

THE EVOLUTION OF EXCHANGE AND THE ONTOLOGY OF VALUE IN THE DIGITAL AGE: AN ECONOMIC-PHILOSOPHICAL STUDY OF THE CRYPTO-SECTOR TECHNOLOGIES

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Abstract. *Relevance.* Technological innovations that are driving the digitalisation of economic life are highlighting the need for a philosophical rethink of the nature of money, trust and value. The crypto sector is a particularly interesting area for the implementation of new forms of exchange that challenge traditional ideas about the monetary system. *Problem statement.* The emergence of cryptocurrencies as decentralised digital assets raises a number of fundamental economic questions concerning the autonomy of money issuance, the limits of state regulation, the nature of value, new forms of trust and economic freedom. It is becoming essential to critically rethink the technological and socio-historical aspects of the formation of a new ontology of value and exchange. *The purpose of the study* is to establish the conditions necessary for utilising the potential of the crypto sector to overcome the crisis of confidence and reduce transaction costs. *Materials and methods.* The study is based on an analysis of classical and modern economic theories of money and the concepts of decentralisation and monetary competitiveness. The study's methodology includes a systemic approach, structural and functional analysis methods, a comparative historical method and a dialectical method. *Results.* The present study analyses the evolution of the concept of 'private money' in the digital age, with a particular focus on the ontological, technological, and sociocultural dimensions of value and trust. To this end, cryptocurrencies and other crypto instruments are used as illustrative cases. The study demonstrates that cryptocurrencies can be understood as a partial realisation of the concept of 'private money' in a digital environment, where trust is based not on institutional guarantees but on algorithmic transparency and integrity. Ontological grounds for reconsidering value, economic freedom and relative autonomy in the digital economy have been identified. Several prerequisites for utilising the crypto-sector's potential to overcome the trust crisis and reduce transaction costs have been formulated. *Conclusions.* The crypto-sector is a space not only for the implementation of technological and financial innovations, but also a fundamental historical challenge to traditional views of the role of the state, centralised issuance, autonomy, self-regulation, trust, and value. Further study requires an interdisciplinary approach, in which the philosophy of economics plays a key role in conceptualising new forms of economic reality. This article provides an explanation of economic and philosophical ideas on the 'denationalisation of money', offering a structural analysis of contemporary practices that implement these ideas in blockchain, cryptocurrency and smart contract concepts.

Keywords: money, cryptocurrency, blockchain, smart contracts, trust, freedom, value, technological integrity, banking, non-bank financial institutions.

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1. Introduction

Cryptocurrencies are not a random historical and socio-economic phenomenon, but rather a logical continuation of scientific and technological development. They emerged at the intersection of advancements in mathematics, cryptography, computer science and networking. Blockchain technology is the result of the evolution of cybersecurity systems, decentralised networks and consensus algorithms that enable trust without the need for traditional financial intermediaries. This aligns with the broader trend of scientific and technological progress, alongside the digitisation of economic and social life, and the weakening of centralised structures due to new technological factors.

Cryptocurrency is an innovative financial instrument that has sparked considerable debate among economists, financiers, lawyers and politicians. While some researchers consider cryptocurrencies to be just another financial 'bubble' (Diehl et al., 2022; Chowdhury & Damianov, 2024), others see them as the foundation of the future financial system (Ryan, 2020; Fujiki, 2021). States are reacting ambiguously to this phenomenon: some are actively investing in digital assets, while others do not recognise them as legal tender and are simultaneously working on creating their own digital currencies.

2. Literature Review

The arrival of blockchain technology and various crypto assets represents a significant update to the economic infrastructure with consequences for financial markets, platforms and related areas. Some researchers emphasise that decentralised consensus mechanisms and blockchains have fundamentally changed the way participants store and transfer value without centralised intermediaries. These new technological capabilities have led to explosive growth in experimentation and applications in the areas of crypto, centralised finance and, in particular, decentralised finance (Biais et al., 2023). The article under discussion draws attention to theoretical and empirical trends in blockchain economics, ranging from consensus mechanisms and mining structures to issues of liquidity, market structures, and regulation. These are considered to be an important starting point for economic and philosophical analysis of innovations in the crypto sector.

Recent research (Radanliev, 2024) examining the applications of machine learning in finance and its implications for risk evaluation also critically examines which advanced and developing economies are better positioned to capitalise on these technological advances. Furthermore, it scrutinises the landscape of long-standing versus speculative crypto ventures, clearly distinguishing authentic

blockchain innovations from schemes that resemble scams.

A study by Uddin et al. (2024) focuses on new forms of data ownership and issues of value distribution, providing a broad overview with an emphasis on the synergy between blockchain, AI, and the Metaverse. This fits into the context of reflections on innovation as a socio-technical project and its economic and philosophical implications. The Metaverse is on the verge of a transformative shift, driven by the integration of state-of-the-art technologies such as artificial intelligence, blockchain, robotics, augmented reality, virtual reality and mixed reality. This convergence of innovations is poised to reshape the global digital landscape, fostering novel social structures, economic models, and operational frameworks for organisations and communities alike.

The discourse on cryptocurrencies and economic trust overlaps significantly with broader debates on digital technologies and human rights. Decentralised financial systems offer new opportunities for economic inclusion, privacy protection and autonomy – values that closely align with the human rights agenda in the digital age. However, the absence of clear regulation and accountability raises significant ethical and legal concerns, particularly with regard to transparency, consumer protection, and equitable access. From a philosophical standpoint, the emergence of crypto-economies redefines contemporary understandings of freedom and justice. They embody the promise of liberation from centralised control and the risk of reproducing new forms of digital inequality and exclusion. Some of the previously published papers (Borinshtein et al., 2021; Stovpets et al., 2023) address issues relating to freedom and justice and the challenges to human rights posed by digitalised social environments.

