



國際金融論壇

INTERNATIONAL  
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International Finance Forum (IFF)

**REPORT ON THE DEVELOPMENT OF  
GLOBAL DIGITAL CURRENCIES**

**2024**



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## Foreword

In the age of the digital economy, digital currencies have far-reaching and multidimensional meaning that embodies their deep impact on the global financial system. In this great era, the global development of digital currencies is moving forward at an unprecedented speed, marked by a profound change in the financial system. Not only are digital currencies a product of technological innovation, but they are also an important driving force behind the digitalization of the global economy. They have had a profound impact on traditional financial models, monetary policy, payment systems, and even national sovereign currency systems.

Analyzing and summarizing the development of digital currencies therefore has extremely important meaning. On the one hand, it helps one understand how digital currencies are redefining the nature of all currencies, challenging the traditional financial framework, and delivering new opportunities and challenges for the global economy. On the other hand, it also provides precious insights for policymakers, financial institutions, and investors, helping them respond to the risks brought on by technological progress so that they can formulate forward-looking strategies and achieve economic growth and financial stability. Not only does in-depth analysis of digital currency related global development trends give one a better grasp on the pulse of the current era, but it also provides theoretical support and practical guidance for future financial innovation and global economic coordination.



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# IFF20

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# Chapter 1

## Analysis of the Development and Momentum of the Global Digital Currency Industry





# Chapter 1

## Analysis of the Development and Momentum of the Global Digital Currency Industry

### 1.1 Origin of the Development of the Digital Currency Industry

With the invention of the computer and the rapid development of information technology, since the 1950s digital tech has gradually become embedded in the financial industry with unprecedented breadth and depth. In 1958, Bank of America began using computers for its savings business for the first time. SWIFT was then established in 1973, and today it has become the biggest global network for electronic settlements between banks. Since the 1980s - with the increasing need to better satisfy people's gradually increasing demand for retail payments and based on **the need to protect traders' privacy and reflect on the modern monetary system** - there has been continuous progress in digital currency related innovation and research. **Computer science breakthroughs in cryptography have also enabled further progress in the development of digital currencies.**

The historical development and technological progress of digital currencies did not happen overnight, but **over the course of multiple technological iterations.** In 1982, the computer scientist and cryptographer David Chaum proposed the use of blind signature technology to protect user privacy - and based on this, he then proposed the concept of digital cash for the first time and developed the world's first digital currency, DigiCash. In 1996, Douglas Jackson, an oncologist, established the digital currency e-gold, which could be exchanged for gold at an exchange rate of 1:1 with a gold reserves reserve ratio of 100 percent. In 1998, the computer scientist Wei Dai created B-money, a digital currency which used distributed ledger technology for the first time ever. In 2005, Nick Szabo came up with Bitgold, the first digital currency to be invented that uses a proof-of-work consensus mechanism, which enables the digital currency ledgers stored in different nodes to remain consistent while also solving the problem of digital currency issuance. And in 2009, someone known on the internet as Satoshi Nakamoto sent a white paper about something called Bitcoin to members of a 'cryptocurrency mailing group'. This white paper formally proposed the concept of Bitcoin, marking the perfection of a digital currency based on decentralized

blockchain technology. This type of digital currency is also called cryptocurrency because it has no central server and no tangible assets in reserve - instead, it confirms currency ownership and transactions based on cryptographic principles. Since blockchain technology is used for distributed accounting, no government or individual can shut these accounts down. On January 3, 2009, Satoshi Nakamoto mined the first block of Bitcoin on a small server in Finland and received a reward of 50 Bitcoins - which is how the Genesis Block of Bitcoin came into being.

After the birth of Bitcoin, the development of digital currencies gradually went through four phases. **During the initial exploratory phase (from 2009 to 2013),** Bitcoin's applications were **limited mainly to tech enthusiasts and financial specialists,** and it also had to grapple with various technical problems and legal risks. During the initial period when Bitcoin first went online and began operating, it was very easy to mine. One could even use a laptop computer to get Bitcoin rewards, and so the actual price of such transactions was very low. On October 12, 2009, a user on the Bitcoin Forum who called themselves 'New Liberty Standard' used PayPal to pay the Bitcoin developer Sirius USD 5 in exchange for 5,050 Bitcoins. This was the first ever recorded transaction involving the exchange of Bitcoin and USD. On May 22, 2010 - which turned out to be a historical moment in time - a programmer used 10,000 Bitcoins to buy two pizzas. As a result, May 22 subsequently became 'Bitcoin Pizza Day' to commemorate the first time Bitcoin had ever been used to buy actual products in the real world. After that, transactions involving digital currency began to appear with greater frequency, and investors began using various types of legal tender to buy Bitcoin. On December 13, 2010, Satoshi Nakamoto logged into the Bitcoin Forum for the last time, after which they never appeared again. Even to this day, no one has ever discovered Satoshi Nakamoto's true identity - a fact which in and of itself also embodies the decentralized spirit of Bitcoin and blockchain technology. Soon after that, on June 19, 2011, hackers gained

administrator privileges at the Bitcoin exchange Mt. Gox by stealing its database. They then used this access to create fake sell orders, pushing the price of Bitcoin down to USD 0.01. Mt. Gox and other major exchanges subsequently announced a seven-day suspension of trading. After that, the database was leaked again, and hackers used the information inside it to break into the MyBitcoin online wallet and steal 4,019 Bitcoins from over 600 wallet addresses. These incidents dealt a severe blow to investors' confidence in the security of Bitcoin, and also triggered a significant drop in the price of Bitcoin. On October 1, 2013, the FBI arrested Ross Ulbricht, the founder of the 'Silk Road' website and operator of the account name 'DreadPirate Roberts', at the San Francisco Public Library. Ross was charged with drug trafficking, money laundering, hacking, and various other crimes. Nearly 30,000 Bitcoins held by 'Silk Road' were seized, and 144,000 Bitcoins held personally by Ross were also confiscated.

During its **rapid development stage (2013-2017),** the price of Bitcoin shot up, attracting a great deal of attention. More and more people became accepting of digital currencies, and many new digital currencies and related technologies - such as Ethereum, Litecoin, and blockchain - also emerged. Meanwhile, digital currencies gained a certain legal status in some countries. On November 20, 2013, Yi Gang, who was Deputy Governor of the People's Bank of China at the time, publicly stated at an event that "Bitcoin is inspiring" and "will remain a long-term focus", stressing his conviction that "investors have the freedom to participate in Bitcoin transactions." For a short time after that, Bitcoin's popularity in China proceeded to increase further, with daily trading volume reaching twice that of the Bitcoin exchange Mt. Gox. However, on December 5, 2013, the Chinese government declared that Bitcoin was not a currency and banned all financial institutions from participating in any Bitcoin related business, causing a sharp drop in its global price. On April 10, 2014, the People's Bank of China went a step further and required some Chinese banking institutions to close the bank accounts of some Bitcoin exchanges by April 15. With this increasingly strict policy environment, some exchanges continued to operate through overseas banks and cryptographic voucher systems, but overall it led to a significant decrease in the volume of digital currency transactions in China. However, on October 22, 2015, the European Union (EU) Ministry of Justice announced that within the EU, transactions involving Bitcoin and other cryptocurrencies would not be subject to 'value added tax' (VAT), and that digital currencies are 'currencies' rather than 'commodities'. On April 1, 2017, the Japanese legislative system also passed a bill to include Japanese digital currency exchanges in anti-money laundering and 'know your customer' supervision, and recognized Bitcoin as a legal means of prepayment. With Bitcoin attracting greater and greater levels of attention from investors and financial institutions, more and more companies began to accept payments or donations in the form of Bitcoin. On July 30, 2014, Wikipedia announced that it would begin accepting donations in Bitcoin, and on September 8, 2014, Braintree - a subsidiary of PayPal - announced a partnership with Coinbase to provide users with Bitcoin payment services. And on December 11, 2014, Microsoft announced that it would accept Bitcoin payments in its Windows and Xbox digital stores.

As the price of Bitcoin skyrocketed and attracted ever-increasing amounts of public attention each year, it became increasingly difficult for individual netizens to mine Bitcoin independently. On August 16, 2010, its mining difficulty was only 511T - but as of May 21, 2021, this had increased to a peak of  $2.5 \times 10^{13}T$  - i.e., a total increase of 49 billion times. Bitcoin mining activities also shifted from mining on personal computers in the early days to graphics processing unit mining - and even the mining of centralized mining pools. On June 13, 2014, the computing power of the mining pool GHash.io even

reached 51 percent at one point. However, GHash.io subsequently issued a statement saying that it would "never participate in a 51 percent attack", and it promised to reduce its share of computing power to below 39.99 percent by guiding miners to other mining pools. With the continuous growth of Bitcoin nodes and traders, however, the issue of Bitcoin block expansion gradually made its way onto the agenda. Ultimately, with supporters and opponents of expansion failing to reach a consensus, the expansion dispute led to the first hard fork for Bitcoin on August 1, 2017. Supporters of the 'Segwit' optimization plan continued to support Bitcoin, while supporters of the 'big block' plan - which represented a more radical expansion plan - created Bitcoin Cash (BCH) and went ahead with a 1:1 airdrop to the original Bitcoin holding accounts.

Next came **the phase of supervision, regulation, and control that coincided with the bursting of the Bitcoin bubble (2017-2020).** During this time, the digital currency market experienced a large-scale bubble burst, with the price of Bitcoin plummeting from nearly USD 20,000 at the end of 2017 to just USD 3,000 at the end of 2018. At the same time, more and more countries began to supervise, regulate, and control digital currencies to protect investors and maintain financial stability. In China, on September 3, 2017, regulators banned all forms of initial coin offerings (ICOs) in the country. On September 14, 2017, Chinese regulators ordered all digital currency exchanges in the country to close within a certain period of time and stop registering new users. This prompted various digital currency exchanges that had been operating in China to gradually begin shifting operations overseas. After that, in 2018 large US tech companies such as Facebook, Google, and Twitter successively announced that they would ban all advertisements for digital currency on their platforms. On June 11, 2018, the US Commodity Futures Trading Commission (CFTC) went a step further and issued subpoenas to four digital currency exchanges - Bitstamp, Kraken, ItBit and Coinbase - asking them to explain their alleged manipulation of market prices. **As part of this strict regulation of private digital currencies, digital currencies and blockchain technology received greater attention from governments around the world** - which to this day are continuing to gradually explore the development of central bank-issued digital currencies based on their own legal tender. To that end, on January 29, 2017, the People's Bank of China officially established the Digital Currency Research Institute. At the end of 2019, the People's Bank of China announced the first batch of pilot cities - which included Shenzhen, Suzhou, Chengdu, Xiong'an, Beijing, and Zhangjiakou - as part of the issuance of a 'digital renminbi'.

Finally, **during the recovery and development phase (from 2020 to the present), the digital currency market gradually recovered and the price of Bitcoin once again went up, breaking through to achieve historic highs.** Meanwhile, more and more financial institutions and enterprises began accepting digital currencies, exploring the merging of digital currencies with traditional financial systems. More and more countries have also begun to further explore the possibility of issuing central bank-issued digital currencies. In particular, since the outbreak of the COVID-19 pandemic the popularity of the Metaverse and non-fungible token (NFT) digital collections has brought the concept of the blockchain back into the public eye and further promoted the development of various **new digital currencies and smart contracts.**

## 1.2 Factors Driving the Development of the Global Digital Currency Industry

When considering the driving factors behind the development of digital currencies, one should first **look at the background of this development**. First, the progress of digital technology in recent years - especially the technological breakthroughs achieved in the field of cryptography - made it technically possible to create a completely decentralized digital currency that is not managed by any intermediary institution. This concept has become familiar to people through the development of Bitcoin and meets people's needs for conducting anonymous transactions and cross-border payments at the same time. Second, **the global Covid-19 pandemic** changed the overall structure of the global economic system and profoundly affected people's consumption habits and daily lifestyles. Various unique situations that arose as a result of the pandemic made customer needs and model innovation more adaptable while also promoting further rapid development of the digital economy. This then caused digital finance and digital currencies to become a more integral part of people's lives, and it did so with unprecedented breadth and depth. Finally, **with the transformation of production methods in the context of globalization** - especially the development of new-generation information technology - suppliers of mid-to-high-end products in the value chain can now reach the middle and lower reaches of the value chain through Big Data, cloud computing, and smart tech. At the same time, data security in the value chain is becoming increasingly important. The monopoly of the internet and financial capital in the industrial chain is also intensifying, while digital tech in the global value chain is becoming increasingly important. Digital currencies are a critical component of this, and so they will also play an increasingly important role in the future of economics and finance.

This report will **also analyze the driving factors behind the development of digital currency from the perspective of its functional applications**. More specifically, **first of all digital currencies can be used for online payments and cross-border remittances** - which not only shorten transaction times, but also reduce the costs of these transactions. The Chinese central bank's digital currency - represented by the digital renminbi - arrives in recipient accounts instantly. Not only is this payment experience just as good as that of Alipay and WeChat Pay, but it also allows users to make payments by directly using M0 cash that is backed by the central bank, making it possible to bypass financial intermediaries. The payment speeds of private digital currencies such as Bitcoin and Bitcoin Cash vary. For transactions involving Bitcoin, the confirmation speed is relatively slow and multiple blocks are usually required to confirm a transaction - which therefore tends to take tens of minutes. Bitcoin does, however, have notable advantages - notably higher levels of privacy protection and the widest acceptance. Bitcoin is the most widely accepted private digital currency in the world, and it can also be sent and received in real time through new technologies such as Lightning Network. Other digital currencies such as Bitcoin Cash and Litecoin continue to adhere to the proof of work consensus mechanism, and their speed of payment is faster than it is for Bitcoin. New blockchain architecture digital currencies - such as delegated proof of stake (DPOS)-based TRON and proof of history (POH)-based Solana - feature faster payment speeds. Of these, Solana's transmission speed per second is 65,000, making it the fastest of all currently active public chains.

Second, **digital currencies can also be used for investment**. The deflationary nature of Bitcoin causes its price to keep rising - the prices of various new digital currencies often rise by hundreds or thousands of times, thus attracting the attention of many investors. The characteristics of digital currencies - which are unlike any traditional

investment products - also enable them to play a role as a risk hedging tool in investment portfolios. Various digital asset futures and options derived from digital currencies such as Bitcoin and Ethereum can also be decentralized based on smart contract programs. The emergence of stablecoins - such as USDT - also enables investors to purchase USD stablecoins or EUR stablecoins across borders without restrictions under foreign exchange controls, thereby building an investment portfolio of foreign currencies. By using private digital currencies such as Bitcoin and USDT, users can also bypass the financial supervision of relevant countries and realize the deposit and withdrawal of US stock investments.

**Digital currencies can also be used to purchase goods and services**, especially to meet traders' needs for anonymous and convenient payment. Users get certain discounts when using digital renminbi to purchase goods via digital platforms such as Meituan Waimai and JD.com, and they can also connect directly with the central bank through digital renminbi M0 to make digital payments - thereby bypassing third-party private enterprises such as Alibaba's Alipay and Tencent's WeChat Pay. Digital currency also makes it possible to purchase goods that would be difficult to pay for with these types of third-party payment tools. An example of this is how streaming service providers such as Spotify and Netflix in the US do not support access by users in mainland China due to copyright protection reasons - which means they also do not permit the use of Chinese payment tools for member purchases to watch movies or listen to music on their platforms. By using private digital currencies such as Bitcoin and USDT, however, users in mainland China can enjoy these streaming services by directly purchasing and sharing Spotify or Netflix accounts with American users across borders. By using Ethereum, any user anywhere in the world can trade various digital assets - such as NFT digital collections, ENS domain names in Web3.0, and digital real estate in the metaverse Decentraland - at any time in the blockchain.

Digital currencies can also serve as the infrastructure of the Web3.0 world to build new digital products. By using the Ethereum network, e.g., one can use Ethereum to purchase Ethereum Name Service domain names in the Web3.0 network world, achieve domain name service resolutions in the Web3.0 network based on Ethereum smart contracts, resolve Web3.0 domain names to decentralized storage servers that are also built on blockchain technology, and therefore achieve internet access that is not controlled by any centralized organization. Various NFTs and metaverse applications can also be built based on Ethereum, allowing users to use digital currencies to purchase digital collections and permanently store user ownership records in the blockchain.

Finally, digital currencies are an important part of the digital economy. **Rapidly changing emerging technologies in the digital economy have acted as a powerful force promoting the development of the global digital currency industry, and the reverse is also true - the development of digital currencies has promoted the development of the digital economy**. Functionally speaking, building a digital currency system is an important force for promoting the development of the digital economy, as is the use of circulation data generated by digital currencies to upgrade the production domain. At the same time, the public is increasingly recognizing the significance of digital currencies as the infrastructure of the digital economy, the engine driving the era of the digital economy, and the booster of a digital society. Digital currencies are not only a lubricant that promotes the internal circulation system of the digital economy, but also an important driving force promoting the internationalization

of the digital economy - which is conducive to promoting both cross-border trade financing as well as the development of **digital trade**. In particular, in the digital economy system the development of real industries such as **digital supply chains and digital manufacturing** has given rise to further development of digital currencies. Digital currencies enabled by blockchain technology have further promoted the bypassing of intermediaries in the above industries. Using digital currencies as 'tokens' in the blockchain system allows information originally controlled by centralized institutions to be fixed in the blockchain in the form of smart contracts - making tampering impossible while also strengthening multi-party coordination and data sharing in the digital economy system.

