

# Bitcoin: a Survey on Finance, Technology and Environment

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**ABSTRACT:** Bitcoin has had a volatile journey since it was launched in 2009, the current main impressions of Bitcoin are mostly negative, resource-consuming, endangering financial security, and even associated with crimes, such as fraud, money laundering, and so on. However, this paper analyzes the origin of bitcoin and with the creative combination of existing computer technology, the construction of a complete transaction system was founded by Bitcoin, which has caused a huge impact in the fields of finance, technology and the environment. We have to acknowledge its shortcomings and deficiencies in some aspects, On the other hand, realize that Bitcoin has brought great progress and reflection in the fields of finance, technology, environment, etc.

## 1 Introduction

It is first necessary to define the concept of Bitcoin, as the influence of Bitcoin will be evaluated at length. The concept of the blockchain was created by Nakamoto Satoshi in 2008[1], and at the same time, the Bitcoin protocol was founded upon the basis of the blockchain. The blockchain is an integrated and decentralized technology and peer-to-peer network based on a variety of mature computer technologies, encryption algorithms, and network systems, especially the HTTP and TCP/IP protocols. The cryptocurrency known as Bitcoin functions as a reward for the miners who supply the computing power necessary to maintain the blockchain network.

According to Nakamoto's white paper, Bitcoin is a virtual, encrypted, digital currency based on a peer-to-peer network. Although Bitcoin's value was negligible upon its creation, it's value has been characterized by moments of rapid appreciation. Bitcoin has become the most precious digital currency, with each coin currently valued at tens of thousands of dollars. During its ascent in value, however, Bitcoin has also experienced moments of extreme volatility. Although some investors made a great deal of money in Bitcoin over the past ten years, others have lost their fortunes. It's undeniable, however, that the field of digital encryption has developed from a niche industry to a significant market force in just over a dozen years, with the current value of the entire cryptocurrency market estimated at more than one trillion dollars. Even some countries, such as the Central African Republic, have replaced their national currencies with cryptocurrencies, and many other nations are also building national digital currencies based upon the technological framework of the blockchain and the influence of Bitcoin [1].

Given the widespread usage and the undeniable

potential of cryptocurrencies, investors and scholars must acknowledge the influence of these new technologies. Although the future of Bitcoin remains unclear, cryptocurrencies, digital currencies, and the blockchain have become realities of the current financial landscape.

## 2 Impact of Bitcoin

Bitcoin was first created as a representative application of blockchain technology. The success of Bitcoin has proven that blockchain technology can be applied to real-world scenarios. In summary, Bitcoin is a payment system which runs on the blockchain using decentralized architecture. Each individual user of the system can become a component in the vast payment network. Users who supply computing power receive Bitcoins as compensation. The purpose of this decentralized model is to prevent any single user or institution from controlling the network. Fundamentally, this system bypasses the monitoring and control of commercial banks and governmental financial institutions. Each individual user can provide labor through the use of computational power and the expenditure of electricity. Rewards are distributed based upon the contribution of this type of labor. Thus, the entire Bitcoin payment system relies on countless computer terminals located around the world, all of which are subject to the same rules.

Through the use of a hash technology, Bitcoin transactions are recorded on a totally independent ledger. Most importantly, this ledger is open and publicly accessible, components of which are held by all the individual users who participate in the Bitcoin network[2]. This system ensures that the ledger will be open and tamper-proof. The technology behind Bitcoin has allowed users who do not know or necessarily trust each other to

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build a dependable ledger despite their anonymity. This kind of system has implications far beyond applications in cryptocurrency. It is precisely because the Bitcoin ledger is open and tamper-proof that its accounts are guaranteed to be credible. This feature of cryptocurrency is not shared by any commercial bank, financial institution, or even any government supported central bank.

## 2.1 Impact in finance

One of the fundamental purposes of currency is to serve as a means of exchange. This usage was one of the motivating factors behind the invention of Bitcoin. In this sense, Bitcoin naturally fulfills one of the basic functions of currency. Since the adoption of the gold standard, the issuance of currency in the modern economy and society has been supported by national credit. In the time since the gold standard was abandoned, currencies have suffered from continual depreciation due to inflation. Sadly, every nation on earth has adopted a policy which contributes to the devaluation of their own currencies.

According to the theory of monetarism, the supply of currency should follow this formula[3]:

$$M = \frac{PQ}{V}$$

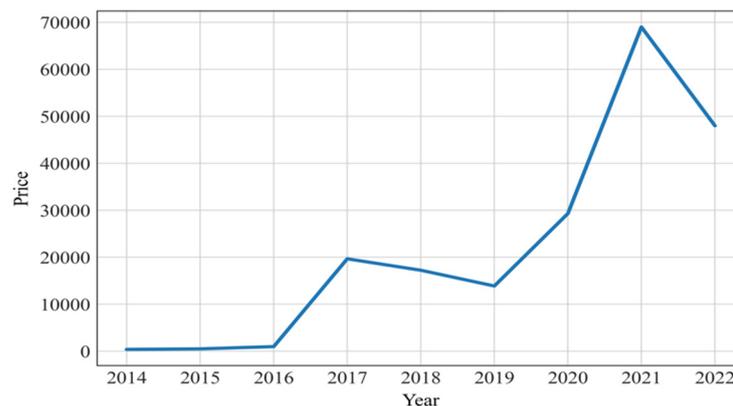


Fig. 1. Bitcoin daily closing price

(Photo credit: Original)