In addition, conclusions of the publication (Garratt & van Oordt, 2023) are considered to be of particular significance for the philosophical reflections on trust, reliability, and economic institutionalisation of crypto networks. This publication presents a model-empirical study that demonstrates how fixed investments in mining equipment affect the stability of PoW networks, their vulnerability to '51% attacks', and the entire economic dynamics within the crypto sector. The idea that economic incentives are linked to the institutional stability of networks is an important argument in economic and philosophical reasoning about how 'architecture' may determine norms and the distribution of benefits.

Another analytical paper on the role of mining technologies and investment dynamics supplements the aforementioned article. It focuses on the interplay between technological choice, barriers to entry and the distribution of economic benefits within the cryptoeconomy. The authors argue that, unless larger

miners have a significant comparative advantage in acquiring new hardware, investment leads to a more decentralised network (Capponi et al., 2023).

One of the recent publications (Mumford et al., 2024) presents a socio-philosophical analysis of how crypto instruments affect marginalised communities. The high volatility of the cryptocurrency market has generated immense wealth for some individuals, while resulting in severe financial losses for others. The authors argue that the problem lies in the fact that marginalised communities are disproportionately drawn to these new financial technologies, yet remain particularly susceptible to risks such as fraud, manipulation and systemic exploitation within the crypto ecosystem. At the same time, the perspectives and experiential knowledge of marginalised communities are still largely overlooked, as academic enquiry continues to favour dominant theoretical frameworks and conventional research methodologies. This imbalance in scholarly attention perpetuates established hierarchies of knowledge production and contributes to the ongoing socioeconomic marginalisation of groups that are already vulnerable.

The response to challenges affecting the financial interests of all social groups (both prosperous and marginalised) could be a move towards raising overall intellectual level and human potential, primarily through higher education. The primary trends and issues inherent in the reform of the education system are delineated in one of the preceding publications (Borinshtein et al., 2022). The enhancement of crypto-literacy has been identified as a pivotal component of contemporary educational reform.

A comprehensive review of Bitcoin's role as an asset class is presented in a study by Kang et al. (2025), which addresses issues such as volatility, portfolio diversification and regulatory implications. This study is highly relevant to discussions about the philosophical categories of 'value' and 'money' in the digital age. Another recent study provides a chronological and institutional analysis of the evolution of the crypto ecosystem. The article describes the transition from protocol innovation to complex financial instruments and institutional integration (Bongini et al., 2025). In this regard, an earlier article is equally important. This article builds a taxonomy of various cryptocurrencies based on how these actors present themselves and their projects to the general public (Cavallaro & Mathieu, 2024).

Stupak (2025) presents an illustrative article based on empirical research conducted in 41 countries between 2019 and 2024. The article demonstrates the impact of economic risks, inflation, currency instability and the regulatory environment on the adoption of crypto assets. The author also provides a socio-economic analysis of the role of 'digital money' in times of uncertainty.

From a methodological perspective, it is important to consider the issues in the crypto sector in the context of the so-called platform economy. In this respect, the authors took note of the related study in the Journal of Economic Methodology (Nik-Khah, 2025). The concept of platform economics offers a valuable analytical framework through which to understand the structural dynamics of the crypto industry. Cryptocurrencies and blockchain-based ecosystems represent a novel approach to market design, replacing traditional intermediaries with digital platforms and reshaping the distribution of value, trust, and governance. The crypto sector operates as a laboratory for these platformised economic models, where code, algorithms and decentralised protocols function as the primary coordination mechanisms. This transformation challenges conventional economic theories by blurring the boundaries between markets, technologies, and institutions. It also raises critical questions about power, inclusivity, and the ownership of digital infrastructures.

These reflections are supplemented by a critical analysis of the conditions under which cryptocurrencies could function as a unit of account in theory. The article (Aguila, 2025) compares classical theories of money (commodity, credit and institutional) with the characteristics of crypto assets. It concludes that the structural features of cryptocurrencies, such as decentralisation, price instability and a lack of state-backed emission, seriously limit their ability to become a fully-fledged unit of account without institutional transformation.

Some recent studies have drawn attention to ecological issues in view of the significant energy consumption of crypto farms and data centres. In particular, the present study considers an article by Koemtzopoulos et al. (2025) to be of particular importance, as it analyses the role of stablecoins and similar technological solutions in the carbon footprint of the crypto ecosystem. Clarifying this issue is crucial for economic and philosophical discussions on the 'ethics of innovation' and sustainable development.

3. Methodology

The study is based on an analysis of classical and modern economic theories of money and the concepts of decentralisation and monetary competitiveness. The study's methodology includes a systemic approach, structural and functional analysis, a comparative historical method and a dialectical method.

4. Results & Discussion

To understand the conditions that led to the creation of cryptocurrencies, it is helpful to look back at the events of 2008, when the global financial system was

hit by a major shock. September 2008 marked the beginning of a deep economic crisis, foreshadowed by the collapse of Lehman Brothers, one of the largest investment banks in the United States, which had been operating since 1850 and employed around 26,000 people in various countries. Between 2003 and 2008, the volume of mortgage loans issued by the bank increased from 18 billion USD to 680 billion USD. Meanwhile, the equity capital of Lehman Brothers amounted to approximately 22.5 billion USD. From a financial standpoint, this meant that the bank's assets in the risky mortgage market exceeded its actual equity capital by a factor of 30. With such a vulnerable credit strategy, even a 3–5% decline in the US housing market would immediately leave the bank without any capital. This is precisely what occurred at the beginning of the 2008 mortgage crisis (US Senate, 2010; Walker & Clarke, 2012; Ball, 2018).

The global economy entered a recession that lasted several years. This period was characterised by a decline in purchasing power and industrial production, mass layoffs and rising unemployment, reduced lending and slower economic growth. Every country integrated into the global market was affected by the negative impact of the financial crisis. In the US alone, nearly 2 million people lost their jobs, and pension funds around the world suffered huge losses. How could this happen? The fact is that, in the years leading up to the crisis, banks were issuing mortgage loans to anyone who wanted one without considering the borrower's ability to repay. They then packaged these loans into separate stocks and securities and earned billions from this irresponsible speculation. Later, most of these banks were saved from bankruptcy by the state because they were deemed too important to the financial system to be allowed to fail. But where would the money to rescue them come from in the midst of a financial crisis? Some came from the budget (i.e., taxpayers' pockets), and the rest was simply printed, thereby devaluing people's savings.