However, **digital currencies also have some significant disadvantages**. Due to their anonymity and decentralization, digital currencies can easily be used for various illegal and criminal acts such as money laundering. Studies have shown that about a quarter of users (25 percent) and nearly half of Bitcoin transactions (44 percent) are related to illegal activities, as are about one fifth (20 percent) of the total transaction volume and about half (51 percent) of Bitcoin holdings. At the same time, the digital currency market also comes with high risks and instability. Digital currency exchanges endlessly experience the phenomena of 'crashing' and 'running away'. Withdrawing digital currency to one's own wallet greatly reduces its liquidity, and users must repeatedly pay high fees as part of the subsequent withdrawal and deposit process. All of this means that investors in digital currencies generally must bear greater risks.

### 1.3 Summary

In summary, this chapter analyzes the origin of the development of digital currencies from a historical perspective, discusses the characteristics of the different development stages of digital currencies since their inception, and discusses the driving factors behind the development of the digital currency industry from the perspectives of development background and functional utility. The conclusion is that **advances in digital technology, changes in people's consumption habits caused by the Covid-19 pandemic, and changes in production methods due to globalization** have all promoted the development of digital currencies. Next, this report analyzes the driving factors behind the digital currency industry from the perspective of functional utility. First, digital currencies **make online payments even more convenient** on the user side while also **protecting user privacy to a certain extent**. Second, digital currencies are favored by investors as **high-quality investment products**. Digital currencies can also be used for **cross-border payments to purchase various digital services and goods**. Finally, digital currencies can be used as the infrastructure element of decentralized applications to build various Web3.0 digital ecosystem products. At the macro level, digital currencies have **reshaped the world's monetary system** and are promoting the transformation of the international financial architecture with unprecedented breadth and depth. On the one hand, **this impacts the existing international monetary system**, and on the other hand it provides new means of evasion for weak countries that have been hit with financial sanctions. Chapter 2 Overview of the worldwide development of digital currency

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### 2.1. Country-specific comparative analysis of the current state of development worldwide of private digital currency

#### 2.1.1 Country-specific comparative analysis of the current state of development of worldwide mainstream native coins and their technical characteristics

##### 2.1.1.1 Comparative analysis of the development status and technical characteristics of global mainstream native tokens

The native coin of a blockchain - also known as main chain coin, public chain coin, basic coin, etc. - is a cryptocurrency directly built on a specific block and is also the core asset of the blockchain network. It is used to pay transaction fees, execute smart contracts, and participate in consensus mechanisms, etc. In other words, a native coin is a digital currency with an independent main chain. It is generally an independent digital asset in a blockchain network, with its own issuance limit, distribution method, and economic model. Currently, mainstream native coins include Bitcoin (BTC) on the Bitcoin main net blockchain, Ether (ETH) on the Ethereum blockchain, Cardano (ADA) on the Cardano blockchain, TRON (TRX) on the TRON blockchain main chain, and ATOM on the Cosmos blockchain. In short, different countries adopt cryptocurrencies to different degrees. According to the Global Cryptocurrency Ownership Status in 2024 report released by Singapore's Triple-A, as of 2024, the average global rate of use of cryptocurrencies is 6.8 percent, and users worldwide have exceeded 560 million, which is an increase of 33% compared to 2023's 420 million users. Of these, 34% of encrypted currency users are 24-35-year-olds. The country with the fastest rate of growth in holdings is the United Arab Emirates at 25.3% over 2023.

Table 2-1 shows a ranking of the cryptocurrency holding rates of the residents of various countries in 2024, with such nations as the UAE, Singapore, and Turkey, which have relatively friendly policies towards digital currency innovation, having the highest cryptocurrency holding rates. For example, the UAE is extremely friendly to the blockchain and crypto industries, and plans to become the world's first blockchain government. The UAE court even ruled in a 2024 case (No. 1739 of 2024) that cryptocurrency may validly be used as a form of wage payment. The UAE is also actively adopting central bank digital currencies. The UAE Central Bank has not merely issued its own digital currency, Govcoins, but also successfully completed the first digital dirham cross-border payment transaction worth AED50 million (ca. CNY98 million) with the Bank of China via the multilateral central bank and through the multilateral central bank digital currency bridge it took part in setting up.

Table 2-1 Ranking of global cryptocurrency holding rates of various countries

Country	Cryptocurrency holding rate
UAE	25.30%
Singapore	24.40%
Turkey	19.30%
Argentina	18.90%
Thailand	17.60%
Brazil	17.50%
Vietnam	17.40%
US	15.50%
Saudi Arabia	15.00%
Malaysia	14.30%
Hong Kong, China	14.30%
Indonesia	13.90%
South Korea	13.60%
South Africa	12.40%
Switzerland	11.50%

Data source: Singapore Triple-A's The State of Global Cryptocurrency Ownership in 2024 report

Table 2-2 shows that, unlike holding rates, in terms of total holdings, populous countries such as India, China, and the United States, although not ranked high in holding rates in 2023, have relatively high total holdings, ranking first, second, and third in the world, respectively. This may be because these countries, as populous

nations, are also hotspots for digital currency investment. Although their penetration rate is not as good as digital currency policy friendly countries such as the United Arab Emirates and Singapore, the total amount is still higher.

Table 2-2 Ranking of Total and Proportion of Cryptocurrency Holdings by Global Residents in 2023

Country	Population	Ownership	Ownership Percentage
Country	Population	Ownership	Ownership Percentage
India	1428627663	93537015	0.065473333
China	1425671352	59134683	0.041478482
United States	339996563	52888108	0.155554831
Vietnam	98858950	20945706	0.211874656
Pakistan	240485658	15879216	0.066029784
Philippines	117337368	15761549	0.134326765
Brazil	216422446	25955176	0.1199283
Nigeria	223804632	13261259	0.059253729
Iran	89172767	12000000	0.134570233
Indonesia	277534122	12205132	0.04397705

Data source: <https://www.triple-a.io/cryptocurrency-ownership-data>

Unlike counting cryptocurrency holdings alone, blockchain analysis platform Chainalysis has compiled a 2023 cryptocurrency adoption index for countries worldwide, which counts the use of cryptocurrencies from a broader perspective than cryptocurrency holdings. The index combines on-chain data with real-world data to measure which countries lead the world in cryptocurrency adoption. The Global Cryptocurrency Adoption Index consists of five sub-indices, including centralized service value acquisition ranking, retail centralized service value acquisition ranking, P2P exchange trading volume ranking, DeFi value acquisition ranking, and retail DeFi value acquisition ranking. Each sub-index is based on the use of different types of cryptocurrency services in different countries. The index ranks the sub-indices of all 154 countries [195, according to the United Nations], weights the rankings according to characteristics such as population size and purchasing power, takes the geometric mean of each country in these five rankings, and then normalizes the final number on a range of 0 to 1 to provide each country with a score that determines the overall ranking. The closer a country's final score is to 1, the higher its ranking. Unlike the aforementioned rankings, the highest cryptocurrency adoption index is in developing countries such as India, Nigeria, and Vietnam. The main reasons for the growth of cryptocurrency in India are the rise of fintech and the widespread adoption of mobile technology. India has the world's second-largest smartphone market, with more than 1 billion smartphone

users. At the same time, Nigeria is also one of the fastest-growing countries in Africa's Web3 market, mainly because Nigeria has a large population, a young population structure and a strong interest in emerging things, all of which have driven the development of Nigeria's cryptocurrency market. Digital currency participants in Vietnam are also particularly focused on various application projects of blockchain. The "Vietnam Cryptocurrency Market Report 2022" revealed that as of now, there are about 200 active blockchain projects in Vietnam. The report further shows that Vietnam has more than 16.6 million cryptocurrency holders, making it the second largest country in the Association of Southeast Asian Nations region after Thailand, of which 31% hold Bitcoin. These active blockchain projects in Vietnam mainly focus on GameFi, DeFi, NFT, Web3, infrastructure and crypto wallets. From a historical perspective, this is mainly because Vietnam has suffered much economic instability and inflation, and traditional banks cannot provide good returns. Cryptocurrencies and other derivative digital assets can serve as a good means of storing value. Secondly, many Vietnamese working abroad need to send money home, and the processing fees for cross-border remittances using traditional banks are high, while using cryptocurrencies such as Bitcoin can reduce costs. Finally, cryptocurrency is a gray area in Vietnam, with no clear legal framework to prohibit or support it, so there is expansive room for blockchain activities, and digital transactions are carried out without the influence of any central agency or government.



Table 2-3 Global Cryptocurrency Adoption Index Ranking in 2023

Country	Overall index ranking	Centralized service value received ranking	Retail centralized service value received ranking	P2P exchange trade volume ranking	DeFi value received ranking	Retail DeFi value received ranking
India	1	1	1	5	1	1
Nigeria	2	3	2	1	4	4
Vietnam	3	4	4	2	3	3
United States	4	2	8	12	2	2
Ukraine	5	5	3	11	10	10
Philippines	6	6	6	19	7	7
Indonesia	7	13	13	14	5	5
Pakistan	8	7	7	9	20	20
Brazil	9	9	11	15	11	11
Thailand	10	8	15	44	6	6
China	11	10	5	13	23	23
Turkey	12	11	9	35	12	12
Russia	13	12	10	36	9	9
United Kingdom	14	15	20	38	8	8
Argentina	15	14	12	29	19	19
Mexico	16	17	18	30	16	16
Bangladesh	17	18	19	33	22	22
Japan	18	22	21	49	18	18
Canada	19	25	23	62	14	14
Morocco	20	27	25	21	26	26

Data source: Chainalysis data analysis platform

Analyzed from the technical characteristics of different types of digital currencies, native coins play a key role in promoting the development and innovation of blockchain projects. The prosperity of the blockchain ecosystem requires the participation of users, developers and investors, and native coins, as an incentive, can stimulate the interest and enthusiasm of these participants. By holding, using and contributing to native coins, participants can obtain internal rights and interests in the ecosystem and promote broader application exploration, technological innovation and community building. It not only provides economic support for the ecosystem, but also promotes the active participation of users and developers, and promotes the development and innovation of blockchain projects. The existence of native coins helps to build a healthy and active digital economic ecosystem and contribute to the sustainable development of the entire blockchain industry. Specifically, the above-mentioned native coins are further classified based on the consensus mechanism used by the main chain.

Native coins based on the POW mechanism. Bitcoin's currency generation system is based on the POW (proof of work) mechanism. Miners obtain the right to keep accounts through computing power competition, and obtain transaction fee income and Bitcoin rewards. In addition to BTC (Bitcoin), Ethereum also used the POW mechanism, but it was abandoned after the "Shanghai Upgrade" was completed on April 12, 2023, and turned to the POS mechanism. In addition, the native coins that still use the POW consensus mechanism include Litecoin (Litecoin), Bitcoin Cash (BCH), Monero (XMR), Ethereum Classic (ETC), BSV (Bitcoin Satoshi Vision), Zcash, Dash (DASH), etc. The above situation shows that the main ones that still adhere to the POW mechanism are derivative currencies of digital currencies such as Bitcoin and Ethereum, as well as coins such as Dash and Monero that emphasize complete decentralization and user privacy. This is because so far, although the POW mechanism is less efficient and more costly than other consensus mechanisms, it is still the most capable of reflecting the decentralized spirit of blockchain technology and achieving maximum user anonymity.

Native coin based on the POS mechanism. POS (Proof of Stake) is the consensus mechanism used by Solana, Cardano, and Tezos. It was first created in the Bitcoin forum in 2011 as an alternative to proof of work to improve the shortcomings of the old consensus mechanism. In 2012, the first cryptocurrency project to adopt proof of stake, Peercoin, was born. After the completion of the "Shanghai Upgrade" on April 12, 2023, the Ethereum 2.0 mainnet has also switched from proof of work to proof of stake. Trying to be "more scalable, more secure, and more sustainable". This method uses much less computing power than the proof of work method and is more environmentally friendly. Specifically, the PoS algorithm determines the weight of a node in the consensus process based on the amount of currency held. Nodes holding more currency are more likely to be selected as block nodes, thereby receiving more rewards. Compared with PoW, the PoS algorithm saves energy consumption and increases transaction speed, but there are also problems of excessive concentration of wealth and potential attacks. Currently, the coins that use POS and its derivative consensus mechanisms mainly include ETH (Ethereum), ADA (Cardano), ATOM (Atom), SOL (Solana), etc.

Among these, Cardano (ADA) is a product of the Cardano project and is developed based on the Proof of Stake algorithm Ouroboros. As the base currency of the Cosmos network, a decentralized cross-chain ecosystem, ATOM has many unique functions and features. First, ATOM is traded and verified in a decentralized manner, avoiding the security risks brought by centralized exchanges. Secondly, ATOM can achieve cross-chain interoperability, allowing digital assets between different blockchains to flow freely. Finally, ATOM uses the Proof of Stake consensus mechanism, using stake pledge as the decision-making standard for generating new blocks, improving the security and efficiency of the system.

Solana is a blockchain that combines Proof of History (PoH) and Proof of Stake (PoS). Compared with Ethereum and Bitcoin, the unique consensus algorithm it uses is designed to deal with the 'blockchain trilemma' (that is, no solution can simultaneously solve the three problems of decentralization, scalability and security in the blockchain). Due to its low cost and high efficiency, the Solana blockchain is well suited to decentralized development, from wallets, DeFi, Web3 to NFT, and can operate more than a thousand transactions per second. Solana coin (SOL) is the native virtual currency of the ecosystem, with a supply of about 500 million virtual currencies. Solana holders can not only participate in the governance of the overall ecosystem, pay transaction fees to purchase various NFT digital collections derived from the Solana main chain, but also receive rewards through coin staking.

### 2.1.1.2 Country-specific comparative analysis of the current status of global Bitcoin development

Bitcoin's currency generation system is grounded on the POW (proof of work) mechanism. Miners vie for accounting rights using computing power, and thereby gain transaction fee income and Bitcoin rewards. The anonymous character of Bitcoin renders this report unable to count the number of Bitcoins owned by everyday investors in various countries worldwide. Thus, this report first compares and analyzes the number of government-held Bitcoins from a global angle. Table 2-2 indicates the statistical table of the number of Bitcoins governments hold in various countries. As of 2023, and based on the statistical table analysis, the total amount of Bitcoin governments worldwide held was 73,701 Bitcoins. Specifically, 90.3% of the Bitcoins were in the hands of the US government, totaling 69,640 Bitcoins. This is primarily because the Federal Bureau of Investigation has seized a total of 259,112 Bitcoins in its law enforcement actions in the past. Though the FBI sold 189,472 Bitcoins with the aid of the federal government, the US government still holds the most Bitcoins of any government. After the US, Norway holds a 2.14% stake in MicroStrategy (MSTR). This means that, factoring in the 158,400 Bitcoins MSTR holds, the Norwegian government indirectly owns 3,390 Bitcoins, i.e., 4.4% of the world government share. Furthermore, the government of El Salvador is also on this list, making up 3.2% of the global government share (2,473 Bitcoins). This is mostly because the nation was the first in the world to adopt Bitcoin as legal tender. Ukraine is also a major Bitcoin holder, primarily as its government started accepting Bitcoin to ease war donations. Ukraine has 0.8% of the number of Bitcoins held by world governments (642 Bitcoins). Bhutan is slightly lower than Ukraine with its 621 Bitcoins (i.e., 0.8% of the share). This is mainly because Bhutan is seeking to utilize electricity from the country's hydroelectric power plants to drive Bitcoin mining machines. Venezuela further holds 0.3% of Bitcoin, with 125 Bitcoins stored in public wallets. At the bottom of the list is Finland, which seized 85 Bitcoins on legal grounds and pledged to donate the money to Ukraine as aid during its war with Russia.

Table 2-4 Statistics on the number of Bitcoins held by governments of various countries worldwide in 2024

Governments	BTC Holdings 2024	Share %
United States	69640	0.903
Norway	3390	0.044
El Salvador	2473	0.032
Ukraine	642	0.008
Bhutan	621	0.008
Venezuela	240	0.003
Finland	85	0.001

Data source: <https://coinweb.com/trends/which-country-owns-the-most-bitcoin/>

The nodes of private digital currencies are divided into full nodes, light nodes and SPV nodes. Full nodes refer to nodes of a complete blockchain that contains all transaction information. Light nodes still need to download all data for parsing and obtain transaction data related to themselves, but they do not need to save all data locally. SPV nodes do not need to download all data of new blocks, but only need to save block header information. Unlike Bitcoin mining, downloading all blockchain historical data and becoming a Bitcoin full node does not generate any income. The only benefit to users is that using a full node for Bitcoin trading activities is the safest, so to some extent it reflects the country's need for anonymous transactions for digital currencies. In addition, Bitcoin full node users are equivalent to playing the role of a "voluntary verifier" in the Bitcoin transaction verification system, and can provide data verification and download services for other light node or SPV node users. Although the current historical block data is as high as hundreds of GB and it takes a long time to fully synchronize, the existence of Bitcoin full nodes is a guarantee of the decentralization of the Bitcoin system. If all Bitcoin

full nodes are monopolized by a certain individual, data tampering and other problems may occur. Therefore, the number of Bitcoin full nodes, to some extent, can reflect the willingness of digital currency users in the country to maintain the decentralized characteristics of the Bitcoin system. Currently, the number of Bitcoin full nodes varies greatly in different countries. Table 2-5 shows the number of Bitcoin full nodes in different countries on July 24, 2024, where n/a means that the country or region where the node is located is unknown. The US is still the country with the largest number of Bitcoin full nodes in the world, followed by Germany, France, the Netherlands and other European countries. China, which has traditionally had more Bitcoin mining activities, ranks outside of the top 10. The number of full nodes in Vietnam, India, and other countries that use more digital currencies in Table 2-3 is also relatively small. This phenomenon shows that the US still has the highest demand for Bitcoin anonymization and the need to maintain the decentralized characteristics of the Bitcoin system.