Given constant growth of the global economy, it is clear that Bitcoin's future use could be complicated by the limited number of coins which can exist. Although the demand for coins in circulation can be met temporarily, the total number of coins may not be sufficient to keep up with the demand in the future. It is clear, therefore, that the prevention of currency depreciation is more crucial to users than the circulation of currency in the economy.

## 2.2 Impact in technology

Decentralization is a more significant feature of

$M$  : Refers to the amount of currency required in circulation.

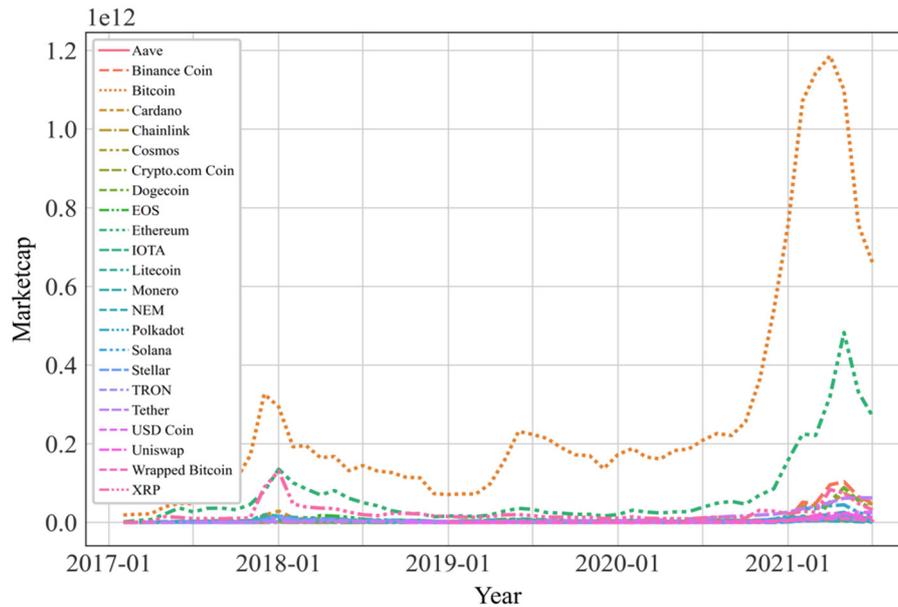
$P$  : Refers to the average price of a commodity.

$Q$  : Refers to the number of items.

$V$  : Refers to the velocity of currency circulation (measured by the number of transactions).

Currency devaluation, price increases, and inflation occur when the money supply is higher than the quantity of money needed. Since the state has complete control over the money supply, central banks are free to print money for political reasons or to deal with economic troubles. Bitcoin, however, was designed to avoid this weakness of state-backed currencies, as the total supply of Bitcoin has been capped at 21 million coins. No organization or person will ever be able to increase the amount of Bitcoin in circulation beyond this number.

In the last few years, the price of the bitcoin has risen from several dollars to tens of thousands of dollars per coin. Fig 1 shown below clarifies that the price trend plot of bitcoin from 2014 to 2022 is a surprisingly steep curve. And the chart shows that the bitcoin market is becoming more and more enormous. The soaring price is precisely because of the total limitation of 21 million.



**Fig. 2.** Market cap of Cryptocurrencies history trend

(Photo credit: Original)

The Bitcoin protocol's fundamental design as a network of unique users guarantees that it will remain decentralized and tamper-proof. As a result, trades may be made anonymously and third parties cannot tamper with accounts. This is a significant advancement which differs from other contemporary financial structures. Traditional financial institutions attempt to prevent fraud through identity verification and law enforcement. Nevertheless, the incentives for unethical behaviors remain. Fraud, embezzlement, and other financial malfeasance still occasionally occur, even in spite of potential penalties. In the Bitcoin ecosystem, however, it would be impossible for such actions to occur, as long as a user's identity, or more specifically, their password, is not compromised.

Since Bitcoin is based on a global network, it automatically removes the limitations imposed by national boundaries. For instance, there is no need to calculate the exchange rate between national currencies when funds are sent across borders. Consumers also benefit from the absence of service fees usually imposed by financial institutions. The elimination of exchange rate conversion would considerably simplify international trade settlements if Bitcoin is utilized.

Bitcoin uses scientific and technological means to

prove the possibility of electronic currency, thus triggering the subsequent wave of creating digital currency on the basis of blockchain. So far, hundreds of digital currencies have been created and issued. As can be seen from Fig 2, After the creation of digital currency, its market cap has achieved rapid growth in a short period of time, thus building a more ambitious digital currency world together with bitcoin.