It transpired that banks had initially earned unjustified extra profits, after which the state bailed them out at the expense of taxpayers. One of the main causes of the 2008 crisis was excessive lending: banks provided mortgage loans on a massive scale and turned them into financial instruments that were actively sold on the market. However, when the mortgage crisis hit, leading to the mass repossession of properties and a fall in their value, as well as bankruptcy threats for large creditor banks, the central bank had to carry out financial interventions using tax revenues and the additional issuance of unsecured money, with all the ensuing consequences (primarily an increase in the inflation rate). As a financial monopolist, the state could afford to use money in this way.

In this context, the issue of *financial justice* has become particularly relevant. Could an alternative financial

system be created that would prevent such crises from happening? It was during this period that Bitcoin, the first cryptocurrency, was introduced with the aim of creating a decentralised financial system that is independent of the state and protected from inflationary risks and manipulation by central banks.

In the traditional financial system, government agencies and banks are responsible for the issuance, storage and control of cash flows. The idea of creating a currency that was not subject to government agencies or banking structures seemed utopian. However, in 2008, an individual (or group) operating under the pseudonym Satoshi Nakamoto published a document describing the concept of Bitcoin, a digital, peer-to-peer payment system. It operates based on decentralised accounting of transactions between all participants, who have equal status.

Imagine a situation in which one user wants to transfer a certain amount of 'digital coins' to another user. These are simply numbers representing units of account, recorded using cryptographic methods. They transfer their funds in the form of 'digital coins' and can similarly receive funds from another user to their digital account. These transactions must be recorded in such a way that they cannot be altered or cancelled. In traditional financial systems, banks perform this function, but in Bitcoin (hereafter referred to as 'BTC'), this information is stored in the form of a distributed ledger that is accessible to all network participants.

This system is based on *blockchain* technology, which involves a chain of blocks containing encrypted records of all transactions. Each new block contains the hash code of the previous block, ensuring an unbreakable link between them. If changes are made to one of the blocks, the hash code of all subsequent blocks changes, which makes fraudulent manipulation extremely difficult. As blockchain is a distributed accounting system, copies of it are stored in many network nodes (Seow, 2020) and any unauthorised interference is instantly detected by other participants.

The document (Nakamoto, 2008: 2) defines an 'electronic coin' as a chain of digital signatures. Each owner transfers the coin to the next owner by digitally signing the hash of the previous transaction and the next owner's public key, and adding this to the end of the coin. The recipient can verify the chain of ownership by checking the signatures.

Thus, blockchain acts as a kind of accounting ledger that stores data on all transactions. Unlike traditional accounting systems, however, this information is not controlled by a centralised authority, but is distributed among all participants. This ensures transparency, resistance to change and a high level of trust, eliminating the need for external intermediaries.

Blockchain technology is essential for the operation of cryptocurrencies. It provides decentralised storage and accounting of transactions. Creating a new block

in the blockchain involves finding its hash, which is a unique cryptographic identifier determined by solving a complex computational task. This process is known as 'mining', and its participants are called 'miners'. Once a miner has found the correct hash, they notify the other network participants. They verify the correctness of the newly found block and confirm that it complies with the overall structure of the blockchain (Calvão, 2019). If successful, the new block is added to the chain and the miner receives a reward in the form of new bitcoins (BTC). Thus, bitcoin issuance is carried out through the mining mechanism, replacing the traditional centralised state-issued currency system. However, this raises the question: how could such technology take root in a situation where the state has a monopoly on money issuance?

The idea of 'private money' originated in the work of F. Hayek (2007), which was published and republished with revisions between 1976 and 1978. Hayek proposed correcting the defects of the financial system, such as inflation, instability, unreasonable increases in government expenditure and the constant growth of public debt, by removing the state from its role as issuer and transferring this function to private entities that would pursue a more disciplined monetary policy. According to Hayek, this would help preserve the value of money, and he termed this change in approach to currency issuance 'the denationalisation of money'.

Among other things, F. Hayek observes that government monopolies on money issuance were problematic even when metal money was in circulation. However, it became an intolerable calamity when paper money (or other forms of symbolic currency), which can be the best or worst kind of currency, came under political control (Hayek, 2007: 25).

Hayek reinforces his arguments with the following statement: 'Government cannot act in the general interest. Even if the government knew what to do about the money supply in the general interest, it is highly unlikely that it would be able to act accordingly. Once governments are given the power to benefit particular groups or sections of the population, the constant temptation to meet local or sectional dissatisfaction by manipulating the quantity of money, so that more can be spent on services for those clamouring for assistance, will often be irresistible. Such expenditure is not an appropriate remedy but necessarily upsets the proper functioning of the market' (Hayek, 2007: 80).

In his review of Hayek's book *Denationalisation of Money*, D. Howard notes: 'Hayek points out two major economy-wide advantages of competitive money supply in addition to the increase in consumer choice and, hence, welfare. First, he contends, since competitive money would lead to a stable price level, it would tend to ameliorate the problem of business cycles by improving the predictability of prices and, hence, their information value. (For example, if

a particular relative price changes under a free-market regime, it is more likely the result of a fundamental change in the economy, rather than simply the result of a change in the rate of monetary expansion). Second, abolishing the monopoly of government in the supply of money would weaken government power and increase individual freedom' (Howard, 1977: 4).

A notable feature of cryptocurrencies is their decentralised nature, as well as their transboundary and denationalised character. The concept of Bitcoin, the first and currently most authoritative cryptocurrency, was presented on the internet in 2008, primarily attracting the interest of cryptography specialists. On January 3, 2009, the first block in the Bitcoin blockchain, known as the 'genesis block', was created. This block contained no transactions, only a text message: 'Chancellor on brink of second bailout for banks'. This was the front-page headline of the British newspaper 'The Times' that day (Elliott & Duncan, 2009).