Table 2-5 Statistics of the number of Bitcoin full nodes in various countries worldwide on July 24, 2024

Country	Number of Bitcoin full nodes
1. n/a	12029
2. United States	1771
3. Germany	1760
4. France	432
5. Netherlands	334
6. Finland	305
7. Canada	283
8. United Kingdom	221
9. Singapore	213
10. Switzerland	164

Data source: This report was collected and collated using the Bitcoin full node client

### 2.1.1.3 Country-specific comparative analysis of the development status of Ethereum worldwide

As the digital currency with the second-largest market value after Bitcoin, Ethereum draws investors' attention because: First, Ethereum introduces the concept of smart contracts, allowing developers to write and deploy automatically executable contract codes. This makes Ethereum not only a digital currency, but also a development platform for decentralized applications (DApps). Smart contracts are used to build decentralized finance (DeFi), digital asset issuance, supply chain management, voting systems, and other applications. Secondly, Ethereum has a large and active developer community, as well as numerous projects and applications, forming a huge ecosystem. These include DeFi applications such as decentralized exchanges (DEX), lending platforms, NFT markets, and various blockchain-based games and social platforms. Moreover, one of the design goals of Ethereum is decentralization and openness. Anyone may join the Ethereum network and participate in node operation, develop DApps or participate in community governance. This

openness increases the possibility of innovation and enables anyone to access and use Ethereum's functions under equal conditions. In addition, the underlying technical architecture of Ethereum has been developed and improved for many years, and has high security and stability. Despite some security vulnerabilities and network congestion incidents, the Ethereum team and community have continued to enhance the robustness and security of the platform through upgrades and improvements. Finally, Ethereum smart contracts follow open standards such as ERC-20 and ERC-721, which promote the interoperability and liquidity of various coins and digital assets. This also makes Ethereum one of the most popular digital asset issuance platforms in the world.

From the analysis of the current state of development of countries worldwide, Table 2-6 shows that, according to data as of July 25, 2024, the US currently has the largest number of Ethereum nodes, followed by Germany, South Korea, Canada, the United Kingdom, France and other countries. Unlike the aforementioned cryptocurrency holding rate and holding volume rankings, the reasons why the above countries have a large number of Bitcoin and Ethereum

nodes should be multifaceted. First, these countries are in a leading position in information technology, Internet infrastructure and high-speed network connections. Having advanced technical infrastructure makes it easier and more reliable to run and maintain cryptocurrency nodes, especially the bloated block data of Bitcoin and Ethereum requires high-speed networks and large-capacity hard drives to maintain the operation of full nodes. Secondly, the US and the above EU countries have developed financial systems and deep economic foundations. These conditions make individuals and institutions more inclined to invest and participate in the cryptocurrency market, thereby promoting the growth of the number of nodes. Moreover, Bitcoin and Ethereum full nodes are different from mining activities that can bring income. Full node users only voluntarily download full node clients and join the main network to maintain the decentralized characteristics of the Bitcoin and Ethereum systems or for personal

research and development needs. These countries have active technical communities and a large number of software developers, engineers and individuals interested in new technologies and innovations. Their participation has driven the increase in the number of Bitcoin and Ethereum network nodes, so the ranking of the number of full nodes is different from the country ranking of cryptocurrency holding rate and holding volume. In addition, in these countries, the laws, regulations and supervision of cryptocurrencies are relatively loose or clear, which helps encourage more individuals and companies to run and manage cryptocurrency nodes in the country. Finally, universities and research institutions in these countries have extensive research and educational activities in the field of blockchain technology and cryptocurrency. This academic support and knowledge accumulation also promotes the growth of the number of nodes.

Table 2-6 Statistics on the number of Ethereum full nodes in major countries worldwide in 2024

Rank	Country	Number of full nodes (ratio)
1	US	1,977 (48.56%)
2	Germany	498 (12.23%)
3	South Korea	149 (3.66%)
4	Canada	141 (3.46%)
5	UK	141 (3.46%)
6	France	107 (2.63%)
7	Netherlands	87 (2.14%)
8	Iran	75 (1.84%)
9	Singapore	68 (1.67%)
10	Czech Republic	67 (1.65%)

Data source: This report was collected and collated using the Ethereum full node client

### 2.1.2 Analysis of the current status of stablecoin development in different countries

The volatility of Bitcoin prices indicates that it cannot provide the core functions of currency. The so-called stablecoins attempt to make up for this defect, but whether they can successfully expand and maintain stability is questionable (Eichengreen, 2019). Currently, stablecoins mainly include USD Tether (USDT), USD Coin (USDC), DAI, etc. Among them, Tether and USDC occupy the highest market share and rank third and seventh in the total market value of digital currencies, respectively, which is comparable. This is mainly because USDT currently avoids the US market, while USDC is relatively positive about being included in the US government's regulatory framework. Currently, the stablecoin bill drafted by Patrick McHenry, a Republican member of the current majority party in the House of Representatives, has been passed by the House Financial Services Committee. The House bill is relatively brief and gives state governments greater power, while the Senate bill is more detailed and balances the power of state governments and the Federal Reserve. The Senate bill not only clarifies who can issue stablecoins anchored to the US dollar, but also involves how to deal with the merger or bankruptcy of the issuer. The bill proposes that if the issuer of a stablecoin goes

bankrupt, the Federal Deposit Insurance Corporation (FDIC) should take over to protect the interests of depositors. The draft also encourages multiple institutions, including banks, to participate in the issuance of stablecoins. For stablecoins with an issuance volume of less than USD1 billion, the supervision will not be as stringent as that of banks. For stablecoins with an issuance volume of more than USD1 billion, the bill requires the same strict supervision as banks. Both versions are exclusive of USDT, especially the Senate draft, which expressly bans US companies from holding or using USDT.

Therefore, the implementation of the new regulations will be relatively beneficial to USDC. The chief executive of Circle, the issuer of USDC, has also been actively promoting Congress to introduce regulatory bills, emphasizing the full margin system of USDC, and compared with the partial reserve system of commercial banks, USDC can provide full margin and 100% redemption of US dollars without worrying about bank runs. However, from this perspective, it can also be concluded that the impact on the US market is greater, and the US government's regulatory attitude towards different types of stablecoins will deeply affect their global market trend.

At the same time, the company registration location of the stablecoin issuer also has a greater impact on its market trend. Table 2-7 shows the locations of the headquarters of the top 10 stablecoins

in terms of total market value, showing that stablecoin issuers generally set up the headquarters of the issuing entity in the US or other countries or regions with relatively loose digital currency policies and tax haven characteristics. Setting up the headquarters in the US is mainly to comply with the requirements of US regulatory policies and to obtain higher attention and technical support. Setting up the headquarters in some countries or regions outside the US is to circumvent regulation and achieve true decentralization of stablecoins.

For example, Tether is issued by a company called Tether Limited, which was originally registered in the Isle of Man, then moved to Hong Kong, China, and is now headquartered in the Bahamas, but its actual operating team has close ties with the US cryptocurrency trading platform Bitfinex, but the actual registration place is considered a tax haven for offshore banking. In contrast, USDC issuer Circle is subject to US jurisdiction because it is headquartered in Boston, Massachusetts. USDC issuer Circle Internet Financial further announced in early 2024 that it plans to move its legal base from the Republic of Ireland to the US after the initial public offering. In short, USDC has set up its various entities in the US mainly because the company has always put the compliance of its stablecoin business at the top of its company development. USDC's strategy of establishing itself as a fully regulated and transparent stablecoin may prompt Tether to try to reshape its public image.

DAI is the current decentralized stablecoin which leading player Maker DAO officially issued and started managing in 2017. MakerDAO is a decentralized finance (DeFi) project headquartered

in San Francisco whose founder is Rune Christensen. First Digital (FDUSD) is a stablecoin backed by reserves, issued by a subsidiary of First Digital Limited, a financial company headquartered in Hong Kong. USDD is issued by the TRON Foundation, which is headquartered in Singapore (TRON had dual headquarters in San Francisco and Beijing in its early development), and its founder is the Chinese Justin Sun. Sun set up the headquarters of the USDD issuer in Singapore rather than the US to circumvent regulation. In April 2024, the US SEC amended its lawsuit against Tron founder Sun, claiming that he frequently traveled to many places in the US, giving the court corresponding jurisdiction. The SEC accused Sun Justin and his company of selling unregistered securities through Tron and BitTorrent (BTT) coins and engaging in manipulative money laundering transactions. The SEC said that Sun Yuchen spent more than 380 days in the US between 2017 and 2019, with travel destinations including New York, Boston, and San Francisco. Sun countered that the coin sale was conducted entirely overseas, avoiding the US market, so the SEC had no right to impose jurisdiction on him and the Singapore-based Tron Foundation. PYUSD was endorsed by Paypal in its issuance and is available on PayPal's Venmo payment application. The stablecoin is built on Ethereum and issued by Paxos Trust Company, which is headquartered in New York and provides customers with regulated blockchain infrastructure. In addition, Edelcoin AG announced the launch of Edelcoin (EDLC), a stable payment coin backed by a basket of precious and base metals, which has higher stability than a single fiat or metal-based stablecoin and has the same versatility as other digital currencies.

Table 2-7 Ranking of global stablecoin market capitalization in 2024

Overall rank	Coin	Overall value	Overall amount in circulation	Headquarters
3	Tether	USD114,397,689,330	114,419,695,894 USDT	Bahamas
7	USDC	USD34,045,254,012	34,050,433,983 USDC	Boston, US
19	DAI	USD5,347,781,372	5,347,888,596 DAI	San Francisco, US
46	First Digital USD	USD2,019,998,217	2,021,456,516 FDUSD	Hong Kong, China
90	USDD	USD737,947,349	738,651,979 USDD	Singapore
124	TUSD	USD495,734,749	495,201,533 TUSD	San Francisco, US
149	PYUSD	USD349,644,031	349,835,043 PYUSD	New York, US
201	EDLC	USD6,203,301,740	5,516,931,200 EDLC	Switzerland
202	USDe	USD3,399,038,489	3,400,785,672 USDe	Unclear
207	FRAX	USD647,179,176	649,434,271 FRAX	Unclear

Data source: This report was manually collected and organized (data statistics as of July 25, 2024)

Outside the US, Hong Kong is also actively embracing the opportunities presented by stablecoin development. On July 18, 2024, the Hong Kong Monetary Authority announced the participants of the stablecoin issuer “sandbox.” In addition to local companies such as HKD Circle and Standard Chartered being among the first participants, mainland Chinese internet giant JD.com was also included. Specifically, the five companies are JD Digital Chain Technology (Hong Kong) Limited, HKD Circle Innovation Technology Limited, Standard Chartered Bank (Hong Kong) Limited, Animoca Group Limited, and Hong Kong Telecom Limited.

However, all of the aforementioned companies only plan to issue Hong Kong dollar (HKD) stablecoins. As Hong Kong serves as a “safety valve” for the flow of capital in and out of China, the development of an HKD stablecoin industry not only helps further solidify Hong Kong’s status as an international financial center but could also have a significant impact on the global financial ecosystem, reinforcing the role of the HKD in the international trade system. That said, the absence of an offshore RMB stablecoin in the issuance

process means that this is still merely a trial run for innovation and development in the digital currency industry. If, in the future, the issuance of RMB stablecoins in Hong Kong progresses alongside industry development, Hong Kong, as the largest and most important offshore RMB business center, will be poised to further promote the internationalization of the RMB and the use of RMB-denominated digital assets amid the wave of digitalization.

Of course, analyzing the pegged currencies of the current mainstream stablecoins, Tether (the stablecoin with the largest trading volume) offers several variations, including USD Tether, EUR Tether, RMB Tether, Philly Gold and Silver Index Tether, and Tether Gold. Table 2-8 shows the global circulation statistics for different types of Tether by currency. According to the latest Tether transparency report released on July 24, 2024, USD Tether still accounts for the largest share of circulating Tether, indicating that stablecoins pegged to the US dollar continue to dominate the market. Following USD Tether are EUR Tether, RMB Tether, MXN Tether, Tether Gold, and others, reflecting a market structure where the dominance of the US dollar coexists with a multi-polarized landscape in the stablecoin sector.

Table 2-8: Global Circulation Statistics of Different Types of Tether by Currency

Currency Type	Net Circulation
USD Tether	114,419,695,893.83 USD
EUR Tether	30,618,610.07 EUR
RMB Tether	20,503,468.90F RMB
MXN Tether	19,562,400.00 MXN
Tether Gold	246,524.33 Ounces

Data source: <https://tether.to/en/transparency/?tab=usdt>

From a technical perspective, Tether does not have its own blockchain network. Instead, it issues tokens and records transaction information within existing blockchain networks by appending additional information to transactions. Tether is primarily issued and recorded using the Bitcoin Omni protocol, the Ethereum ERC-20 protocol, and the TRON TRC-20 protocol. Tether tokens issued on different protocols are not transferable between each other. Tether was first issued on the Bitcoin Omni protocol in November 2014. However, due to its low payment efficiency, transaction volumes have since been surpassed by ERC-20 USDT and TRC-20 USDT, which launched in 2018 and 2019, respectively. Using the Bitcoin Omni protocol as an example, the specific algorithm involves recording transaction information in the Bitcoin locking script’s OP\_Return field as “memo information.” The amount of Bitcoin transferred in these transactions on the Bitcoin network, which stores Tether transaction records, is usually limited to the minimum dust threshold of 546 satoshis (0.00000546 BTC), aside from the miner fees, paid to the recipient to prevent dust attacks. Since memo information in Bitcoin blocks is immutable, storing Tether transaction data in these memos fully prevents the double-spending issue for Tether. This mechanism allows Tether to achieve centralization at the issuance level while maintaining decentralization at the transaction verification level.

USD Tether (USDT) is neither mined by miners nor does it involve the creation of additional currency. Instead, it is issued in a centralized manner as a digital currency with 100% reserve backing.

Users can obtain USDT by wiring USD to a bank account provided by Tether via SWIFT, or by exchanging for USDT on the Bitfinex exchange. When redeeming USDT for USD, the reverse process applies. However, there are certain restrictions when converting USDT to USD through Tether’s official website. According to an announcement by Tether on November 27, 2018, individual users must meet a minimum redemption amount of \$100,000 when redeeming fiat currency through the Tether website, and are subject to a fee. Most small to medium-sized users typically exchange USDT through cryptocurrency exchanges.

When Tether adopts the Omni protocol, ERC-20 protocol, and TRC-20 protocol, the verification speed increases in that order, while security and transaction fees decrease correspondingly. The decrease in security is primarily due to the shorter operational history of the TRON TRC-20 protocol compared to Bitcoin’s decade-long history and continuous revisions. TRON’s relatively shorter history might expose it to potential vulnerabilities, and the TRON team has even offered a \$10 million reward to developers for identifying any flaws in the TRON network. Therefore, large transactions typically use the Omni protocol, medium-sized transactions use the ERC-20 protocol, and small transactions are carried out using the TRC-20 protocol.

Further analysis shows that although the aforementioned protocols differ, user preferences are also constantly evolving. Table 2-9 displays the circulation rankings of USD Tether across various blockchain mainnets. According to the latest Tether transparency report

published on July 23, 2024, the highest circulation of USD Tether is on the TRON network, totaling \$60.3 billion. Following this, USD Tether issued on the Ethereum network reaches \$50.6 billion, while USD Tether on the traditional Bitcoin Omni network lags significantly behind, with only \$130 million. This is far lower than other emerging

blockchain protocols like Avalanche and Solana, indicating that stablecoin users are highly sensitive to payment speed. They tend to prefer using stablecoins on the TRON and Ethereum networks rather than on the Bitcoin Omni network, which offers the highest level of privacy protection.

Table 2-9: Circulation Rankings of USD Tether Across Various Blockchain Mainnets

Blockchain Mainnet	Circulation Amount (USD)
Tron	60,318,181,182.30
Ethereum	50,657,945,368.29
Avalanche	1,259,646,866.15
Solana	731,256,391.97
Ton	619,674,501.59
Near	253,999,998.00
Celo	188,100,000.80
Omni	130,009,681.25
Cosmos	103,500,000.11
EOS	72,650,283.65
Tezos	37,277,929.64
Polkadot Asset Hub	22,997,725.05
Algorand	13,017,596.75
Liquid	10,211,849.00
SLP	986,524.74
Kusama Asset Hub	239,994.54

Data source: <https://tether.to/en/transparency/?tab=usdt>

### 2.1.3 Analysis of the Current Development of Platform Tokens by Country

Platform tokens are digital currencies issued by cryptocurrency exchanges. Currently, the leading platform tokens include Binance Coin (BNB) issued by Binance, HT issued by Huobi, and OKB issued by OKEX. Platform tokens generally carry the characteristics of both loyalty points and stocks. Their primary functions include fee discounts, dividends, appreciation of the platform token itself, participation in community governance, airdrops of other tokens, and facilitating new listings. In other words, as digital currency exchanges continue to grow and expand, they are no longer content with earning profits solely by collecting intermediary fees on cryptocurrency transactions. Instead, they are leveraging their high visibility and large user bases to build new cryptocurrency ecosystems, which brings higher liquidity.

According to a report from Forbes, as of November 2022, more than 16 global cryptocurrency and DeFi exchanges had created their own platform tokens, with a combined market capitalization exceeding \$62 billion. These platform tokens offer holders exchange benefits such as transaction fee discounts and preferential margin

loan terms, while also allowing the issuers to gradually dominate cryptocurrency trading. By leveraging their trading volume advantages, they attract investors to use their platform tokens as intermediary currencies, thus attempting to challenge the US dollar’s role as the primary value anchor in the cryptocurrency market.

