- the risks that global stablecoins can create as a result of their size: not only the risks inherent in any stablecoin can be increased in the case of global stablecoins. The first category relates to the conditions of competition (the absence of competition will deprive consumers of the opportunity to fully take advantage of the innovations that stablecoins represent; preventing this risk will require ensuring the interoperability of global stablecoins in general). The second category of risks is associated with consequences for financial stability, the third with consequences for monetary policy.

4. DISCUSSION

The analysis indicates that while digital currencies offer significant benefits, their integration into the global economy requires careful consideration of regulatory and security issues. The potential for CBDCs to address these challenges is promising, but their success depends on international cooperation and the development of standardized regulatory frameworks. Future research should focus on empirical studies that examine the long-term effects of digital currencies on economic stability and growth.

In light of the above, the cryptocurrencies of the first generation Bitcoin, as well as the second generation stablecoins, are not able to meet all the requirements of the market and the state, and therefore government agencies have created or are preparing to create a legal framework that would provide a safe environment for use among the general public. This is due to the fact that any regulation comes with costs that create barriers to entry, protecting existing players, which makes it ambiguous from a competitive point of view.

Another form of government intervention, much stronger than regulation, is aimed at providing an alternative to private production, as in the case of the Central Bank Digital Currency (CBDC) broadcast. Therefore, before intervening, the government should, in principle, make sure that two conditions are met: that private initiative is unable to meet a clearly expressed need (in other words, there must be a "market failure") and that the benefits of public production outweigh any possible disadvantages that it creates.

Two forms of government intervention are consistently considered here: regulatory in nature and industrial in nature.

- the first is to do nothing or even promote crypto assets, as El Salvador and the Central African Republic did by granting bitcoin the status of legal tender. This approach is incompatible with the risks that crypto assets pose at this stage and the risks they may pose in the future, especially for financial stability.;
- the second approach, on the contrary, is to ban activities related to crypto assets, the prohibition of their existence in itself cannot be reasonably considered, given the global availability and absence of an issuer that characterize them. Then the ban may be implicit (exchanges, banks and other financial institutions are prohibited from offering services to individuals and legal entities trading in crypto assets) or explicit (making transactions with crypto assets or owning them is punishable by criminal sanctions). According to the Library of Congress in the United States, the number of countries imposing a ban in one form or another increased from eight to nine months between 2018 and 2021 (Algeria, Bangladesh, China, Egypt, Iraq, Morocco, Oman, Qatar, Tunisia) for an explicit ban and from fifteen to forty-two months for the implied prohibition. Such a purely administrative approach is unfavorable for competition and innovation (Deng et al., 2019).

CBDC can be defined as an element of the monetary base (or central currency), which is exchanged at face value for paper money and reserves, which the Central Bank can independently create or destroy, which is available 24 hours a day every day of the year and which circulates through the digital infrastructure. As with stablecoins, it is useful to distinguish whether it is a wholesale CBDC available only to financial institutions or certain types of duly accredited operators, or a retail MNBC intended for the general public, but which financial institutions can also own.

The motives, methods, and potential consequences of CBDC broadcasting vary from form to form. The reasons are discussed below, the ways and the consequences, which are more relevant in the medium term, since there are still very few CBDCs, none of which are large or issued in advanced economies.

However, at this stage, it should be noted that one retail CBDC provides a substitute for fiat money, as well as deposits, since it, like the last two, can be used in transactions or as a means of saving. But if the substitution for paper money is internal to the Central Bank's balance sheet, without changing their amounts and leaving the banks' balance sheets unchanged, the same does not apply to the replacement of deposits. The latter leads to a loss of resource for banks ("disintermediation") in favor of the central bank (this does not necessarily lead to an increase in the balance sheet of the central bank or a decrease in the balance sheet of banks).

Among the reasons for CBDC broadcasting, regardless of its type, is to always provide a payment instrument that carries neither credit risk (the central bank cannot default) nor liquidity risk (it can always provide more of its currency if there is demand for it). As for the wholesale CBDC, its issuance is sometimes considered unnecessary, since, taking into account reserves, the Central Bank would already provide a tool for settlements on transactions between banks in the central currency.