The message in question highlighted the crisis in the global financial system and the need for an alternative approach to money. On January 12, 2009, Nakamoto conducted the first ever Bitcoin transaction, sending 10 BTC to programmer Hal Finney. Over time, more and more users joined the network to try out the new technology and become miners (Davis, 2011). In the early stages, Bitcoin did not function as a means of payment, so it had little value and was primarily used for testing purposes.

The situation began to change in 2010 when the first commercial transaction involving Bitcoin took place. 10,000 BTC (worth approximately \$40 at the time) were transferred in exchange for two delivered pizzas. This event is considered a milestone in the history of cryptocurrencies, as it demonstrated that tangible items could be purchased with 'virtual coins'. Bitcoin gradually gained popularity and its price began to increase. This raises the question of what determines the value of cryptocurrency and why people are willing to buy, sell and use it for payments. The answers probably lie in the decentralised nature of cryptocurrencies, the relative anonymity of users, the limited issuance of cryptocurrencies, and the growing public confidence in alternative financial systems. This creates a dialectical problem concerning the relationship between transparency, publicity, and privacy. This problem is solved differently in centralised and decentralised payment systems.

The traditional banking model achieves a certain level of confidentiality by limiting access to information to the parties involved and a trusted third party only. This method is ruled out by the need to publicly announce all transactions (as is the case with blockchain), but confidentiality can still be maintained by breaking the information flow at another point, for example by keeping public keys anonymous. While the

public can see that someone is sending a certain amount to someone else, they cannot link the transaction to a specific person. This is similar to the level of information disclosed by stock exchanges, where the time and size of individual transactions (the 'ticker') are published, but the parties involved remain anonymous (Nakamoto, 2008: 6).

It should be noted that, back in 1998, Nick Szabo – a scientist specialising in informatics and cryptography – developed an algorithm for a decentralised digital currency and termed it 'bit-gold' (Szabo, 2008). He proposed a market mechanism model based on inflation management and explored ways of identifying *reliable* information in an *unreliable* decentralised system. In cryptography, there is a metaphorical notion called the 'Byzantine Generals Problem' (Lamport et al., 1982; Fedotova & Veltri, 2006). This cryptological task involves ensuring the correct interaction between several remote operators who have received orders from a central location. Some of the operators, including the centre, may be malicious, or external malicious actors may have tampered with the messages during transmission. Therefore, a unified action plan must be developed to benefit the remaining honest operators.

In what manner can the fundamental *problem of decision-making* in a decentralised environment be articulated? The following discussion will turn to an allegory. The Byzantine army is comprised of n legions, with each legion under the command of its own general. All generals are subordinate to the commander-in-chief. In theory, any of the generals (or even the commander-in-chief himself) could be a traitor. The night before the battle, each general receives a secret order from the commander-in-chief detailing what should be done at 10 a.m. the following day. The time is the same for everyone and is known in advance. The options for the order are: 'attack the enemy' or 'retreat'. Depending on the combination of different decisions, there are three most likely outcomes: a) If all loyal generals attack together, Byzantium will destroy the enemy army (a favourable outcome); b) If all loyal generals retreat in an organised manner, Byzantium will preserve its army but will not achieve victory (an intermediate outcome); c) If some loyal generals attack and some retreat, the enemy will gain the upper hand and can destroy the entire Byzantine army in parts (an unfavourable outcome).

It is also important to consider the possibility that, if the commander-in-chief is a traitor, they may issue conflicting orders to different generals in order to create chaos. Therefore, generals must plan for this possibility and avoid acting independently of each other. If each general acts completely independently of the others, for example by making random choices, the probability of a favourable outcome is very low. For this reason, generals need to exchange information

with each other promptly in order to reach a unified decision.

However, in addition to the technical, logical and informational aspects of cryptocurrencies as a form of 'private money', as described above, it is equally important to understand the psychological and historical-philosophical nuances of how the global financial system was built and the structural problems that ultimately made the phenomenon of cryptocurrency possible.

In order to understand why people may become dissatisfied with traditional payment methods and seek alternatives, enabling the existence and growth in value of cryptocurrencies, it is necessary to consider the nature of money itself. Throughout human economic history, exchange has been a fundamental concept: to obtain a certain good or service, something must be given in return. In fact, money is *whatever people agree to recognize* as money. Initially, items of general value such as livestock, food, furs and leather were used as currency. Over time, however, people realised that these forms of currency were inconvenient, and so they began using precious metals and coins minted from them (McWilliams, 2025).

As the global economy developed, metal money became less practical. It was difficult to transport and control its circulation. Most importantly, there was not enough of it to meet the growing financial needs of states, especially during wars. Consequently, in the 18th century, Europe transitioned to using paper money, initially tied to gold and silver (bimetallism). For the next two centuries, the global economy operated on the basis of the gold standard, whereby national currencies (such as pounds, guilders, dollars and francs) were backed by real precious metal reserves.

There were three stages of gold standard. The *gold coin standard* was the classical gold standard, when the basic monetary unit was defined in gold coins, while the banknotes and coins of other metals in circulation could be freely and without restrictions exchanged for gold coins at their nominal value. In other words, any holder of a banknote could exchange paper money at a bank for gold coins or gold bars at a fixed guaranteed parity, which was printed on the banknotes themselves. Between 1816 and 1914, the English pound sterling could be freely and unconditionally converted into gold (Challis, 1992). At that time, it was the world's main reserve currency. However, with the outbreak of the First World War, all belligerent countries suspended the free conversion of banknotes into gold. The United States was the exception, however, as the gold coin standard remained in place there until 1933.

Following the First World War, Great Britain and France's attempts to return to the pre-war gold-coin standard were inevitably unsuccessful. This was mainly due to a mismatch between real gold reserves and the amount of paper money in circulation. The British

pound lost its position as the world's reserve currency, being replaced by the US dollar. However, the gold-coin standard was also abolished in the USA in 1933. The *gold bullion standard* replaced it, whereby paper money could still be exchanged for gold, but only in the form of bullion weighing at least 12.5 kg. Obviously, few people could take advantage of this opportunity. This eliminated millions of potential small-scale claimants to gold reserves.