The most successful of these platform tokens is Binance Coin (BNB), created by Zhao Changpeng, China’s richest person, with a market cap reaching \$45.97 billion. Table 2-10 shows that many of these platform tokens are associated with remote operations. While some have headquarters in developed countries like Singapore, the US, and Japan, the rest are based in crypto-friendly or tax-advantageous countries such as Seychelles, the Bahamas, and the Cayman Islands. Among these, exchanges like Binance, OKX, Huobi, and Gate.io, all originally China-based with Chinese investment, moved their headquarters overseas or adopted a remote, headquarters-free structure after China tightened its cryptocurrency regulations.

Table 2-10: Location and Market Capitalization Rankings of Major Platform Tokens in 2022

Exchange	Token Symbol	Headquarters Location	Market Capitalization (USD millions)
Binance	BNB	None, remote	45,977
OKX	OKB	Seychelles	4,651
Uniswap **	UNI	New York, US	4,188
Crypto.com	CRO	Singapore	2,024
TokenizeXchange	TKX	Singapore	803
Huobi	HT	Seychelles	699
Kucoin	KCS	Seychelles	693
Whitebit	WBT	Lithuania	682
PancakeSwap	CAKE	Japan	590
BTSE	BTSE	British Virgin Islands	562
Gate.io	GT	None, remote	538
SynthetixNetwork	SNX	Australia	392
FTX	FTT	Bahamas	262
MEXC Global	MX	Seychelles	87
Bidjet	BGB	Singapore	27
BitMart	BMX	Cayman Islands	16

Data source: <https://www.forbes.com/sites/ninabambysheva/2022/11/14/the-looming-62-billion-crypto-contagion/?sh=1aa5c1a61c39>

## 2.2 Comparative Analysis of the Global Development of Central Bank Digital Currency (CBDC) by Country

Central Bank Digital Currencies (CBDCs) are categorized into retail and wholesale types. Wholesale CBDCs are only available to central banks and financial institutions, not the general public (Bech and Garratt, 2017). However, in terms of technical design, more and more central banks are considering a "hybrid" or "intermediated" architecture, where the CBDC represents a direct claim on the central bank, akin to cash, while the private sector handles all customer-facing activities (Auer et al., 2020). When issuing CBDCs, some are based on "tokens," others on "accounts," and some use a combination of both (Lee et al., 2020).

Currently, nearly 50 central banks have launched CBDC designs or prototypes (Auer & Boehme, 2021). More than one-third of surveyed central banks indicated that issuing a CBDC is a medium-term possibility (Boar et al., 2020). Among 66 retail CBDC projects and 25 wholesale CBDC projects, most are still in the research or pilot phase. Only the central banks of the Bahamas, Nigeria, and the Eastern Caribbean have officially issued retail CBDCs. Wholesale CBDC projects showing significant progress include Canada's Jasper project and the European Central Bank's Stella project.

### 2.2.1 The Bahamian Sand Dollar

In October 2020, the Central Bank of the Bahamas announced the official launch of the central bank digital currency (CBDC) known as the "Sand Dollar," making the Bahamas the first country in the world to formally issue a CBDC. The Sand Dollar is issued through a 1:1 exchange with the Bahamian dollar, which is pegged to the US dollar. To avoid inflation, the Central Bank of the Bahamas will only mint new Sand Dollars when demand increases. When new Sand Dollars are minted, an equivalent amount of physical Bahamian dollars will be removed from circulation.

The technological solution for the Sand Dollar is provided by transaction service provider NZIA, which developed a new distributed wireless payment system specifically for the CBDC. This system features a modular design, integrating hybrid wireless communication networks, blockchain hardware nodes, edge processing capabilities, and the "Cortex" distributed ledger. It can work in tandem with the existing banking system, serving as a decentralized payment network to supplement the traditional centralized system.

Why did the Bahamas, a small island nation in the Caribbean, lead the world's major economies in officially issuing a CBDC? According to the Commonwealth Secretariat's 2020 State of Digital Economies in the Commonwealth report, the Bahamas had an internet

penetration rate of 90%, ranking fourth among Commonwealth nations, just behind Canada, Australia, and New Zealand. Additionally, based on information from the project homepage for the Bahamian Sand Dollar, the Central Bank of the Bahamas conducted a pilot CBDC project in Exuma in the summer of 2019. The survey results from this pilot showed that approximately 96% of Exuma residents owned mobile devices, and around 40% of respondents used these devices for bill payments or online banking. Nearly two-thirds of respondents expressed willingness to use mobile devices for payments or transactions in the future.

In an interview with The Wall Street Journal, Central Bank Governor John A. Rolle noted, "The damage to infrastructure caused by Hurricane Dorian in the Bahamas meant that, in some cases, it took more than a year for banks to rebuild physical branches. However, if we have an electronic payment infrastructure accessible to everyone, it would be as simple as re-establishing communication links." In summary, the Bahamas' highly developed digital economy, high internet penetration, and residents' willingness to adopt electronic payments laid the foundation for the rapid progress of the country's CBDC project. Additionally, the Bahamas' unique geographic composition of dispersed islands further heightened the need for the issuance of a central bank digital currency.

### 2.2.2 Nigeria's eNaira

On October 25, 2021, Nigeria's president announced the official launch of the central bank digital currency (CBDC) known as the eNaira, making Nigeria the second country in the world to formally issue a CBDC. The eNaira is built on the open-source distributed ledger project Hyperledger Fabric and supports a two-tier model architecture adopted by the Central Bank of Nigeria. To ensure inclusivity, the eNaira operates on an account-based CBDC model. To address the potential issue of economic dollarization, the eNaira has also been designed with future interoperability with other countries' CBDCs in mind.

Why was Nigeria, a small African nation, so eager to issue a CBDC? According to the Coin Dance database, over the past five years, Nigeria ranked second in the world—behind only the US—in Bitcoin transaction volume on the Paxful trading platform. This surge in cryptocurrency use is largely due to persistent inflation. Data from Trading Economics shows that Nigeria's inflation rate has consistently remained above 10%. In an effort to combat inflation, residents have increasingly turned to cryptocurrency as a medium of exchange, which has, in turn, exacerbated illegal activities such as money laundering, drug trafficking, and arms dealing. Therefore, the primary objective of the Central Bank of Nigeria in launching the eNaira is to mitigate the risks associated with cryptocurrency, safeguard financial security, and curb illegal transactions.



### 2.2.3 Canada's Jasper Project

Unlike retail CBDCs such as the Bahamian Sand Dollar and Nigeria's eNaira, which cater to the transaction needs of the general public, Canada's Jasper Project is an early wholesale CBDC initiative, and one of the fastest-progressing CBDC projects in developed countries, having already reached the pilot stage. The Jasper Project has used different blockchain technologies at various stages. From 2017 to 2018, the Bank of Canada's wholesale CBDC project, Jasper, explored multiple aspects across four phases: conducting preliminary investigations into using blockchain technology for large-value interbank payments, testing the efficiency of distributed ledger technology (DLT) for high-value interbank payments, exploring the potential benefits of integrating CBDCs with other assets, and experimenting with the development of a cross-border, cross-currency settlement system.

In Phases 1 and 2, the Jasper Project operated on different blockchain platforms: Ethereum and Corda, a financial trading platform developed by fintech company R3. Due to Ethereum's public nature, the Jasper Project identified significant privacy risks during Phase 1 testing. Unlike public blockchain systems like Bitcoin and Ethereum, Corda uses a permissioned ledger, meaning that data is not visible to the entire network but only to authorized participants within the contract scope. Furthermore, every node owner in the Corda system must go through a Know Your Customer (KYC) process to receive certification before joining the network.

As a result, the Phase 2 report gave high marks to Corda's permissioned ledger technology. Although it concluded that independent DLT systems are unlikely to be as cost-effective as centralized payment systems in terms of core operational costs, the report also noted that blockchain technology could improve the efficiency of the financial system due to its ability to integrate with broader financial market infrastructures.

### 2.2.4 European Central Bank and Bank of Japan's Stella Project

The Stella Project is a joint research initiative between the European Central Bank (ECB) and the Bank of Japan focused on wholesale CBDCs. To date, four phases of experiments have been conducted. The first and third phases utilized Hyperledger Fabric, while the second phase employed Corda as the supporting technology. Phase 1 explored using distributed ledger technology (DLT) to handle large-scale payments. Phase 2 tested securities settlement within a DLT environment. Phase 3 applied DLT-related technology to improve cross-border payment efficiency. On February 12, 2020, the ECB and the Bank of Japan released a joint report on the fourth phase, which examined the use of privacy-enhancing technologies (PET) to address potential privacy concerns in the application of DLT to financial services, such as limiting third-party access to information. This report aimed to ensure that CBDCs can be audited effectively while maintaining confidentiality.

### 2.2.5 Digital Renminbi

In the field of central bank digital currency (CBDC) development, China is one of the earliest countries to indicate plans for the trial operation of a CBDC. In 2014, the People's Bank of China (PBOC) established a legal digital currency research group to conduct specialized studies on the issuance framework, key technologies, issuance and circulation environment, and relevant international experiences. In 2016, the PBOC established the Digital Currency Research Institute and completed the development of the first-generation prototype system for the legal digital currency. By the end of 2017, the PBOC began organizing commercial institutions to jointly conduct research and experiments on the Digital Currency Electronic Payment (DCEP) project. On January 4, 2022, the Digital Renminbi (pilot version) app was made available in major app stores. By January 7, 2022, 49 platforms, including JD.com, Meituan, Ele.me, Tmall Supermarket, and Didi Chuxing, had already integrated the Digital Renminbi system.

Currently, the Digital Renminbi has entered multiple pilot phases, with promotional testing conducted in various cities and regions. These pilots cover different application scenarios, such as retail payments, public transportation, and government services. The trial has been extended to both large and small cities. At the same time, the user experience of the Digital Renminbi continues to improve, featuring functionalities such as online and offline payments, as well as offline transactions. Users can carry out various transactions via the Digital Renminbi wallet, such as shopping, transferring funds, and paying for public services.

At the technical platform level, the Digital Renminbi's technology platform continues to improve, providing a secure and reliable foundation. Emerging technologies, including blockchain, are used to ensure the security and transparency of transactions. The legal and policy framework supporting the promotion and use of the Digital Renminbi is also being gradually refined. The Chinese government maintains a positive attitude toward the development of the Digital Renminbi and has introduced a series of policies to regulate its application. Major commercial banks and financial institutions have begun participating in activities related to the Digital Renminbi, such as issuance, exchange, and trading, facilitating its full integration into the financial system.

China's exploration of the Digital Renminbi has also attracted international attention. China has engaged in discussions and

cooperation with other countries and regions regarding the standards and policies for digital currencies, advancing the global discourse on the development of digital currencies.

On the technical front, although the Digital Renminbi uses technologies similar to Bitcoin, such as digital certificates, digital signatures, and secure encrypted storage, it differs from private digital currencies like Bitcoin in several key ways. First, unlike Bitcoin, the Digital Renminbi employs a system of limited anonymity. In real-world application scenarios, the Digital Renminbi account addresses are anonymous. However, in the backend system, ownership identification can be linked to the real identity of the user, with this connection being established by the digital currency system. The Digital Currency Research Institute of the People's Bank of China highlighted this in its patent "Payment Method and Payment System for Digital Currency" (Patent No. CN201710493136), stating, "Although the owner identifier of the digital currency itself is anonymous, the backend of the digital currency system can associate it with a real identity." Therefore, compared to Bitcoin, the central bank digital currency can facilitate financial transactions with limited anonymity while better preventing the use of digital currencies for illegal activities.

Secondly, in terms of algorithms, Bitcoin primarily uses the Elliptic Curve Digital Signature Algorithm (ECDSA) to sign and verify transaction information, while the Digital Renminbi uses the domestic standard SM2 elliptic curve public key cryptography algorithm for signing and verifying transactions. Bitcoin mainly relies on the SHA-256 hash function developed by the US National Security Agency (NSA) as its message digest algorithm, whereas the Digital Renminbi uses the domestic hash algorithm standard SM3. Therefore, the Digital Renminbi leverages domestically developed encryption algorithms based on elliptic curve cryptography and cryptographic hash functions, which better safeguard the security of the central bank digital currency system. Additionally, the SM2 algorithm incorporates more error-checking features compared to ECDSA, further enhancing data integrity and system security. The SM3 algorithm builds upon the design of the SHA-256 algorithm, adding complexity, such as using two message words in each round of the compression function, thereby increasing its security.

Finally, Bitcoin's signature information is broadcast across the entire network and can be verified by any full node on the network. In contrast, the signature information of the Digital Renminbi is only verified by the recipient and the service provider's system. The authorized service provider's system belongs to an authorized node within the permissioned chain. As such, the Digital Renminbi does not use Bitcoin's fully open public blockchain but adopts a permissioned chain system similar to the Corda distributed ledger platform. In this system, transactions are not broadcast across the entire network; the consensus mechanism is only present among the nodes responsible for transaction verification. There is no concept of blocks, as subsequent transactions directly reference preceding ones.



## 2.3 Emerging Trends in the Integration of Global Digital Currencies with Various Emerging Digital Technologies

### 2.3.1 Digital Currency and Smart Contract Development

The development of smart contracts based on digital currency blockchain technology forms the foundation for the interaction and integration of digital currencies with various emerging digital technologies. Ethereum was the first blockchain platform to support smart contracts, known for its programmability, rich ecosystem, and sustainable upgrade capabilities. Within the Ethereum Virtual Machine (EVM), anyone can write valid scripts to execute any logic. Currently, various digital economic products based on new digital currencies like Ethereum include decentralized applications (dApps), such as decentralized exchanges, decentralized identity verification, decentralized voting, and more. Additionally, various assets, such as real estate, stocks, and metals, can be tokenized on Ethereum and traded on the blockchain. Based on the Ethereum platform, supply chain management can also be implemented on-chain to increase transparency and efficiency, helping companies better monitor and manage their supply chains.

According to the 2023 Blockchain and Web 3.0 Developer Statistics Report released by Dappros (see Table 2-11), the country with the most blockchain developers is the US, followed by India, the United Kingdom, and Canada. Blockchain developers can be further divided into Ethereum developers, Hyperledger developers, Solidity developers, NFT developers, and Web3 developers. Ethereum developers focus on writing smart contract programs on the Ethereum mainnet, aiming to issue derivative tokens or develop various Ethereum contract programs. Hyperledger is currently the most mainstream platform for permissioned blockchain development, primarily used in blockchain applications that require data security and cannot be fully decentralized, such as central bank digital currencies (CBDCs). Solidity is the language needed for writing Ethereum smart contracts. NFT development centers around non-fungible tokens, with digital collectibles being a popular use case in recent years.

### 2.3.2 Digital Currency and Metaverse Technology

Private digital currencies are widely used in the construction and settlement of the metaverse. Digital currencies used for monetary settlements within the metaverse are known as metaverse coins, with the main ones being SLP, TLM, CHR, SAND, AXS, and MANA. Currently, the most well-known metaverse projects, Decentraland and The Sandbox, use their self-issued private digital currencies, MANA and SAND, respectively, for digital asset transactions such as purchasing metaverse land and props. All data within Decentraland and The Sandbox is stored in the form of smart contracts on the Ethereum public blockchain, and the immutable nature of blockchain technology ensures that the ownership of digital assets in the metaverse is not controlled by any centralized institution.

For these reasons, investment in the metaverse is gradually attracting the attention of major financial institutions. In July 2022, Warba Bank, an Islamic bank, announced its entry into the metaverse and purchased two plots of land. In September 2022, DBS Bank, Singapore's largest commercial bank, also announced that it had purchased virtual land for development in the metaverse. Globally, NFT investors are using metaverse coins to transcend the limitations of time and space, facilitating the free exchange and circulation of currency in the digital world of the metaverse.

According to a 2022 survey conducted by Finder involving over 28,000 respondents worldwide on NFT ownership rates (see Table 2-12), countries with higher ownership rates are mainly developing countries, such as the Philippines, Thailand, and Malaysia. In contrast, 70.6% of American respondents indicated they did not know what NFTs were, and only 2.8% owned NFTs, suggesting that while NFT technology originated in the US, most current traders have shifted to developing countries.



Table 2-11: Ranking of Countries by Number of Blockchain Developers Worldwide

Rank	Country	Blockchain	Ethererum	Hyperledger	Solidity	NFT	Web3
1	US	6493	1545	280	1902	1077	1031
2	India	5469	1915	660	2286	657	979
3	UK	1459	274	58	317	162	144
4	Canada	1229	354	64	407	231	245
5	Pakistan	1132	423	73	541	270	269
6	France	1057	233	59	349	185	121
7	Nigeria	940	181	16	296	119	135
8	Vietnam	866	171	27	327	117	96
9	Germany	862	205	63	223	69	84
10	Spain	791	209	79	273	101	103
11	Turkey	690	103	20	237	81	87
12	Singapore	657	145	24	192	112	86
13	Italy	647	95	19	145	84	59
14	China	581	99	17	115	60	57
15	Netherlands	570	95	31	110	44	33
16	UAE	533	168	46	194	93	95
17	Brazil	528	140	41	188	83	77
18	Korea	507	69	11	108	66	30
19	Australia	499	100	15	111	56	50
20	Iran	498	94	10	171	39	60

Data source: <https://www.dappros.com/202303/worldwide-blockchain-and-web3-developers-statistics-2023/>

Table 2-12: Ranking of NFT Ownership Rates by Country

Rank	Country/Region	Own at least one NFT	Plan to buy NFT	Expected Ownership
1	Philippines	0.32	0.095	0.415
2	Thailand	0.266	0.079	0.345
3	Malaysia	0.239	0.105	0.344
4	UAE	0.234	0.115	0.349
5	Vietnam	0.174	0.1162	0.291
6	Nigeria	0.137	0.217	0.354
7	Brazil	0.121	0.099	0.22
8	Hong Kong (China)	0.107	0.104	0.211
9	Venezuela	0.106	0.135	0.241
10	Peru	0.099	0.145	0.244

Data source: <https://www.finder.com/nft-statistics>

### 2.3.3 Digital Currency and Web 3.0 Network

The foundation of digital technology development is Web 2.0, which is based on innovations in centralized server information technology. In contrast, the upcoming Web 3.0 era is characterized by decentralization and is built on blockchain technology, with digital currencies functioning as the medium for information exchange and value transfer within this system.