However, CBDC is precisely a tool that spreads across a digital infrastructure other than the one currently used by the central currency, and reserves cannot be placed on the blockchain: we currently do not have cash in the ledger. Conversely, one Wholesale CBDC would allow financial institutions to conduct end-to-end transactions on the blockchain with assets represented as tokens, including settlements, without using stablecoins, which pose a residual risk. As a result, the use of blockchain will become more attractive to financial institutions and more secure for the system as a whole, since the use of a central currency strengthens financial stability.

Thus, the motive for issuing a wholesale CBDC may be to promote financial innovation and reduce transaction costs through the use of blockchain. The release of a wholesale CBDC can also increase the "dubiousness" of the financial services market by fostering competition by attracting a new provider, which allows financial service users to benefit from the faster efficiency gains provided by this technology.

As for the retail CBDC, we are talking about adapting the provision of cash to the technological context of digitization, which will allow central banks to communicate with the public where, for example, in Sweden, the demand for paper money is falling sharply. In addition, since 2016, the Central Bank of Sweden has been exploring the possibility of issuing retail CBDCs called e-krona. However, he is not sure that there is a public demand for this, since the main thing for him is to have access to technological progress.

The release of a retail CBDC can also help reduce the social costs of retail payment services. These costs are estimated at almost 1% of GDP in the eurozone, half of which is accounted for by cash payments, whether at the level of the central bank, second-tier banks, merchants or the public (Bindseil, 2020).

However, the decrease in the share of cash in trade shows that this cost reduction is already happening spontaneously. In emerging and developing economies, a retail CBDC can also serve the purpose of ensuring the availability of financial services. How-

ever, experience shows in such different examples as M-Pesa in Kenya or Pix in Brazil that other means are available for this purpose.

Thus, it is in the sector that was identified above as the most lagging, cross-border payments, in particular for money transfers, that CBDC could bring the most, but this is not related to the release of a retail CBDC.

Finally, tax reasons may motivate the issuance of a retail CBDC, especially where the use of paper money remains very common, that is, again in emerging market economies or developing countries.

5. CONCLUSION

In conclusion, digital currencies hold the potential to transform international development by offering secure, efficient, and inclusive financial systems. However, realizing this potential requires addressing significant regulatory and security challenges. The study recommends that policymakers prioritize the development of comprehensive legal frameworks and international cooperation to ensure the successful integration of digital currencies into the global economy.

During the study, the authors concluded that the existing crypto assets do not meet all the requirements of the modern economic system, and also do not have a legal framework in the field of security and market regulation.

The main threat is that competition from private players is intensifying with the advent of cryptocurrencies launched by digital giants, whether American or Chinese. After the ambitious launch of its virtual currency, dubbed Libra and then Diem, Facebook eventually abandoned it, but other large private companies continue to explore the possibilities of cryptocurrencies. The risk is that by seizing the means of payment, these companies will receive full information about the payments made and, consequently, about personal data. In addition to the threat to data privacy, there is also the risk of a malfunction of national currencies. Especially at a time when cash is gradually disappearing and payments are increasingly dematerialized. Another important issue is the global competition that central banks are involved in. The main ones compete with each other for imposing their currency on international exchanges, especially against the dollar.

To these numerous threats and questions is added the question of whether a digital currency issued by the central bank can meet the demand and expectations of users. They usually use intangible payment methods (bank cards, bank transfers, phone payments or through interbank systems), and many of them do not necessarily see what else digital currency will bring them.

However, CBDC has several advantages. In the absence of an answer to the question of user acceptance, the creation of, for example, a digital euro will contribute to the relative standardization of means of payment at the international level. If the digital euro became the standard, it would become compatible, which would allow payments and exchanges to be made faster, almost instantly and cheaper. That is, international payment systems would be more efficient and reliable.

Opinions about the contribution of digital technologies to the world of money are still divided (Andolfatto, 2021). Some believe that what is happening now is a marginal phenomenon that will remain so; others, on the contrary, believe that the ongoing evolution forms the basis of the financial systems of tomorrow. Still others hope that digitalization will lead to the improvement of existing payment systems, as well as to the

modernization of interbank payments and payments between individuals. The only certainty at this stage is that whatever option is implemented, the technology must be brought into line with the law.

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