Following World War II, around three-quarters of the world's gold reserves were located in North America (Draper, 1979), leading to the US dollar becoming the world's main currency. Under the Bretton Woods system (1944–1971), all other currencies were pegged to the US dollar, which was in turn pegged to gold. In turn, the US was obliged to maintain a parity of 35 USD per one troy ounce of gold. This type of gold standard is sometimes referred to as the '*gold exchange standard*' (also, the '*gold-fiat standard*'). Only governments, represented by central banks, were permitted to exchange US dollars for gold. However, in 1971, the US refused to convert USD into gold because there was much more paper USD in global circulation than there was gold in the US Treasury to back it up. Since then, money has become completely fiat, meaning its value is based on people's trust and the guarantees of central banks rather than physical collateral.

In summary, the monetary standard underwent a series of metamorphoses during the relatively short historical period from 1816 to 1971. First came the Gold Coin Standard, a system in which paper money could be freely exchanged for gold coins of full value and gold coins circulated as legal tender in everyday transactions. Then came the Gold Bullion Standard, where paper money could be exchanged for fixed amounts of gold in the form of large gold bars ('bullion'), but not coins, thus restricting access to gold for most individuals. Eventually, the Gold Exchange Standard emerged. This system saw national currencies backed by particular foreign currencies (such as the US dollar, British pound and Swiss franc), which were in turn tied to gold. This led to the Bretton Woods system and the 'Nixon shock', after which the Jamaica Accords were established (i.e., a floating exchange rate regime was introduced, where the exchange rate is determined by supply and demand in the currency market). Governments and their central banks gained new levers of national monetary policy through interest rates, public debt and currency issuance, while gold ceased to function as global currency and became a commodity traded on the stock market. The world finally transitioned to a system of *fiat currencies* that are virtually unrelated to gold reserves. However, these changes have undermined collective trust and confidence in traditional monetary mechanisms.

Fiat money has several key features. Firstly, the government controls its circulation by printing

new banknotes, which can lead to inflation and the devaluation of savings. Secondly, monetary transactions are carried out through banks, which can lose their depositors' funds for various reasons. Therefore, contemporary money is not fully under the control of its owners.

It is possible to estimate the inflation rate of the world's most popular currency. If one troy ounce of gold was worth 35 USD almost a century ago, and if one ounce has recently (in the spring of 2025) had an average cost of about 3,300 USD (Gold price, 2025), by what percentage has the US dollar devalued in less than 100 years? The approximate figure is 9,330% relative to gold. In essence, fiat currency is characterised by its lack of inherent stability, despite its issuance being subject to centralised regulation and its value being guaranteed by the economy of the world's most influential nation.

Unlike fiat money, cryptocurrency – Bitcoin in particular – is decentralised: it belongs directly to the owner and no banks or state intermediaries are required for transfers. To make a transaction, one only need the recipient's crypto wallet address, which is similar to a card or bank account number. Another difference between Bitcoin and fiat money is that the supply of Bitcoin is strictly limited – the total number of coins issued will not exceed 21 million. Additionally, the mining mechanism provides for the reward for adding a new block to be halved every 210,000 blocks. For instance, whereas in 2009 the reward for a miner was 50 BTC, today it is approximately 3 BTC. Nevertheless, the number of miners is growing. While mining used to be possible on a standard home computer with a powerful graphics card and processor, entire crypto farms consisting of thousands of specialised devices are now engaged in this activity.

While the amount of fiat currency is constantly increasing due to government printing, Bitcoin is not subject to inflation in the usual sense thanks to its limited emission algorithms. This is why it is sometimes called 'digital gold'. People trust Bitcoin because it has been in operation for over 10 years, giving its users more control over their funds. Thus, the value of Bitcoin is not based on physical collateral – although it also cannot exist without the physical infrastructure required to implement blockchain technology, which consumes a lot of electricity – nor on state protection. Instead, it is based on users' belief in its unique technology and principles of decentralisation.

However, Bitcoin's performance is quite low at only seven transactions per second, whereas the Visa payment system can handle around 24,000 transactions per second. While this slowness ensures Bitcoin's stability, it also limits its potential for widespread use. Once blockchain technology became widely available and popular, many developers started working on ways to speed up cryptocurrency transactions. In 2011,



Figure 1. US dollar inflation compared to the price of one troy ounce of gold between 1944 and 2025

a former Google employee created a cryptocurrency that was eight times faster than Bitcoin, with a simpler mining process and lower transaction fees. While Bitcoin was often referred to as 'digital gold', this new coin, Litecoin, was metaphorically known as 'digital silver'. Nevertheless, Litecoin was not the only alternative to Bitcoin. In 2012, Ripple, a cryptocurrency, appeared. Unlike the traditional SWIFT banking transfer system, it allowed money transactions to be carried out in seconds with virtually no fees.

Following on from 2012, the number of alternative cryptocurrency projects continued to grow. However, the real revolution in the crypto industry was sparked by the advent of so-called 'smart contracts'. The key idea was to improve blockchain technology and solve the fundamental *problem of trust* in the economy. To this end, the Ethereum platform was launched in 2015. Initially, it was not so much created as a payment system as it was created to provide an affordable basis for the implementation of blockchain technology in side projects.

Smart contracts work as follows: if a purchaser wishes to buy, for example, an apartment, they usually go to a bank and open a letter of credit account. The seller only receives money from this account after signing the purchase agreement, which is monitored by the bank for fulfilment. The bank charges a commission for its services. In Ethereum, the bank's role is eliminated: the system automatically verifies that the contract terms have been met and, when they have been, transfers funds from one cryptocurrency wallet to another. This ensures speed, security and low costs for intermediary services compared to a bank.

The idea of Ethereum was so promising that, even at the initial coin offering (ICO) stage, the development

team attracted investments totalling more than 18 million USD, and the value of the platform's own cryptocurrency (ETH) has grown exponentially since its launch. Additionally, the decentralised finance (DeFi) market has developed thanks to 'smart contracts', allowing users to anonymously exchange cryptocurrencies, obtain loans, and place assets on deposit without the involvement of banks (Corbet et al., 2022).