From a product perspective, one of the representative products of Web 3.0, the Ethereum Name Service (ENS), serves as one of the foundational services in the development of the digital economy in the Web 3.0 era. While, after DNS resolution, a "decentralized, unstoppable, and unfilterable server" can be created using ENS

domain names and the IPFS distributed storage system, in the Web 3.0 framework, the resolution information for ENS domain names is stored in smart contracts on Ethereum. Renting a domain name requires paying a fee in Ether (ETH) to the official ENS service on Ethereum, and each resolution also consumes a certain amount of Ether as gas fees.

Currently, according to Built With's statistics on global IPFS websites (see Table 2-13), as of July 11, 2023, there are 4,843 Web 3.0 websites built using blockchain-based IPFS storage technology. Aside from some websites with .io domain names and those with unspecified locations, the US has the most Web 3.0 websites, followed by China and the Netherlands.

Table 2-13: Ranking of the Number of Web 3.0 Websites Built Using IPFS by Country

Country	Amount
US	1664
China	111
Netherlands	44
Cocos (Keeling) Islands	36
India	34
Finland	33
UK	27
Germany	26
France	22
Canada	22
Russia	20
Brasil	16
Indonesia	15
Switzerland	13
Italy	11
Guernsey Island	9
Spain	8
Singapore	8
Mexico	8
Australia	7

Data source: <https://trends.builtwith.com/websitelist/IPFS>

However, the ENS domain, which is promoted as a Web 2.0 domain alternative, remains largely in the conceptual stage despite its rising speculative value. The ecosystem is developing slowly, with only a few browser tools, such as Brave, currently able to directly access ENS domains. At present, ENS domains, when combined with the

IPFS distributed storage system, are only suitable for building static websites and are not yet applicable to the rapidly evolving digital economy. As a result, the ENS domain management organization has sought help from the Web 2.0 era domain management body, ICANN, and each DNS resolution incurs a significant fee.

### 2.3.4 Digital Currency and Artificial Intelligence Technology

Digital currency and artificial intelligence (AI) technology have a mutually beneficial relationship, promoting each other's development. AI technology can analyze vast amounts of blockchain metadata and digital currency transaction data, offering more accurate market predictions and improvements in technical architectures. Additionally, smart contracts powered by blockchain technology can utilize AI for more complex logical judgments and automatic execution, enhancing the efficiency and flexibility of the blockchain. Moreover, AI can analyze large data streams and transaction patterns to detect potential fraud<sup>1</sup>, improving the security and credibility of on-chain transactions.

From the perspective of central bank digital currencies (CBDCs), AI technology can be utilized to monitor CBDC transaction activities and detect abnormal or suspicious transaction patterns to prevent fraud and illegal activities. Additionally, AI can help develop more intelligent CBDC payment systems, enhancing user experience and payment efficiency. AI can also further improve the efficiency

and security of the blockchain systems used in CBDCs. It enables smart contracts to make more complex conditional judgments and execute tasks automatically, increasing the overall system's flexibility and responsiveness. Finally, AI can assist central banks in policy formulation and decision-making. By analyzing big data, predicting economic trends, and forecasting currency demand, AI can provide more accurate decision-making support, helping optimize monetary policy and economic management.

Currently, many private digital currencies are already empowered by AI technology. Table 2-14 shows that the digital currencies with the highest market capitalization in this category include NEAR, ICP, and FET. In November 2023, NEAR officially launched NEAR Tasks to train and improve AI models. NEAR Tasks is a blockchain-based AI annotation platform where model training requesters (Vendors) can publish task requests and upload basic data materials. Users (Taskers) can participate in task completion by providing text annotations, image recognition, and other manual operations. After completing the task, the platform rewards users with NEAR tokens, and the annotated data is used to train the corresponding AI models.

Table 2-14: 2024 Global Market Capitalization Ranking of AI-Driven Digital Currencies

Rank	Currency	Price	Total Market Capitalization
19	NEAR	US\$5.68	US\$6,254,569,717
27	ICP	US\$9.54	US\$4,456,422,096
32	FET	US\$1.20	US\$3,023,913,830
42	RENDER	US\$6.04	US\$2,366,063,147
43	TAO	#####	US\$2,330,659,380
56	GRT	US\$0.19	US\$1,783,697,943
100	AKT	US\$3.08	US\$746,024,074
131	AIOZ	US\$0.48	US\$530,358,550
173	AGIX	US\$0.57	US\$359,013,041
179	ARKM	US\$1.37	US\$331,613,532

Data Source: This report was manually collected and compiled (data as of July 25, 2024).

<sup>1</sup> For example, Coinbase uses Amazon SageMaker to develop machine learning algorithms for image analysis to combat fraud. The facial similarity algorithm used by the exchange can automatically extract facial features from uploaded IDs and then compare these features with those from other uploaded IDs. Fraudsters often use the same photo on multiple IDs, as editing the photo in several places on an ID would be more difficult. With this facial similarity algorithm, Coinbase can quickly identify these forged documents.]

### 2.3.5 Digital Currency and Asset Tokenization

Decentralized finance (commonly known as DeFi) is a financial system built on blockchain technology that does not rely on traditional financial institutions like brokers, exchanges, or banks to provide financial tools. Instead, it utilizes smart contracts on blockchains, such as Ethereum, to conduct financial activities. DeFi envisions the tokenization of all assets, allowing them to be freely and openly traded in global markets. DeFi tokens are issued by decentralized exchanges or projects, and their holders can benefit from the development of the platform ecosystem. Currently, DeFi tokens mainly fall into three categories: collateralized lending, decentralized platforms, and derivatives platforms.

The most well-known collateralized lending protocol is MakerDAO, a decentralized autonomous organization and smart contract system based on the Ethereum blockchain, which includes both the stablecoin DAI and the governance token MKR. Decentralized exchanges (DEXs) include platforms like dYdX and Uniswap. According to a 2021 report by Chainalysis, which ranked countries based on the total value received via DeFi protocols, the number of on-chain DeFi deposits, and the on-chain retail value received via DeFi protocols, a global DeFi adoption index was calculated (see Table 2-15). The report found that the ranking of countries by DeFi adoption index does not completely align with the ranking by digital currency transaction volume, indicating some variation between the two.

This report argues that the US has the highest adoption rate of DeFi, driven by several factors. First, the US has the world's most developed financial markets and robust technological infrastructure, providing fertile ground for DeFi platform innovation and growth. Second, the US boasts an active venture capital environment, where many tech companies and entrepreneurs seek funding, driving the rapid development of DeFi projects. Additionally, while US financial regulations are relatively strict, they also encourage companies and institutions to develop innovative products within a legal and compliant framework, further promoting DeFi adoption and usage.

Finally, the strong tech culture and financial awareness in the US make investors and consumers enthusiastic and accepting of emerging financial technologies, leading to widespread experimentation and application of DeFi products.

This report argues that Vietnam ranks second in DeFi adoption, driven by several key factors. First, traditional financial services in Vietnam have been largely cash-based, and the rise of fintech and digital currencies offers users more convenient financial services, attracting a large number of users interested in DeFi. Second, Vietnam has a large young population with high technological acceptance, and the innovation and flexibility of digital currencies and DeFi products align well with the needs of this demographic. Additionally, the Vietnamese government has shown a positive attitude towards blockchain technology and digital currencies, promoting the application and development of related technologies. Finally, Vietnam's high inflation rate and the limitations of its financial system have created a greater demand for decentralized financial solutions, with DeFi products being particularly attractive due to their ability to offer increased transparency and financial freedom. These factors combined have contributed to Vietnam's widespread adoption of DeFi products.

In summary, this report believes that DeFi protocols have broken down barriers to cross-border currency transactions and have driven the internationalization of currencies globally. First, in the context of China shutting down P2P platforms and the US's Lending Club requiring social security numbers for KYC verification, blockchain-based lending through DeFi protocols removes obstacles to cross-border lending. Additionally, Chinese-backed digital currency exchanges like Binance and OKex require Chinese citizens to upload ID cards and undergo facial recognition for trading, with high fees for deposits and withdrawals, and there is some risk of "platform collapse." In contrast, decentralized exchanges based on DeFi protocols allow for peer-to-peer token swaps through smart contracts, reducing both risk and transaction costs, which helps to improve the liquidity of digital currencies.

Table 2-15: 2021 Global DeFi Adoption Index Ranking by Country

Ranking	Country	DeFi Adoption Index
1	US	1.00
2	Vietnam	0.82
3	Thailand	0.68
4	China	0.62
5	UK	0.60
6	India	0.59
7	Netherland	0.55
8	Canada	0.52
9	Ukraine	0.49
10	Poland	0.46
11	France	0.46
12	Australia	0.41
13	Turkey	0.40
14	Switzerland	0.38
15	Russia	0.36
16	Argentina	0.34
17	Brasil	0.32
18	Portugal	0.31
19	Hong Kong (China)	0.30
20	Togo	0.30

Data source: <https://blog.chainalysis.com/reports/2021-global-defi-adoption-index/>

## 2.4 The Credit Basis of Digital Currency

Although the digital currency industry has developed rapidly and demonstrated unique characteristics through integration with various new digital technologies, some critics still question the value of digital currencies, particularly private digital currencies or cryptocurrencies, and the credit basis behind them. In a 2020 interview with CNBC, Warren Buffett stated, "Cryptocurrencies basically have no value, they don't produce anything."<sup>2</sup> In 2023, US President Joe Biden submitted his latest annual economic report to Congress, which raised significant doubts about the benefits of digital assets and questioned the value of cryptocurrencies. The report stated, "In fact, so far, crypto-assets have not provided investments with any fundamental value, nor can they serve as an effective substitute for fiat currency to improve financial inclusion or increase payment efficiency; instead, their innovation has mainly been to artificially create scarcity to support crypto-asset prices—many of which lack fundamental value."<sup>3</sup>

Central bank digital currencies (CBDCs) are issued by central banks, with their credit based on national credit guarantees, making

them equivalent in value to national fiat currencies. CBDCs also promote the convenience and digitalization of fiat currencies. In contrast, private digital currencies are issued based on cryptographic algorithms. Stablecoins, similar to unregulated banks, typically have some reserve assets to support the stability of their exchange rate. The credit basis of these stablecoins comes from their value stability and the assets to which they are pegged.

Private digital currencies without reserve backing typically lack tangible assets to support them, and their credit foundation differs. This report argues that the credit support for private digital currencies like Bitcoin and Ethereum, which are mostly not backed by physical assets, stems from the following factors.

First, the credit foundation of private digital currencies is driven by scarcity enabled by technology. For example, Bitcoin has a total supply cap of 21 million coins, and its "mining" output halves every four years, making Bitcoin a deflationary and increasingly scarce currency.

The historical backdrop of Bitcoin's creation was the excessive monetary easing policies in the US following the 2008 financial crisis, which led to currency devaluation. Some scholars believe that Bitcoin shares characteristics with gold, and to some extent, it can be seen as "digital gold" or "Gold 2.0" (Baur & Hoang, 2021).

However, while Bitcoin, like commodity currencies such as gold and silver, exhibits some monetary characteristics, it differs from central bank digital currencies (CBDCs) as it cannot be controlled through monetary policy. Moreover, private digital currencies, represented by Bitcoin, also differ from gold in that Bitcoin can be divided into much smaller units. One Bitcoin can be divided into 100,000,000 satoshis, meaning each satoshi is one hundred-millionth of a Bitcoin. This allows Bitcoin, unlike gold, to avoid becoming entirely deflationary, as it can still meet transactional needs through increasingly smaller units, meaning Bitcoin has an endogenous monetary supply.

Secondly, this report believes that the credit foundation of private digital currencies also stems from the belief of investors and users. In other words, enough investors and traders have already embraced private digital currencies. The founder of the Austrian School of Economics, Carl Menger, argued that money can evolve without government intervention. He proposed that monetary units arise spontaneously from a process in which frequently traded goods

gradually become a universally accepted medium of exchange (Menger, 1892). This social coordination requires no formal decisions or legislative actions but can be driven by existing demand. Additionally, there are strong network effects. The more market participants use a particular medium of exchange, the more utility it provides; in other words, the dominance of a medium of exchange has a self-reinforcing effect (Kiyotaki & Wright, 1989; Kiyotaki & Wright, 1993). In other words, the commodity that is most widely accepted and retains its value over time becomes money. The key reason money is useful is that as long as others perceive it as valuable and are willing to accept it, it works.

Moreover, from a game theory perspective, if a commodity has enough believers, it will become a form of currency. In *Denationalization of Money*, Friedrich Hayek also argued against state control of money issuance and supported the issuance of money by private entities, which provides theoretical support for the value of private digital currencies like Bitcoin.

Analyzing the three main functions of money, it is clear that private digital currencies, such as Bitcoin, are well-suited to the digital age and can fulfill the function of a medium of exchange. Traders no longer need to engage in face-to-face transactions like with paper money, nor do they require a centralized intermediary, as in electronic payments, to verify digital payment instructions. Instead, anonymous payments

<sup>2</sup> Warren Buffett: Cryptocurrency 'has no value' - 'I don't own any and never will', <https://www.cnbc.com/2020/02/24/warren-buffett-cryptocurrency-has-no-value.html>

<sup>3</sup> White House blasts digital assets in new report, sees little value in crypto, <https://www.theblock.co/post/221815/white-house-blasts-digital-assets-in-new-crypto-report?modal=newsletter>

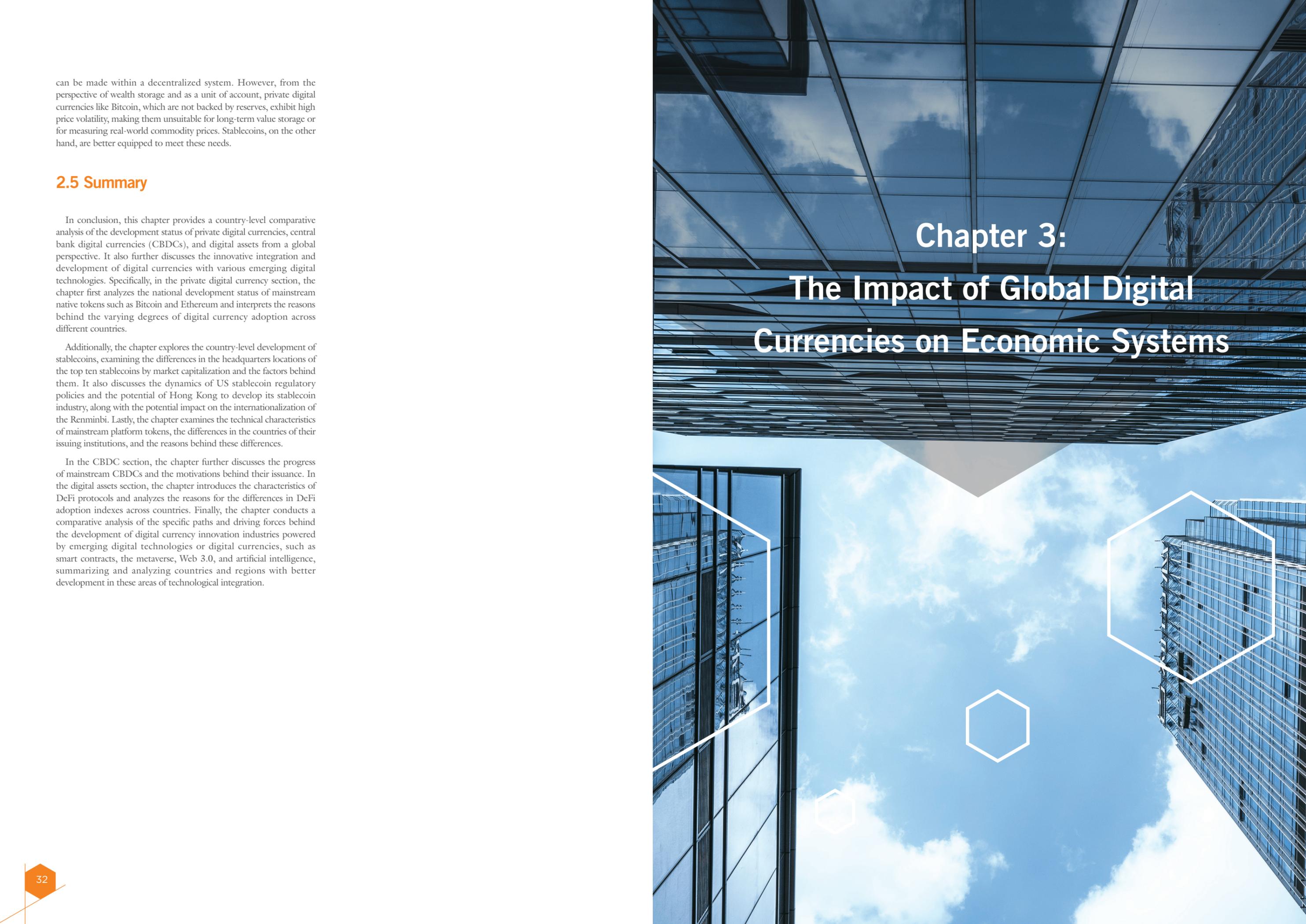
can be made within a decentralized system. However, from the perspective of wealth storage and as a unit of account, private digital currencies like Bitcoin, which are not backed by reserves, exhibit high price volatility, making them unsuitable for long-term value storage or for measuring real-world commodity prices. Stablecoins, on the other hand, are better equipped to meet these needs.