### 2.3 Impact in environment

A common criticism of Bitcoin is that it does not accurately represent the value of the human work used in its production. According to this line of reasoning, Bitcoin cannot fully measure value since it cannot be utilized as a commodity having value, and this limitation will prevent Bitcoin from being adopted as a fully-fledged currency. This argument, however, ignores the process by which Bitcoin is produced, namely, the expenditure of significant amounts of time, computing power, and electrical energy. The computational resources used for mining Bitcoin are not produced out of thin air, but rather they require the consumption of resources and even the labor of numerous technical experts.

**Table 1.** Cost comparison

Gold mining	gross yearly cost : 105 billion
	energy used: 475 million
	tons CO2 produced: 54 million
Gold recycling	gross yearly cost: 40 billion
	energy used: 25 million
	tons CO2 produced: 4 million
Paper currency & minting	gross yearly cost: 28 billion
	energy used: 39.6 million
	tons CO2 produced: 6.7 million
Banking system	gross yearly cost: 63.8 billion(electricity use) + 1870 billion(all expense)
	energy used: 2340 million
	tons CO2 produced: 390 million
Bitcoin mining	gross yearly cost: 0.375 billion

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energy used: 3.97 million
tons CO <sub>2</sub> produced: 0.66 million

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Unit: gross yearly cost: USD\$; energy used: GJ  
Source: author's adaptation [6]

On the other hand, some people said the large amount of computing power supported by Bitcoin will lead to a large amount of carbon dioxide emissions. Just recording or even verifying some simple transactions requires massive calculations, and a lot of electricity is wasted on invalid calculations [5]. For this criticism, this paper compares the current electricity consumption and carbon dioxide emissions of gold and banks to maintain economic and social operation. Table 1 shows the cost comparison between gold mining, gold recycling, paper currency and minting, banking system and bitcoin mining.

The cost comparison of gold mining, paper currency, banking system and bitcoin mining is shown in table 1. It can be seen from Table 1 that the bitcoin is the most economical compared to gold mining, paper money, and even the banking system. Therefore, this particular criticism of Bitcoin does not stand up to scrutiny.

### 3 Limitation and drawbacks

After over a decade of growth, Bitcoin's ecosystem has grown to a valuation of hundreds of billions of dollars. This level of growth can be attributed to the widespread use of the cryptocurrency in a variety of properties. Bitcoin has also been recognized as the first successful test case for the use of blockchain technology. Issues such as transaction hazards, however, have arisen along with the development of Bitcoin. In order to expedite user transactions, professional exchanges have taken on the role of banks, and numerous consumers have housed their Bitcoins in these exchanges. It is relatively commonplace, however, for exchanges to vanish or for wallets to be stolen. For instance, thieves stole 4,100 Bitcoins from the Bitcoin wallet inputs.io in November 2013, and hackers stole 1,295 Bitcoins from the Bitcoin payment processor, BPIS[7]. Unfortunately, since Bitcoin payments are irreversible, it remains possible for users to lose assets as a result of fraud or weaknesses in the larger network environment.

Since transactions using Bitcoin are anonymous, many criminals use Bitcoin for money laundering and to support illegal activities. Since Bitcoin is more difficult to trace and track than traditional currencies, especially after being laundered, it is easy for criminals to conceal the proceeds of illegal enterprises. Bitcoin's blockchain technology, however, provides a permanent, publicly accessible record of transactions, which criminals cannot refute once their identity has been proven.

Bitcoin is most often criticized for its carbon footprint, since it relies on computational power to establish a consensus mechanism, which is the foundation of Bitcoin's public ledger. Bitcoin's consensus process, however, is reached through the use of workload proof, which is accomplished by performing highly complex mathematical equations to reflect the work performed and to confirm transactions. This method results in inefficient resource usage, namely, a waste of electricity. The current

energy market relies heavily the combustion of fossil fuels which causes increased carbon emissions and resulting environmental deterioration. According to a February 2021 CNBC report, the carbon footprint of Bitcoin, the world's largest cryptocurrency, is equivalent to that of New Zealand[8]. Based on data from the Bitcoin Energy Consumption Index from Digitconomist, an online tool created by data scientist Alex de Vries, the report concluded that the Bitcoin industry was responsible for releasing nearly 37 megatons of carbon dioxide into the atmosphere every year. With the advancement of technology, however, renewable energy will increasingly replace fossil fuels. These developments can help minimize the impact of Bitcoin on the environment. At the same time, Bitcoin technologies are also evolving. One day in the future, a more efficient and environmentally friendly consensus mechanism may be adopted.

### 4 Conclusion

Overall, Bitcoin has emerged as a new technological architecture and as a payment system that is open to all. Based upon examples of the widespread use of Bitcoin in the past, it should be feasible in the future to create a genuinely fair, equitable, and trustworthy ecosystem based on current technologies. Founded upon a spirit of cooperation, Bitcoin has not only had a positive impact on countless users' lives, but it has also been driving further innovations in the space of decentralized finance. From this perspective, the invention of Bitcoin represents a major benefit to human society.

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