Ethereum has also greatly simplified the creation of new cryptocurrencies. There is no longer any need to develop one's own blockchain; the tools in the Ethereum ecosystem are sufficient. This has led to a rapid increase in the number of cryptocurrency projects, some of which have turned out to be 'scams', i.e., fraudulent schemes. This was particularly noticeable in 2017, when the ICO boom was comparable to the rapid development period of Internet companies in the late 1990s. The ICO scheme works as follows: developers create a startup project and position it as promising in order to attract investment. To this end, they issue their own cryptocurrency for the project and pledge investors a significant increase in its value as a result of the project's future success. In this scheme, cryptocurrency is similar to shares. These new 'coins' are sold on the open market for real fiat currency, and the startup company that issues them fuels demand by promising investors solid returns (although, of course, this is only if the startup takes off). However, this scheme carries significant risks.

Unlike traditional investments, where companies have to follow certain laws and share their financial reports, the ICO world has almost no oversight, which makes it tricky. Any startup can launch its own cryptocurrency, collect money from investors and then

simply disappear. Since 2017, the ICO industry has seen many cases of investors contributing large sums to empty projects in the hope of huge profits. While the value of the cryptocurrency may temporarily increase, most tokens ultimately depreciate (Swartz, 2022). Many projects turned out to be outright fraudulent, while others were simply unviable, either because of the nature of their activities or from a technological point of view. Only a small fraction of projects lived up to investors' expectations. Essentially, ICOs have become a new form of venture capital, but without any investor protection mechanisms.

For example, following the release of the Squid Game series, information appeared online about a crypto project whose developers promised to hold a tournament based on the TV show. In order to participate, one had to purchase the SQUID coin that they had issued. As the number of buyers grew, so did the value of the coin. However, it then became clear that, while it was possible to *buy* SQUID coins, it was impossible to *sell* them. The project closed, the sales website and related social media pages disappeared, and the value of the token plummeted. This is a classic example of a fraudulent ICO.

Albeit, not all ICOs were fraudulent. For example, Ethereum previously generated significant profits for early investors. Nevertheless, most crypto projects turned out to be financial bubbles that exploited human greed. If investing real money in virtual coins to participate in a game seems pointless, what can be said about buying digital images for tens of thousands of dollars?

At the start of 2021, the Christie's auction house sold a 'digital painting' by the American artist Mike Winkelmann, known by the pseudonym Beeple, for 69 million USD. Entitled *Everydays: the First 5000 Days*, the work consisted of 5,000 images created by the artist every day for 14 years. While Christie's had previously sold highly valuable items, these were mostly unique works of art. Examples include Leonardo da Vinci's 'Savior of the World' (1499), which was sold to a Saudi Arabian prince for 450 million USD in 2017, and Pablo Picasso's 'Young Girl with a Flower Basket' (1905), which fetched 115 million USD. Unlike the aforementioned works, however, Beeple's 'painting' did not exist in physical form – only its non-fungible token (NFT), which confirmed symbolic ownership rights, was sold. As the work has no physical form and is presented exclusively as a JPEG file that can easily be copied and distributed, the auction house did not sell the file containing the image itself. Only a unique token associated with the image was sold: the NFT, which was formed in the blockchain and certifies ownership of the artwork. This was the first time in history that such an object had been sold at auction for the price of a classical art masterpiece (Wang et al., 2023).

Unlike BTCs (Bitcoins) and ETHs (Ethereums) – of which millions have been issued – NFTs (non-fungible tokens) are unique digital assets, each one different from the next. They are somewhat similar to works of art: the original 'Mona Lisa' is kept in the Louvre, although reproductions and digital copies are widely available. The 'Mona Lisa' belongs to humanity and world culture, but the Louvre is the actual owner, custodian and beneficiary. Similarly, the blockchain for NFTs allows anyone to check who 'owns' a particular digital object. However, the real value of the latter may prove highly questionable in a very short time.

Despite the initial controversy surrounding NFTs (Han & Nah, 2023), Beeple's artwork sale sparked a frenzy, demonstrating the 'greater fool theory' in action. Diverse groups of people spent substantial amounts of real money on not only 'digital paintings', but also 'memes', GIF files and mobile game characters. The most famous NFT project was the 'Bored Ape Yacht Club' collection, comprising 10,000 'unique images of bored apes' (Cellini et al., 2023). The developers attracted pop culture figures who publicly displayed their 'unique digital purchases'. This widespread interest, which came as a surprise to many, was reminiscent of the 17th-century 'tulip mania', but instead of tulip bulbs, traders were reselling digital images (more precisely, their NFT tokens).

As expected, the NFT boom ended as suddenly as it began, with trading volume plummeting by 97% and most tokens losing their value. It transpired that many influencers who had ostensibly purchased NFTs were merely fuelling demand in order to resell their assets at a higher price amid this strange surge in popularity. It later emerged that even the people who bought Beeple's work for 69 million USD did so to draw attention to their own cryptocurrency, which soon lost almost all of its value (naturally, all of its holders lost their money).

The ICO and NFT examples are just the tip of the crypto industry iceberg, illustrating cases of fraud based on unreasonable expectations. In this sense, they are financial pyramid schemes implemented using blockchain technology. But can such projects be considered a 'scam' (fraud)? This occurs when investors or users sell a certain crypto asset en masse in order to convert it into fiat currency, causing its value to collapse very quickly. However, an alternative scenario should be considered. It is to be posited herewith that there is an insurance company in a certain city that insures the majority of local car owners. In a sudden occurrence, hail begins to fall in this city, resulting in damage to all insured vehicles. Should all insured owners opt to file claims for compensation simultaneously, this could potentially result in the insurance company's bankruptcy, as it would be unable to fulfil its financial obligations to its customers. However, the question arises as to whether such a sudden financial insolvency

of the insurer can be classified as a 'scam'. The same thing happens with banks when most depositors decide to close their accounts and withdraw their money. After all, it is no secret that banks use their customers' deposit funds to carry out credit and financial transactions. However, when the owner of the FTX crypto exchange was suspected of lending customer funds to partner companies, this caused panic and a surge in customer requests to withdraw funds from FTX. The company was unable to satisfy these requests.