## 2.5 Summary

In conclusion, this chapter provides a country-level comparative analysis of the development status of private digital currencies, central bank digital currencies (CBDCs), and digital assets from a global perspective. It also further discusses the innovative integration and development of digital currencies with various emerging digital technologies. Specifically, in the private digital currency section, the chapter first analyzes the national development status of mainstream native tokens such as Bitcoin and Ethereum and interprets the reasons behind the varying degrees of digital currency adoption across different countries.

Additionally, the chapter explores the country-level development of stablecoins, examining the differences in the headquarters locations of the top ten stablecoins by market capitalization and the factors behind them. It also discusses the dynamics of US stablecoin regulatory policies and the potential of Hong Kong to develop its stablecoin industry, along with the potential impact on the internationalization of the Renminbi. Lastly, the chapter examines the technical characteristics of mainstream platform tokens, the differences in the countries of their issuing institutions, and the reasons behind these differences.

In the CBDC section, the chapter further discusses the progress of mainstream CBDCs and the motivations behind their issuance. In the digital assets section, the chapter introduces the characteristics of DeFi protocols and analyzes the reasons for the differences in DeFi adoption indexes across countries. Finally, the chapter conducts a comparative analysis of the specific paths and driving forces behind the development of digital currency innovation industries powered by emerging digital technologies or digital currencies, such as smart contracts, the metaverse, Web 3.0, and artificial intelligence, summarizing and analyzing countries and regions with better development in these areas of technological integration.



# Chapter 3: The Impact of Global Digital Currencies on Economic Systems

## Chapter 3: The Impact of Global Digital Currencies on Economic Systems

### 3.1 The Impact of Digital Currencies

#### 3.1.1 The Impact of Private Digital Currencies on Currency Internationalization

The decentralized and difficult-to-regulate characteristics of private digital currencies such as Bitcoin make them the best medium for transnational virtual economies. They are often used with highly anonymous tools such as Bitcoin mixers for illegal offline transactions such as smuggling, drug trafficking, and human trafficking. However, huge fluctuations in Bitcoin's value put it at a disadvantage in the legal virtual economy. Therefore, stablecoins such as USDT are better placed to meet the need for decentralization in digital currency transactions while also ensuring the stability of the currency value of both parties in a transaction, making them the mainstream digital currencies of choice in the purchase of various virtual goods such as NFT artworks, virtual numbers, digital platform memberships, and educational mailboxes. This mainstream reality of the purchase of the aforementioned digital goods using USDT denominated in US dollars has further solidified the existing status of the US dollar as an anchor currency in this new generation of a decentralized digital economic system. Tavabi et al (2019) used crawler technology to crawl the corpus of more than 80 dark web forums - and based on artificial intelligence (AI) methods, they used the latent Dirichlet allocation (LDA) algorithm and the non-parametric hidden Markov model algorithm to model and statistically find that 84.7 percent of dark web users are male and only 9.4 percent are female. In addition, they also counted the average daily number of dark web users in various countries around the world as follows (see Table 3-1) - and found that the US has the largest number and proportion of dark web users, followed by Germany and India. One should note, however, that this statistical table does not include data from China. This report believes that this may be because the researcher only counted the English corpus and has not yet analyzed and counted the corpus data of the Chinese dark web forum.

Table 3-1 Statistics of the average number of daily users in various countries around the world who visit the dark web

Country	Average Number of Daily Users
US	467,982(19.69 %)
Germany	283,997(11.95 %)
India	102,554(4.32 %)
Indonesia	92,715(3.90 %)
France	91,667(3.86 %)
Russia	89,891(3.78 %)
Finland	85,092(3.58 %)
Netherlands	69,416(2.92 %)
UK	61,458(2.59 %)
Egypt	50,612(2.13 %)

Data source: Tavabi et al (2019) research thesis

However, with the gradual rise of currencies such as the euro and the renminbi, Tether, the company that issued USDT, also issued other corresponding stablecoins such as euro tether (EURT), the offshore renminbi tether (CNHT), and the Mexican peso tether (XMNT). According to the latest transparency report that Tether released in July 2023 (see Table 3-2), the current total amount of USDT in circulation is USD 83.3 billion, while for euro tether and offshore renminbi tether the corresponding amounts are far less at only EUR 36.38 million and RMB 20.5 million. This means that for

the time being, EURT, CNHT, and other non-USD stablecoins can only be used as a supplement to stablecoin transactions and have not yet been able to challenge the existing pattern where the US dollar is the anchor currency in the digital currency trading market. USDT

is also issued on many of the main blockchain chains such as Tron's Tron network, Ethereum's Ethereum network, the Solana network, and Bitcoin's Omni network, and it has the greatest exchange compatibility.

Table 3-2 Tether Currency Ranking Table

Currency Type	USDT	EURT	CNHT	XMNT
Tron Network	USD 43,118,788,997	None	None	None
Ethereum Network	USD 38,301,860,819	EUR 36,385,896	RMB 5,503,468	MXN 19,562,400
Solana Network	USD 859,056,690	None	None	None
Omni Network	USD 237,944,877	EUR 1,443.99	RMB 15,000,000	None
Other	USD 860,414,101	None	None	None
Total Amount Issued	USD 85,820,856,434	EUR 36,387,340	RMB 20,503,468	MXN 19,562,400

Data Source: Tether Official

#### 3.1.2 The impact of central bank-issued digital currencies on currency internationalization and their country-specific development experience

Many scholars believe that the promotion of central bank-issued digital currencies will also promote the internationalization of countries' sovereign currencies. Cong & Mayer (2022) simulated the dynamic global competition of legal tender, cryptocurrencies, and central bank-issued digital currencies based on a two-country game model and found that by launching a central bank-issued digital currency, **weak currencies might end up challenging the dominance of strong currencies**. If this does end up posing a threat to the dominance of strong currencies, then the issuance of central bank-issued digital currencies by weak countries will also make strong countries more motivated to launch central bank-issued digital currencies of their own, thereby generating strategic complementarity. The Center for Strategic and International Studies also pointed out in its April 2022 research report that China's digital renminbi plan has made governments in the US, EU, and Japan more interested in having their own central bank-issued digital currencies. In addition, the Biden administration in the US is strengthening its review of China's digital renminbi plan because it is worried that this may threaten the US dollar's status as the world's main reserve currency. Shen (2022) further used the smooth transition autoregression (STAR) model and the nonlinear time-varying parameter stochastic volatility vector autoregression (TVP-SV-VAR) model to empirically analyze the relationship between digital renminbi, renminbi internationalization, and the development of the international monetary system. The results show that the relationship between digital renminbi and renminbi internationalization varies over time, and there are significant differences in this relationship under different economic conditions. **The digital renminbi also promotes renminbi internationalization, thereby contributing to further diversification of the international monetary system.**

Regarding technical principles, this report asserts that there are several reasons why digital currencies promote currency internationalization. First of all, the characteristics of digital currency transcend time and space, making cross-border payments and

settlements more convenient and making it possible to complete settlements faster and more efficiently than with traditional paper currency - which makes digital currency highly attractive. Second, if digital currency uses blockchain technology, its decentralized characteristics will make it more democratic in terms of governance structure - and it can also be used to conduct currency-to-currency settlements based on cross-chain technology, bypassing centralized settlement institutions such as SWIFT and thus gaining more international recognition. Finally, based on technologies such as AI and Big Data, blockchain regulates money supply more efficiently and in a timelier manner, thus giving it greater stability than traditional currency.

## 3.2 The Impact of Digital Currencies on Residents' Consumption

For private digital currencies, there are various mobile payment tools that are constantly emerging - these will make digital currency transactions, payments, and the use of private digital currencies for consumption more convenient as well. These tools are emerging because it is difficult for ordinary users to use full nodes to receive and send digital currencies - and as a result, digital currency mobile wallet applications are constantly emerging. Digital payment tools for digital currencies are divided into centralized and decentralized wallets. Centralized digital currency wallets include various exchange wallets - such as Coinbase wallets and Okex wallets - that are used for fast currency transactions in exchanges and fast exchanges with legal currencies. These are suitable for short-term digital currency investors and centralized digital currency derivative transactions. The transaction fees for these exchanges are generally low, but so is security. This means that decentralized wallets based on open-source code are currently the mainstream means of large-scale, long-term storage of private digital currencies. Ethereum wallets are now mainly MetaMask - which quickly connect to and log in to various NFT markets such as OpenSea. Other general digital currency wallets include those such as imToken and TokenPocket, which support different types of digital currencies. With the support of these types of private digital currency wallets, users can engage in consumption quickly and conveniently while still ensuring their anonymity. **On the Apexto platform, users can easily use Bitcoin to purchase mining servers - and on the Bamboo Card platform, they can easily purchase digital currency gift cards.**

Looking at central bank-issued digital currencies, these are essentially an effective substitute for cash. The level and trend of cash use in a given country also affects the demand for central bank-issued digital currency. In countries where cash use is already very low, the demand for digital currency will be weak - but in places where cash use is more widespread, the demand will be stronger due to the lack of cash alternatives (Khiaonarong and Humphrey, 2019). Central bank-issued digital currencies have several obvious advantages over physical cash. The existence of physical cash sets a lower limit on interest rates - which is the main reason for the ineffectiveness of adopting negative interest rates as part of a country's monetary policy. The use of central bank-issued digital currency, however, will potentially overcome this lower limit (Grasselli and Lipton, 2019). In addition, central bank-issued digital currency not only serves as an effective supplement to an economy's reserve policy (Stevens, 2021), but also makes it easier for rural areas to access cash and banking services (Alonso, 2020).

The Covid-19 pandemic has further highlighted the inefficiencies of the retail payment market and the potential benefits of central bank-issued digital currencies (Cheng et al., 2021). More specifically, if central bank-issued digital currencies become widely accepted for transactions, buyers will hold more of them - thereby increasing the number of transactions between buyers and sellers, which will then lead to more transactions and, in turn, higher consumption (Keister and Sanches, 2019). Regarding payment methods, however, individual preferences are heterogeneous and cannot be fully explained by demographic characteristics such as income and age. To fully understand the macroeconomic and microeconomic impact of the introduction of central bank-issued digital currencies in a theoretical framework, one must first understand consumers' payment choices, as central bank-issued digital currencies will first expand the payment and savings options that are available to households (Koulayev et al, 2016).

Regarding China's perspective, on July 16, 2021, the People's Bank of China released the "White Paper on the Research and

Development Progress of China's Digital Renminbi", officially fast-tracking the development of its digital currency. In 2020, the scale of digital payments in China had reached RMB 24.9 billion, which is enough to meet the consumer needs of most ordinary users. Some critics therefore believe that the People's Bank of China's digital currency is an overlapping and unnecessary innovation. There are still significant differences between the central bank's digital currency and traditional digital payments, however. Alipay and WeChat Pay, China's two main payment platforms, mainly handle balance payments and quick payments. The process of a balance payment is that the user's funds are transferred from an individual's personal bank account to the corresponding Alipay or WeChat Pay account before consumption. As for quick payment, this refers to the transfer of funds through a bank. Both of these payment types must be transferred through banks or financial institutions, but the digital renminbi is part of M0 and therefore does not need to go through banks. This makes the digital renminbi even more reliable than digital payments - there is no risk of a bank or institution run, and the digital renminbi offers unlimited legal compensation. Also, no one can refuse to accept it, which gives it greater future liquidity and convenience than digital payments and makes it better placed to further promote residents' consumption.

Moreover, the digital renminbi mainly uses the domestic encryption algorithm SM2 for signature verification, while Alipay and WeChat Pay use the RSA algorithm developed by the US National Security Agency for signature verification during transactions. Digital renminbi data is stored in a distributed ledger authorized by the People's Bank of China, while WeChat Pay and Alipay are stored in centralized servers belonging to private enterprises. On May 27, 2015, a municipal construction project in Hangzhou caused the interruption of four large-log optical cables, resulting in the unavailability of some Alipay user services. The digital renminbi uses multiple copies of the central bank's digital currency confirmation information for queries, which effectively prevents downtime risks such as those which might occur with WeChat Pay or Alipay. This also means that the algorithm security and data storage security of WeChat Pay and Alipay are also lower than that of the digital renminbi. In summary, the Chinese central bank's digital currency will bring revolutionary changes to residents' daily consumption habits and feature a completely different experience from that of the country's traditional digital payment tools WeChat Pay and Alipay.

## 3.3 The Impact of Digital Currencies on Cross-border Trade Settlements

Even if a central bank-issued digital currency is only used for domestic purposes, it will still transcend national borders. This makes it crucial to coordinate all the different digital currencies issued by different central banks. If such coordination is successful, central bank-issued digital currencies could be used to improve the efficiency of cross-border payments (BIS Innovation Hub, 2021). Auer et al. (2021a) also believe that central bank-issued digital currencies will also ease the current frictions inherent to cross-border payments. More specifically, thanks to the interoperability of central bank-issued digital currencies, the formation of a multi-central bank-issued digital currency arrangement will make cross-border payments much more efficient (Auer et al., 2021c). Carstens (2020) also believes that the application of blockchain technology to central bank-issued digital currencies will reduce the cost of cross-border payments.

From a more specific technical perspective, one can also analyze the impact of different types of digital currencies on cross-border trade settlements. First, traditional private digital currencies - represented by Bitcoin - are completely decentralized. Transactions that use methods such as 'coin mixing' are theoretically not controlled by any external entity and can be done in a way that is completely anonymous. At present, Bitcoin is widely used in import and export trade settlements in countries facing sanctions by US-led Western countries - such as sanctioned countries include Russia, North Korea, and Iran - as well as cross-border trade settlements for illegal activities such as drugs, money laundering, and terrorism. Since the operation of Bitcoin and various other private digital currencies is not controlled by any government, however, most countries have not supported

their development. In addition, the sharp fluctuations in the value of private digital currencies like Bitcoin also make them unsuitable for widespread use in legal cross-border trade settlements because such fluctuations can cause huge losses for trading companies.

Given these drawbacks of using Bitcoin in cross-border trade settlements, stablecoins - i.e., encrypted digital currencies with stable value - have gradually taken on greater importance. Stablecoins generally maintain an exchange rate between the value of a currency and a legal currency based on intelligent algorithms or equivalent collateral. Mainstream stablecoins include USD Tether (USDT), USD Coin (USDC), and Binance USD (BUSD). Of these, USDT is not generated by miners, nor does it generate additional currency - it does not even have its own main chain. Instead, it is based on smart contract programming in third-party blockchains such as Ethereum and Solana, and it uses a centralized approach to issue digital currency with 100 percent reserves. Users can transfer USD to a bank account provided by Tether through SWIFT, or they can exchange them for USDT through the Bitfinex exchange. When redeeming USD, the reverse operation can be performed. At present, stablecoins are widely used in various financial asset transactions in the Web3.0 world. Although stablecoins have a series of advantages for cross-border settlements, their degree of decentralization is not as good as that of Bitcoin. In addition, in the international trade currency system the US dollar and the euro are relatively strong currencies, and most of the tech companies that issue stablecoins are based in Western countries. Most stablecoins are also pegged to the US dollar, making the US a big winner from stablecoins' current operation model. In essence, stablecoins are credit-derived digital currencies that are based on strong international currencies. There is also the issue of international, strong currencies driving out local, weak currencies - which means that using stablecoins as settlement currencies for cross-border trade may therefore further strengthen the dominant position of the US dollar at the expense of others.



Finally, the emerging multilateral central bank-issued digital currency bridge project is also replacing the overseas issuance of domestic digital currencies through the issuance of depositary receipts by the central banks of various countries in a unified, shared standard 'corridor network'. Overseas users rely on the possession of depositary receipts to derive foreign digital currencies or credit currencies in their own countries. The use of multilateral central bank-issued digital currency bridges in cross-border trade settlements achieves the physical isolation of domestic and foreign digital currencies while also facilitating the domestic supervision of digital foreign currencies - which in turn solves the problem of strong currencies driving out weak ones and reduces the systemic risk of cross-border operations of digital currencies. The depositary receipts of the 'corridor network' rely on the same distributed ledger without the need for a complex network of correspondent banks and can achieve point-to-point transactions in real time, making settlements far more efficient. At the same time, the 'corridor network' also supports access to existing clearing systems, expanding the scope of application and making it convenient for countries that have not launched digital currencies. This model not only bypasses the US-controlled SWIFT system, but it also protects the sovereignty of countries with weak currencies and helps achieve mutually beneficial international financial cooperation. However, the difficulty of this project lies in the fact that it requires extensive participation from the central banks of various countries as well as the coordinated formulation of relevant standards. Otherwise, a 'multiple bridges in parallel' pattern might emerge, which would limit the project's versatility.

### 3.4 Summary

In summary, this chapter studies the impact of private digital currencies and central bank-issued digital currencies on currency internationalization from a global perspective. More specifically, the anonymous nature of private digital currencies benefits illegal cross-border transactions, while the promotion of central bank-issued digital currencies promotes the internationalization of countries' sovereign currencies. Subsequently, this chapter further conducts a statistical analysis of the proportion of user transaction volumes that takes place in dark web transactions in various countries. This analysis examines what happens when private digital currencies are applied to dark web transactions from a country perspective, and discusses the reasons for the differences in dark web transaction volumes in various countries. Finally, this chapter further discusses the impact of digital currencies on residents' consumption as well as cross-border trade settlement based on existing literature.

## Chapter 4 Risks and Challenges of Developing a Global Digital Currency Industry



## Chapter 4

# Risks and Challenges of Developing a Global Digital Currency Industry

### 4.1 The risk of technical security and privacy leaks of digital currencies

The security of traditional digital currencies such as Bitcoin has been substantiated based on the principle of cryptography following years of development, but along with the swift development of digital technology, the latent dangers of technical security risks of digital currencies still persist. Bitcoin's transaction verification system greatly relies on the security of cryptography. The specific principle here is that, after transaction information is hashed to obtain a transaction summary, a sender of digital currency employs a private key and elliptical curve digital signature algorithm (ECDSA) to encrypt and then broadcast the transaction summary. After encryption and broadcast, any full node on the entire network can use the sending square key to decrypt the encrypted transaction summary and validate whether the decryption transaction summary is the same as the previous transaction summary to ascertain whether the transaction information was actually sent by the sender owning the private key. Bitcoin primarily utilizes the ECDSA to sign and verify transaction information. The hash function SHA256 the United States National Security Agency developed is employed as an information digest algorithm.

In recent years, however, and with the emergence of quantum computers, the SHOR algorithm is under consideration for use to crack elliptical curve cryptography in Bitcoin by calculating discrete pairs on hypothetical quantum computers. Among them, using the SHOR algorithm<sup>4</sup> to crack the RSA algorithm requires 4098 quantum positions and 5.2 trillion Toffoli gates to get the 2048-bit RSA key, which indicates that the elliptical curve encryption function is more apt to become the goal of quantum computers than RSA. However, all these numbers have greatly exceeded any quantum

computers that have ever been built, and it is projected that the creation of these computers will take 10 years or more. Theoretically, a 4000-quantum computer can crack Bitcoin encryption in a few seconds.

In response to the potential disruption of digital currency systems by quantum computers, cryptographers have proposed a novel lattice-based cryptography, with the main aim of offering a secure encryption and signature scheme, even with the emergence of quantum computers. It utilizes the structure and properties of lattices, which may be viewed as grids composed of vectors in high-dimensional space. These vectors may be used to represent complex mathematical problems difficult to solve on traditional computers and which are also computationally challenging on quantum computers. However, Chen Yilei, an assistant professor at Tsinghua University, also published a working paper<sup>5</sup> in eprint, further proposing a quantum algorithm to crack lattice codes. In sum, cryptographic algorithms and quantum attack algorithms of digital currencies thus both attack and defend each other.

Viewed from the perspective of the risks of privacy leaks, the anonymity of various private digital currencies has made them tools for illegal activities such as money laundering and smuggling. Thus, protection of privacy is also a highly concerning issue in the area of digital currencies. Bitcoin can theoretically attain complete anonymity in a private world via such technologies as coin mixing, but given the technical characteristics of blockchain public chains, once users' Bitcoin addresses are made public or associated with their real-world identities, all transaction records are disclosed in their entirety.

<sup>4</sup> Prime factorization is a very difficult problem on classical computers, above all for very large integers. However, Peter Shor's algorithm can perform prime factorization in polynomial time on a quantum computer. Specifically, the time complexity of Shor's algorithm is  $O((\log N)^3)$ , where  $N$  is the number of digits of the integer to be factored. This means that, for sufficiently large integers  $N$ , Shor's algorithm can perform prime factorization extremely quickly on a quantum computer, while a conventional computer cannot complete the same task in a reasonable amount of time.

In addition, some emerging digital currency projects, such as Worldcoin, funded by ChatGPT founder Sam Altman and operated by Alex Blania. One condition added to its free airdrop of digital currency is that, to join Worldcoin's digital currency system, users must allow their eyeballs to be scanned and their information collected. Worldcoin employs eyeball scans to create records it calls 'personality certificates' and, per the project, this credential will have many unspecified future applications. However, eyeball privacy data is highly sensitive, involving a great deal of highly sensitive information such as, e.g., race, personal health, and genetic information.

Moreover, most private digital currency exchanges require registered users to undergo KYC verification before they can trade or buy digital currencies to comply with regulatory requirements. For instance, such Chinese digital currency exchanges as Binance and

OKex require users to present their ID cards in front of a camera for facial recognition verification. US-funded digital currency exchanges like Coinbase usually also demand that users enter their personal social security numbers. Compared with the above-cited centralized, greatly privacy-invasive exchanges, regulators in various countries have shut down P2P decentralized exchanges that require no personal authentication information and employ smart contract technology to guarantee transaction security, such as LocalBitcoins. Currently, except for cash purchases on street OTC platforms in countries where digital currency transactions are legal, ever fewer channels exist for anonymous purchases of private digital currencies. As soon as most users enter into the digital currency market, their real identities are locked by regulators.



<sup>5</sup> Quantum Algorithms for Lattice Problems, <https://eprint.iacr.org/2024/555.pdf>

## 4.2 Market volatility and speculative risks of digital currencies

In contrast to traditional currencies, digital currencies are also prone to high market volatility and speculative risks. Unlike investment products such as stocks that are backed by the real economy, private digital currencies often depend exclusively on their scarcity and technical characteristics to buttress their prices. For example, Bitcoin underwent a rise from about USD5,000 to more than USD20,000 in 2020, and then peaked at almost USD69,000 in 2021, before plunging to under USD30,000 in several months. Since 2024, with the advent of the halving of Bitcoin mining revenue, Bitcoin has

swiftly climbed to over USD70,000. El Salvador, which has adopted Bitcoin as its legal tender, has also sustained a certain impact on the stability of its monetary system from Bitcoin's highly volatile value. Furthermore, in May 2022, TerraUSD, a stablecoin pegged to the US dollar, and its sister token Terra (LUNA) both collapsed, thus inducing a major crash in cryptocurrency with losses of up to USD40 billion. As the foregoing cases all indicate, private digital currencies' value may be highly volatile.

## 4.3 Legal compliance risks and regulatory uncertainties of digital currencies

First, significant differences are present in regulatory policies for digital currencies worldwide. Some countries assume a supportive and promotional attitude towards digital currencies - e.g., Switzerland and Singapore - whereas others take a strict regulatory or even prohibitive stance, such as China and India. Differing legal frameworks thus induce complexity and uncertainty in cross-border operations.

Also, digital currency trading platforms and service providers must comply with the laws and regulations of the country in which they are situated, including compliance requirements such as anti-money laundering (AML) and know your customer (KYC). FinCEN in the United States, for example, mandates that digital currency exchanges must institute strict KYC and AML procedures, as they may otherwise suffer fines or operating bans. The legal status of digital currencies differs, moreover, in various countries. Some deem them currencies, while others view them as assets or securities. This difference in taxonomy impacts the treatment of taxation, transactions, and legal proceedings. For example, the US Securities and Exchange Commission (SEC) regards certain digital currencies as securities, and which are thus regulated under the Securities Exchange Act.

Viewed from the perspective of transaction legality, in some countries, digital currency transactions may exist in a legal gray zone and may even be regarded as illegal activities. For example, China declared a total ban on digital currency transactions and mining activities in 2021, prompting companies and investors thus affected to quickly adjust their strategies. Seen from the perspective of compliance costs, compliance requirements raise the operating costs of trading platforms and companies, including the need to employ compliance personnel, construct compliance systems, and secure continuing legal consultation. Particularly in the event of multi-country operations, compliance requirements in various regions may clash, thus further increasing operational complexity and costs.

Based on the above analysis, digital currencies also confront varied risks of regulatory uncertainties. For instance, the risk of abrupt changes in regulatory policy, that is, governments and regulators may suddenly adjust their digital currency policies based on market changes, social impacts, and security issues. These adjustments may trigger sharp market fluctuations, so the strategies of investors and companies then have to be quickly adjusted. In 2018, for example, South Korea's government suddenly tightened its oversight of digital currency transactions, inducing acute market fluctuations.

Furthermore, the introduction of new regulations may necessitate digital currency companies and trading platforms to undertake major business adjustments. For example, the European Union's Markets in Crypto-Assets Act will exert a far-reaching impact on the

digital currency market, including heavier compliance burdens and transparency requirements. Uncertainty in enforcement is, moreover, also a key risk factor since, even when new laws and regulations are introduced, major differences may obtain in their enforcement strength and methods. This uncertainty of enforcement can trigger confusion and compliance risks for companies. For example, India has been discussing digital currency regulation for many years, but the implementation details remain murky, and this has caused trouble for market players.

Lastly, digital currencies further suffer from insufficient cross-border coordination and regulatory conflicts. For instance, conflicts may arise between digital currency regulations in the US and the EU, and companies must thus abide by multiple regulatory requirements, which raises compliance difficulties and legal risks. Moreover, no unified digital currency regulatory standard exists in the world, and different countries have differing regulatory policies, which brings complexity and risks to cross-border transactions and investments. The lack of international cooperation and coordination thus exposes the digital currency market to uncertainties wrought by policy changes in various countries.

## 4.4 Scalability Risks of Digital Currency

Bitcoin's currency generation system rests on the POW (proof of work) mechanism. Miners vie for the right to record accounts via computational power, and thereby gain transaction fee income and Bitcoin rewards. This mechanism is primarily executed via the SHA256 function. Irrespective of the length of the digital information input, SHA256 will output a string with a fixed length of 256 bits. If the input information varies just slightly, this will almost certainly correspond to different strings. Thus, Bitcoin's issuance mechanism is for miners to employ the SHA256 function to crunch a series of network-wide transaction information containing their own Bitcoin rewards and handling fees. If a miner can first make the starting N characters of the output string 0, that miner obtains the right to record accounts, and the transaction information containing the miner's reward is added to the new block. N is determined by the computing power of the entire network. The Bitcoin network is adjusted once every 2016 blocks to assure that the system generates an average of one block every 10 minutes.

Therefore, based on the above analysis, the Bitcoin POW mechanism presents such problems as high power consumption, a complex verification process, high transaction costs, and congested accounting. In Bitcoin's early days, some programmers were able to win the right to account and mine large amounts of Bitcoin using the computing power of ordinary personal computers. However,

with the rise in Bitcoin prices and the arrival of more investors, the difficulty of Bitcoin mining has risen each year. On August 16, 2010, it was only 511T. As of May 21, 2021, this had climbed to a peak of  $2.5 \times 10^{13}$  T, an overall rise of 49 billion times (Figure 5). According to the Cambridge Bitcoin Electricity Consumption Index (CBECI), the annual electricity consumption of Bitcoin mining at the current computing power level, which is estimated per Cambridge University's comprehensive calculation of the comprehensive efficiency of mining machines and their comprehensive power efficiency, the estimated annual power consumption of Bitcoin has risen from 2.12TWH on December 1, 2014 to peak at 143.85TWH on May 13, 2021, in an increase of 67.85 times.

Bitcoin's limited block size also restricts the application of smart contracts to it, causing limited scalability. Traditional blockchains (such as Bitcoin) are limited in their block size and generation speed. Bitcoin's block size is generally 1MB, and a new block is generated every 10 minutes on average, meaning only about three to seven transactions may be processed per second. This limitation leads to insufficient network processing capacity when the transaction volume surges, producing a backlog of transactions. Ethereum, in contrast, is more scalable and boasts a faster processing speed. Ethereum's tps is currently about 15-20. This means Ethereum can process a maximum of around 15-20 transactions per second. However, the



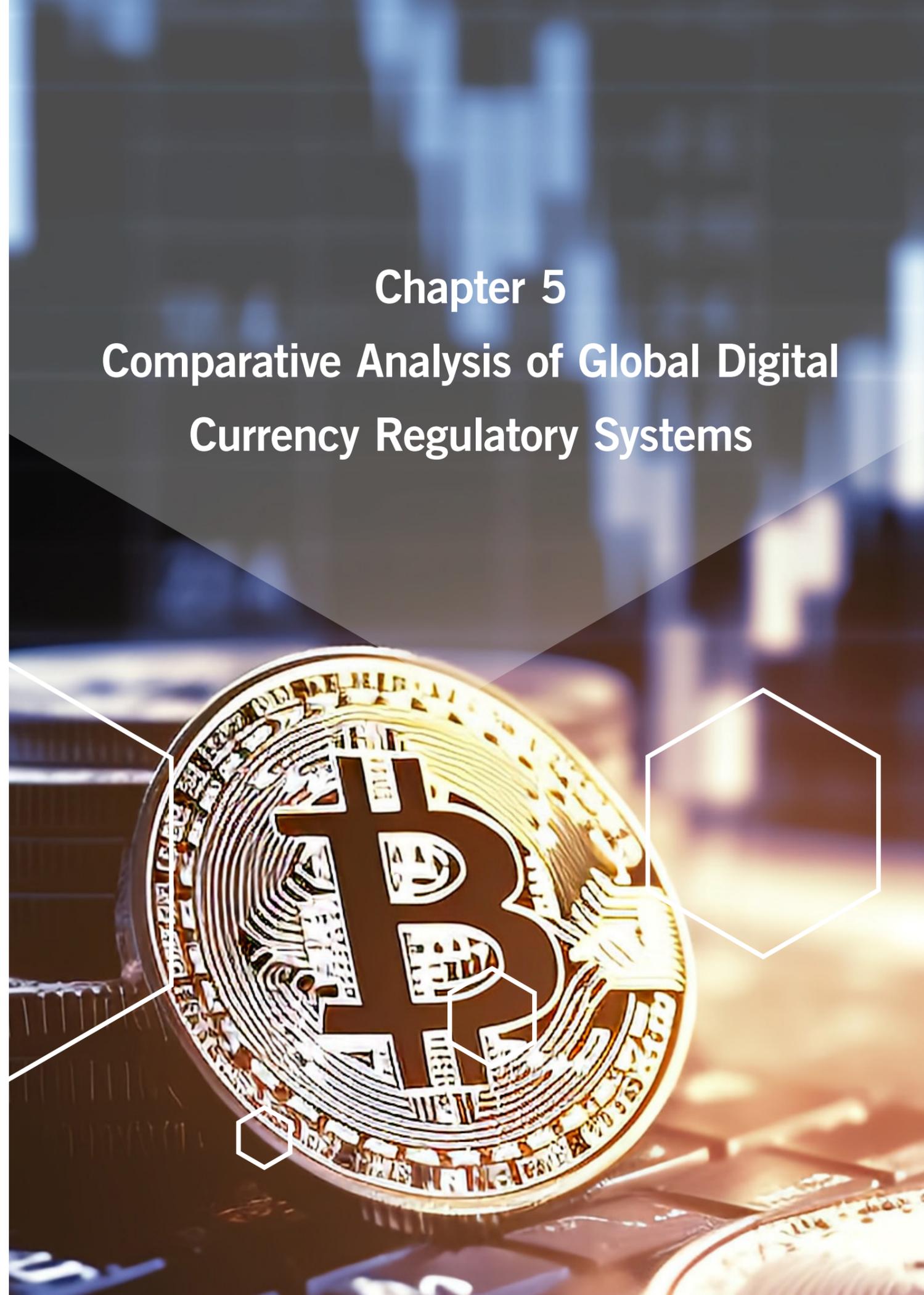
impossible triangle<sup>6</sup> of digital currencies means that, while assuring security, the faster the processing speed and the higher the scalability of digital currencies, so the lower the degree of decentralization. Solana, for instance, has a faster processing speed and higher scalability than Ethereum. Anyone can run a Solana node, but because Solana requires high-performance hardware, validators generally rent servers from private data centers to run their nodes. Thus, the majority of calculations on most blockchains are run on private servers in large data centers. This also makes Solana less decentralized than Bitcoin and Ethereum, but the problem of excessive control of large nodes is present to a certain degree.

## 4.5 Summary

This chapter summarizes and analyzes the risks of developing the digital currency industry from four perspectives: technical security and privacy leakage risks, market volatility and speculation risks, legal compliance risks and regulatory uncertainty, and scalability risks. First, with regard to technical security and privacy leakage risks, as digital technology develops with each day, the technical security risks of digital currency still persist, and the cryptographic algorithms and quantum attack algorithms of digital currency are attacking and defending each other, and some emerging digital currency projects and digital currency exchanges have to carry out face recognition verification in the authentication process, causing the risk of privacy leaks. Second, with respect to market volatility and speculation risks, private digital currencies differ from investment products like stocks that are backed by the real economy. They often depend exclusively on their scarcity and technical characteristics to prop up their prices, and the value of digital currencies is highly volatile. Also, with respect to legal compliance risks and regulatory uncertainty, significant differences exist in global regulatory policies for digital currencies. Some countries, e.g., Switzerland and Singapore, support and promote digital currencies, whereas others, such as China and India, adopt a strict regulatory or even prohibitive stance. Differing legal frameworks infuse complexity and uncertainty into cross-border operations. Lastly, as regards scalability risks, the Bitcoin POW mechanism presents such problems as high power consumption, a complex verification process, high transaction costs, and congested accounting. The limited block size of Bitcoin further restricts the application of smart contracts to Bitcoin, resulting in limited scalability and the continuing existence of the impossible triangle in the field of digital currency.

# Chapter 5

## Comparative Analysis of Global Digital Currency Regulatory Systems



<sup>6</sup> Ethereum founder Vitalik Buterin propounded the blockchain impossible triangle, a theory which refers to the fact that blockchain networks are unable to attain security, decentralization, and scalability at the same time

## Chapter 5 Comparative Analysis of Global Digital Currency Regulatory Systems

### 5.1 Judicial Definition of Digital Currency

How to define the nature of private digital currency forms the focus of digital currency regulation. In judicial practice, certain differences exist between China and the US in the status of private digital currency. In 2013, the People's Bank of China, the Ministry of Industry and Information Technology, and the China Banking Regulatory Commission issued their 'Notice on Preventing Bitcoin Risks,' proposing that "Bitcoin should be a specific virtual commodity, does not have the same legal status as currency, and cannot and should not be circulated and used as currency in the market."<sup>7</sup> Unlike China's regulatory policy, the US defines digital currency as securities and currency in different cases.<sup>8</sup> In US judicial practice, a determination as to whether digital currency is a security primarily rests on the Howey test, a benchmark used by the US Supreme Court in its 1946 (SEC v. Howey) decision to determine whether a specific transaction constitutes a securities issuance. If characterized as a security, it must comply with the provisions of the US Securities Act of 1933 and the Securities Exchange Act of 1934. The Howey test states that an investment contract is a contract, transaction, or plan in which a person invests his or her funds in a common enterprise and expects to profit exclusively from the efforts of promoters or others. The Ninth Circuit Court [of Appeals] distilled the Howey definition into a three-

part test, requiring (1) investment, (2) a joint enterprise, and (3) an expectation of profit through the efforts of others.