Therefore, the risky nature of any financial institution means that, in the vast majority of cases (unless we are talking about the production of real goods and services, where there is at least a net cost and obvious utility), the value of an asset is determined by the project's creator's ability to convince investors of the project's potential to increase capitalisation in the future. As soon as investors start to doubt their ability to sell their assets at a higher price tomorrow than they bought them at yesterday, the value decreases. This process can be either predictable and slow or sudden and uncontrollable. This is a standard market process. Of course, some 'crypto projects' never intended to fulfil their obligations from the outset but instead aimed to attract customer funds, which is undoubtedly a scam. However, as will be demonstrated below, even legitimate projects are not immune to bankruptcy risk, as the existence of any digital asset (and the platforms on which they are traded) hinges on two psychological factors: trust and the desire to become wealthy.

Consider a case involving certain financial risks for users: the online digital currency exchanger (DCE). The terms 'electronic currency exchange', 'digital currency trading provider', 'crypto-trading service', 'electronic exchange platform' and 'crypto exchanger' are also used in this context. In 2010, a new type of organisation emerged, pioneering a fundamentally new approach to trading digital assets by creating convenient platforms for exchanging various cryptocurrencies. These were actually the first centralised crypto exchanges, ushering in a new era of cryptocurrency trading and making it accessible to a wide range of users. One of the most famous platforms was Mt. Gox, which collapsed in 2014. Another was FTX, which went bankrupt in 2022 when approximately 6 billion USD was withdrawn from the exchange in three days due to a loss of investor confidence. This resulted in the loss of a further 10 billion USD, both from regular customers who kept their crypto wallets there and from the owners of FTX tokens.

However, there are also successful examples of cryptocurrency exchanges. One such example is Binance, a cryptocurrency exchange service that has been operating since 2017 and has gradually evolved into a major blockchain company offering a wide range of services. By January 2018, Binance had become the world's leading cryptocurrency exchange in terms of

trading volume, and by the end of 2020, it had an average daily turnover of 3.88 billion USD. As of September 2025, Binance's average daily trading volume is around 25 billion USD (Top Cryptocurrency Spot Exchanges, 2025). Four types of trading are available on Binance: spot, margin, futures and P2P.

Another relatively reliable 'crypto exchanger' is the American company Coinbase, whose average daily trading volume ranges from 2.5 billion USD to 3.5 billion USD. In April 2021, Coinbase became a public company on the NASDAQ stock exchange through a direct listing of its shares. In October 2022, it entered into a partnership with Google Cloud Platform, enabling the latter's customers to pay for cloud services with cryptocurrencies supported through Coinbase Commerce. Another example of sustained success is Kraken, a digital currency exchange that has been operating since 2011 with an average daily trading volume of 1.8 billion USD (as of September 2025). This is a clear example of how innovative financial platforms are building their own digital ecosystems while also integrating with the digital services of established platforms such as Google and Amazon. However, in order to do so, they must agree to *partially relinquish their anonymity and decentralisation*. In the case of Coinbase, they also become participants in the stock exchange, making them subject to US financial regulations.

Therefore, despite the increased riskiness of cryptocurrencies, it cannot be said that the entire crypto industry is fraudulent. Blockchain remains a revolutionary technology that is already transforming certain administrative and financial sectors. This understanding is even emerging at the state level. For example, consider El Salvador. In 2001, El Salvador abandoned its national currency in favour of the US dollar to attract investment and stabilise the economy. Twenty years later, the country's government announced the adoption of Bitcoin as an official means of payment. This decision has been met with mixed responses from researchers (Vázquez, 2022; Boos, 2024; Kim et al., 2024).

This step was indeed aimed not only at innovating and developing the crypto industry, but also at reducing El Salvador's economic dependence on the United States. Today, Bitcoin is used in El Salvador as an alternative payment method alongside the US dollar. However, since the removal of the Salvadoran national currency (the colon) from circulation in 2004, the country has had no means of influencing the national economy. This is precisely why most countries refuse to recognise cryptocurrency as *legitimate money*. Government authority largely hinges on control over the issuance of financial instruments (such as the discount rate), providing the ability to regulate the economy. Losing such control could therefore undermine the functioning of traditional financial institutions.




#	Exchange	Trading volume(24h)	Avg. Liquidity	Weekly Visits	# Markets	# Coins	Fiat Supported
1	 Binance	\$25,063,731,337	941	11,219,193	2174	580	ARS, AUD, BRL and +86 more ⓘ
2	 Bybit	\$4,967,597,102	718	3,669,603	1312	759	BRL, CHF, CZK and +72 more ⓘ
3	 Coinbase Exchange	\$3,500,971,058	782	42,874	470	330	USD, AED, ARS and +61 more ⓘ

Figure 2. Top Cryptocurrency Spot Exchanges on 23.09.2025

Source: <https://coinmarketcap.com>

Another factor affecting the stability of the cryptocurrency market is its concentration in the hands of a small group of owners (Sai et al., 2021). For example, more than 60% of all bitcoins in circulation are held in fewer than 0.5% of crypto wallets. If large investors, known as 'whales', were to sell their assets simultaneously, this could cause a dramatic drop in the value of cryptocurrencies and destabilise the entire system (world.org, 2024). Furthermore, the expansion of cryptocurrencies is limited by their diversity and technological characteristics. For example, Bitcoin and Ethereum operate on different blockchains, which makes it difficult to use them as a single means of payment for all users simultaneously. As with traditional currencies, the problem of conversion is ever-present, and is exacerbated by the multitude of cryptocurrencies, each with their own value, reliability, security and reputation among users.

The high volatility of Bitcoin and 'altcoin' exchange rates makes it impossible to plan long-term finances directly in cryptocurrency. This also limits its use in the real economy. This has led to the development of instruments such as 'stablecoins', the best-known examples of which today are USDT and USDC. While most countries do not yet recognise cryptocurrency as an official means of payment, they do classify it as an *investment asset*.

It is important to emphasise that both the traditional system, in which governments control the issuance and circulation of money, and the decentralised system based on blockchain technology are founded on *mutual* trust between participants. In the former, the state's authority as an issuer is backed by the entire national economy and the population's faith in the financial regulator's competence. In the second case, the focus is on a decentralised consensus within the crypto community that a particular crypto asset is trustworthy and has a certain value in fiat currency.

Returning to the ideas of Hayek, it is worth mentioning another of his thoughts from the book: strictly speaking, in a scientific sense, there is no such thing as a perfectly stable value of money – or of anything

else. Value is a relationship, a rate of equivalence (Hayek, 2007: 58). Therefore, cryptocurrencies are not exempt from this feature as a monetary instrument.

Most governments are taking a cautious approach: they are not banning cryptocurrencies in recognition of the potential of blockchain technology. However, they are also not granting them official currency status, as this would threaten the state's influence over the entire financial infrastructure. In response to the growing popularity of cryptocurrencies, governments are developing so-called *Central Bank Digital Currencies* (CBDCs). Although these assets are blockchain-based, they remain under state control. Using smart contracts in CBDCs increases the transparency of monetary transactions in the digital space. Incidentally, this significantly complicates financial fraud, such as money laundering through crypto assets. However, the pressing issue of the current study has been left to one side.

5. Conclusions

The development of cryptocurrency technologies has given rise to two parallel yet interrelated financial systems. The first is the traditional economy, which is based on centralised (state-controlled) monetary systems that use fiat money and are regulated by governments and central banks. The other is a decentralised system of digital assets operating on the basis of *blockchain technology* and *social consensus* among users, cryptocurrency exchanges, miners and other participants in the crypto market. However, it is important to understand that both fiat and digital currencies are symbolic and unsecured, with their nominal value set independently of the value of the materials (or energy) used to produce them. Both fiat and digital currencies exist thanks to people's *trust* and *shared belief* in their purchasing power. In this sense, both types of money can be considered fiduciary, as they are simulacra.

This study provides evidence to support the hypothesis that cryptocurrencies, defined as those that have been in circulation for over a decade, can

be categorised as a form of money rather than mere assets. As with any medium of exchange, they serve at least the following functions: as a store of value (a tool for preserving value and fixing prices); as a unit of account (a tool for recording mutual obligations); and as a medium of exchange (a tool for simplifying the exchange of goods of different kinds). However, given that cryptocurrencies are still unable to abandon the assessment of their own value in US dollars in order to perform the function of preserving value, presently they cannot be considered a completely autonomous and self-sufficient means of payment. It is not possible to ascertain the present value of Bitcoin without first measuring its value in global fiat currencies. This assertion is further substantiated by the emergence of the 'stablecoin' instrument.

The aforementioned prompts an emphasis on the fact that, as a type of 'private' money, cryptocurrencies can be viewed as more than just a monetary instrument (i.e., a means of payment). Given the high inflationary risks associated with government-issued money and the difficulties of accessing fair credit in many countries, new opportunities are emerging for cryptocurrencies. Among them are:

- Purchasing cryptocurrencies as a form of protection against the constant devaluation of fiat money, as a tool for hedging financial risks through asset portfolio diversification (when an investor adds digital assets to traditional ones already in the portfolio, together with stock indices, shares, and real estate);
- viewing cryptocurrency as a 'digital commodity' for potential speculation;
- using cryptocurrencies as a new means of raising credit funds without applying to banks (in particular, issuing own tokens, which essentially becomes a crowdfunding tool);
- switching from fiat money to cryptocurrencies as a way to circumvent government sanctions, since opening a crypto wallet does not currently require identification of the owner, and as long as the funds remain in the crypto wallet, no one except the owner can dispose of these funds (block or arrest them, confiscate or write them off), provided that security rules are properly followed.

Finally, with the aim of formulating effective proposals for using the potential of the crypto-sector to overcome the crisis of trust and reduce transaction costs, in the light of this study, the authors suggest paying particular attention to the following principles: 1) *institutionalisation of decentralised technologies*

(in particular, the introduction of blockchain solutions in systems for registering rights, contractual obligations, and value circulation can increase the transparency of transactions, reduce information asymmetry, and accordingly, strengthen trust between counterparties without the need to involve centralised intermediaries); 2) *further development of stablecoins based on transparent monetary reserves* (the growth of stablecoins, which are backed by clearly defined and independently verified real reserves, will stabilise cryptocurrency payments and reduce monetary risk, currently hindering the adoption of digital assets in the real economy); 3) *introduction of smart contracts in cross-sector settlements* (further automation of the performance of financial and legal obligations using smart contracts will reduce the cost of legal support for transactions, shorten their execution time, and eliminate numerous opportunities for abuse and violations of agreements, on the basis of algorithmic integrity); 4) *support for decentralised identification mechanisms* (the authors believe that using decentralised digital identity systems will enable economic actors to be verified without the risk of centralised data leaks, thereby strengthening confidence in safe interactions on digital platforms); 5) *development of regulated crypto exchanges and custodial services* (the creation of more transparent and auditable trading and storage platforms based on crypto technologies will minimise the risks of fraud, ensure the safekeeping of assets, and simultaneously reduce the total cost of servicing financial transactions).

Ultimately, it is important to note that control over money is linked to the creation of a specific social reality. 'Private money' and denationalised currencies challenge established forms of power and hierarchy, offering a new ontology of value that is decentralised, pluralistic and flexible. They create space for economic diversity, enabling communities to establish their own rules. Digital property does not replace traditional forms of property; it complements them. This study aims to improve overall understanding of important *socio-economic* technologies such as blockchain, smart contracts and cryptocurrencies. It is evident that the emergence of the crypto-sector ecosystem signifies profound shifts in the global financial architecture. These changes are characterised by their simultaneity, encompassing social, psychological and technological domains. Consequently, this ecosystem of crypto requires further investigation, including through the lens of the philosophy of science.

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