In US judicial practice, the primary reason for determining that digital currency is currency is that it aids in determine the illegal money laundering related to digital currency<sup>9</sup>. In the case of US v. Harmon, 2021 US Dist. LEXIS 73504, 2021 WL 1518344, the court carefully studied the ordinary meaning of the word 'currency' and the statutory history and structure of the District of Columbia's Money Transmitters Act (MTA, D.C. Code § 26-1023), holding that Bitcoin meets the currency definition conditions under the MTA' because although the MTA has never defined the concept of 'currency,' but when the statute does not provide a definition, the court usually gives the statutory term its ordinary meaning. Chief Judge Beryl A. Howell held that the general term 'currency' usually means a medium of exchange, a method of payment, or a store of value, and Bitcoin is all these things. Furthermore, the MTA defines a money transfer as 'engaging in the business of receiving funds for transfer or transferring funds within the US, or transferring to foreign locations by any and all means, including but not limited to payment instruments, wire transfers, faxes, or electronic transfers.'

<sup>7</sup> The blockchain impossible triangle is a theory propounded by Ethereum founder Vitalik Buterin, which refers to the inability of blockchain networks to simultaneously attain security, decentralization, and scalability.

For example, in the case of Chen v. Zhejiang Communication Technology Co., Ltd., an online shopping contract dispute, the Hangzhou Internet Court confirmed the commodity attributes of Bitcoin based on the above announcement and that it was applicable to the seven-day unconditional return system for commodities described in the Consumer Rights Protection Law.

<sup>8</sup> For example, in SEC v. NAC Found., LLC, 2021 U.S. Dist. LEXIS 4079, 2021 WL 76736, blockchain development company NAC Foundation and its CEO Marcus Rowland Andrade successfully raised millions of dollars via an "initial coin offering" ("ICO"). The US government subsequently brought two enforcement actions: a criminal indictment of Andrade for wire fraud and money laundering, and a civil action filed by the SEC alleging fraudulent and unregistered sales of digital securities in violation of the Securities Act of 1933 and the Securities Exchange Act of 1934, the latter based on the defendants' ICO tokens meeting the three prongs of the Howey test.

<sup>9</sup> For example, in US v. Harmon, 2021 U.S. Dist. LEXIS 73504, 2021 WL 1518344, the defendants were charged with conspiracy to launder money, to illegally transfer funds involved in a criminal offense, and to operate an unlicensed money transmission business. The defendants allegedly operated the online service Helix as a Bitcoin Tumbler from 2014 to 2017. The tumbler denuded identifying information from Bitcoins sent to Helix by customers, thereby hiding their source and ownership. The court held that the defendants had violated the District of Columbia's Money Transmitters Act (MTA) (D.C. Code § 26-1023) by engaging in a money transmission business as defined in section (10) of the P&L Act (26 U.S. Code § 1001) without a license. The defendants sought to dismiss the charge of illegal money transmission, arguing that Bitcoin is not a "currency" under the MTA and that Bitcoin mixers are not money transmission businesses under the Unlicensed Money Transmitter Prohibition Act (18 USC § 1960). The court, after carefully examining the ordinary meaning of the word "currency" and the statutory history and structure of the MTA, held that "Bitcoin meets the definition of currency under the MTA."

In the above two cases, the US courts respectively regarded two digital currencies, Bitcoin, as currency and ABTC tokens as securities. Both will greatly bolster the US government's oversight of digital currencies. Since the US judicial system is primarily case law, the above cases will exert a huge impact on future supervision of US digital currency innovation. In response to illegal fundraising using digital currency projects, US courts primarily apply the Howey test in such cases to ascertain whether digital currencies are securities. Among current digital currencies, Bitcoin and Ethereum have been determined by the SEC, while the ICOs of many blockchain companies, among them Telegram and Block.one still cannot evade the fate of being designated as securities and thus are compelled to compromise or reconcile. Unlike the US practice of treating various forms of digital currencies differently, China currently primarily adopts a 'one-size-fits-all' approach. In September 2017, the People's Bank of China, the Central Cyberspace Affairs Commission, the Ministry of Industry and Information Technology, and other agencies issued their 'Notice on Preventing the Risks of Token Issuance and Financing,' which clearly states that 'from the date of this announcement, all types of token issuance and financing activities must be immediately halted.' For example, the judgment of the Guangdong High Court in the 'Hao Lingsheng and Other Fundraising Fraud Case' in 2020 grounded on Article 176 of the Criminal Law of the People's Republic of China and the above proclamation, and the 'LCC Film and Television Blockchain Virtual Currency' and 'PTO Jewelry Blockchain Virtual Currency' issued by the defendant were deemed fundraising fraud. Although prohibiting all token issuance activities can curb illegal fundraising activities using digital currencies in the short term, but, in fact, there are certain similarities and confusions between digital asset innovation projects based on blockchain technology and digital currency projects, which makes it easy for the supervision of blockchain innovation projects to deviate. For example, Zhang Hui, head of the blockchain department of Ant Financial, mentioned at the third 'Blockchain Business Summit' (BoB) on May 2, 2019 that Ant Financial is exploring how to issue digital assets on the blockchain in "some form of a token." But then Ant Financial

refuted the rumor, saying that the "some form of token" Zhang Hui mentioned was not a token. Therefore, at this stage, similar digital currency and digital asset determination standards similar to the Howey test in the US should be formulated as soon as possible. The implementation of relevant laws and regulations will not hinder blockchain financial innovation, and at the same time effectively prevent relevant individuals from using digital currency to carry out illegal fundraising activities.

No cases in China's judicial practice involve the provision of Bitcoin mixer services, and relevant laws and regulations are thus comparatively lacking. As a digital currency with fully public transaction information, Bitcoin's anonymity is primarily realized by Bitcoin mixers. Bitcoin mixers are a key segment of the process of countering illegal transactions using Bitcoin. According to the Anti-Money Laundering Law of the People's Republic of China, 'Anti-money laundering as referred to in this Law refers to the act of taking relevant measures in accordance with this Law in order to prevent money laundering activities that conceal the source and nature of criminal proceeds and their proceeds by various means, and to curb related illegal and criminal activities.' Thus, if Bitcoin is only regarded as a virtual commodity, or if no special law is issued for digital currency mixers, imposing legal sanctions on individuals operating Bitcoin mixer businesses will be difficult in accordance with the Anti-Money Laundering Law. Mainstream Bitcoin mixers that currently still in operation include Kutbit registered by the Russian hosting operator REG.RU LLC, Coinmixer registered by the Spanish suffix domain name es, Bitblender registered by the Australian overseas territory Cocos Islands suffix domain name cc, and Chipmixer registered by the Hong Kong domain name service provider 'Times Internet International Ltd.' Therefore, this report recommends that international judicial cooperation should be bolstered in the area of Bitcoin mixers, and China's legislative body should also introduce relevant regulations as soon as possible to enhance the laws against acts of money laundering that utilize Bitcoin mixers.



## 5.2 Regulation of Illegal Transactions in Digital Currency

Due to the anonymity of Bitcoin attained with the help of obfuscators, Bitcoin finds wide use in illegal activities such as ransomware, drug trafficking, sex crimes, and terrorist crimes. China and the US have cracked down on the use of digital currency for illegal activities in accordance with relevant laws and precedents. A large number of hackers wield ransomware to steal or encrypt user data and demand that blackmailed users pay Bitcoin ransoms. Due to the anonymity of Bitcoin achieved via the aid of obfuscators, it is generally difficult to trace the perpetrators of ransomware attacks. At present, there are no cases in China where lawsuits have been filed against ransomware developers. However, in US judicial practice, in addition to a few cases in which ransomware developers were eventually arrested, there are many cases in which victims sued related servers or computer suppliers for data leaks due to program vulnerabilities.<sup>10</sup> Bitcoin transactions are often used in sex crimes and drug crimes. In the Silk Road, the largest dark web market for Bitcoin transactions, most of the transactions were related to child pornography or drug crimes.<sup>11</sup> Due to the international community's crackdown on terrorist funding, Bitcoin has gradually become a common mainstream transaction and donation method in terrorist activities.<sup>12</sup> China and other developing countries currently lack legislation and regulation on the use of digital currencies such as Bitcoin to raise funds for terrorist crimes. Use of Bitcoin is rife to raise funds for domestic terrorist groups. For example, some illegal Telegram channels in Hong Kong use Bitcoin to raise funds for Hong Kong terrorists who have fled overseas. In response to such illegal and criminal acts, law enforcement agencies in various countries must learn from the US experience, increase undercover internet patrols, and confiscate illegal funds from terrorists in accordance with the law.

Relevant departments of the Chinese government are currently cracking down on such financial blockchain activities as digital currency and ICOs. The 'Notice of the People's Bank of China and Others on Further Preventing and Dealing with the Risks of Virtual Currency Trading Speculation' issued in September 2021 clearly declares virtual currency-related business activities illegal financial activities, requiring "financial institutions and non-bank payment institutions to withhold services for virtual currency-related business activities," which would seem to entirely preclude any possibility of domestic enterprises and ordinary investors taking part in digital currency transactions at source. Yet, in fact, the above regulatory strategy has had no effect on domestic legal persons participating in financial blockchain activities, but has further drawn the notice of more domestic enterprises and ordinary investors. This is also the primary reason the Bitcoin price plunged once after the People's Bank of China issued the so-called "strictest ever" cryptocurrency

regulatory announcement, but then swiftly rebounded, even hitting a historic peak in November 2021. This report found that, of the three major exchanges - Binance, Huobi and OKEx - OKEx did not flush out users from mainland China, but only required them to enter their names and ID numbers for authentication before being able to buy digital currencies with a limit of CNY2,000 per transaction. OKEx only required users to make their WeChat payment names consistent with their authentication names when using WeChat Pay or Alipay to buy digital currencies in C2C transactions to complete them. In other words, since WeChat payment transfers usually only display a part of a name to the other party, if criminals seek to use digital currencies to transfer assets overseas or ply illegal activities, they may utilize multiple ID cards having similar names to authenticate their accounts and conclude anonymous large-scale fund transfers after making multiple small purchases. Although Binance and Huobi claimed to have pulled users from mainland China, ordinary users can still register, register overseas offshore company accounts for institutional authentication, and conduct other operations using overseas virtual mobile phone numbers to circumvent supervision. Thus, the yuan trading areas in Binance and Huobi which employ WeChat Pay, Alipay, and mainland China bank cards to buy digital currencies remain extremely active. However, exchanges such as Zhimakaimen, Paxful, Local Cryptos, and Local Bitcoins not only have yuan trading zones, but also lower certification thresholds. Some trading accounts even see illicit funds flowing in. Specifically, the lower the trading threshold, so the higher the corresponding transaction price, with the so-called 'money laundering premium' phenomenon also being present.

## 5.3 Country-Specific Comparison of Bitcoin Regulatory Systems in Various Countries Worldwide

US regulators, such as the SEC and the Financial Crimes Enforcement Network (FinCEN), have established a comparatively clear framework for the legality, regulation, and taxation of Bitcoin. For example, the SEC deems some digital currencies to be securities and strictly regulates related products. FinCEN requires digital currency exchanges to comply with anti-money laundering (AML) and know your customer (KYC) policies. In addition, the US has a large cryptocurrency trading market, with trading platforms such as Coinbase and Kraken exerting a significant global influence, and US companies are constantly innovating in Bitcoin payments, lending, and blockchain technology applications. However, regulatory uncertainty and compliance costs remain challenges, particularly in tax processing and new product approval. The EU's stance towards Bitcoin has gradually shifted from wary to supportive, striving to strike a balance between promoting innovation and protecting consumers. The EU has adopted the Fifth Anti-Money Laundering Directive (5AMLD) to require cryptocurrency exchanges and wallet providers to comply with strict KYC and AML regulations. Also, the Markets in Crypto-Assets Act (MiCA) aims to provide a unified regulatory framework for crypto assets across the EU to promote market stability and growth. Some EU countries, such as Germany, are relatively clear about the legal status and taxation policies of Bitcoin and have become centers for the development of cryptocurrency and blockchain technology. Switzerland's 'Crypto Valley' has drawn droves of blockchain startups and investors, driving local economic and technological innovation.

Asian countries have a more diverse attitude towards Bitcoin. Japan became the first country to legalize Bitcoin as a payment method in 2017. The Financial Services Agency of Japan strictly regulates cryptocurrency exchanges to protect the interests of investors and thwart criminal acts. South Korea has taken a positive regulatory attitude towards cryptocurrencies. Though it mulled banning it in the early days, it eventually opted to tighten its oversight to ensure market transparency and stability. South Korea has also actively promoted the application of blockchain technology in the financial and public

service sectors. However, China has the strictest attitude towards Bitcoin. Since 2021, it has entirely banned cryptocurrency trading and mining activities, causing many miners and exchanges to move out of China. China is still nonetheless actively promoting the development and testing of the central bank digital currency and deems it a key innovation within the global payment system.

The development of Bitcoin in Latin America and Africa is primarily affected by their economic environment and financial infrastructure. In Latin America, some countries, e.g., Argentina and Venezuela, have become a key tool to fight inflation and protect wealth due against the severe depreciation of local currencies. Furthermore, in 2021, El Salvador became the first country in the world to use Bitcoin as legal tender, aiming to promote financial inclusion and cut the costs of international remittances. Although this move has attracted much attention and controversy, it marks an important attempt by Bitcoin to break into the sovereign monetary system.

In Africa, Nigeria and South Africa above all, Bitcoin's acceptance is also rising, primarily because it provides financial services that are difficult for the traditional banking system to cover. Many Africans use Bitcoin for cross-border remittances and payments, which not only enhances financial inclusion, but also lowers transaction costs. However, the regulatory environment is relatively lagging, and many countries have yet to establish a clear policy framework.

In the Middle East, Bitcoin development is affected by the policies and social culture of various countries. The United Arab Emirates has actively explored the application of blockchain and cryptocurrency, and gradually crafted a regulatory framework that aids innovation. Both the Dubai International Financial Center and the Abu Dhabi Global Market have formulated relevant regulations to lure global blockchain companies. However, such countries as Saudi Arabia and Iran are cautious about cryptocurrencies, focusing primarily on their potential risks to financial stability and effect on the existing monetary system.



<sup>10</sup> For example, in the Blackbaud Data Breach Litigation [In re Blackbaud, Inc., 2021 U.S. Dist. LEXIS 123355, 2021 WL 2718439], Plaintiffs alleged that from February 7, 2020 to May 20, 2020, cybercriminals orchestrated a two-part ransomware attack on Blackbaud's systems. The cybercriminals first infiltrated Blackbaud's computer network, copied Plaintiffs' data, and held it for ransom. They then attempted but failed to prevent Blackbaud from accessing its own systems after being discovered in May 2020. Blackbaud ultimately paid a ransom in an undisclosed amount of Bitcoin in exchange for a promise that any data previously accessed by the cybercriminals would be permanently destroyed. Defendant Blackbaud argued that the Court lacked interim jurisdiction over Plaintiffs' claims, specifically alleging that they failed to adequately allege that their injuries were traceable to Blackbaud's conduct. But in the final judgment, the court rejected Blackbaud's motion and found Blackbaud responsible for the data breach.

<sup>11</sup> In US v. Salaam, 2021 U.S. Dist. LEXIS 103119, 2021 WL 2217066, defendant Salaam attempted to purchase advertising services from backpage.com, a US pornographic classified information website, through Bitcoin to promote its illegal child pornography services and child pornography products. In United States v. Hagan, 766 Fed. Appx. 356, 2019 U.S. App. LEXIS 8839, 2019 FED App. 0144N (6th Cir.), Hagan was accused of using Bitcoin to purchase large quantities of drugs from various overseas suppliers through the 'dark web' and distribute them to other customers. In the "Jiang Zhenquan Drug Smuggling Case" of the Wenzhou Intermediate People's Court of Zhejiang Province in 2020, defendant Jiang Zhenquan used Bitcoin to pay for drugs ordered from overseas sellers. In the "Xie Peng and others drug trafficking case" of the Zhuji Municipal People's Court of Zhejiang Province in 2021, the defendant contacted drug orders through the telegram software, collected drug money in the form of Bitcoin, and sold marijuana grown on leased land in Yunnan to buyers from all over Zhejiang.

<sup>12</sup> In US v. 155 Virtual Currency Assets, 2021 U.S. Dist. LEXIS 69035, 2021 WL 1340971, the US government claimed that through undercover operations on social media platforms such as Telegram and Facebook, it discovered 155 Bitcoin addresses related to fundraising for entities affiliated with foreign terrorist organizations (FTOs). Therefore, the US government believed that these fundraising schemes violated the Transnational Terrorism Act (18 USC § 2332b) and can be confiscated under the Civil Forfeiture Act (18 U.S. Code § 981) (a) (1) and (G)(i). The court cited the case of United States v. Harmon [United States v. Harmon, 474 F. Supp. 3d 76, 80 (D.D.C. 2020)] and regarded Bitcoin as a decentralized virtual currency. Therefore, the Bitcoins owned by the above 155 Bitcoin addresses were regarded as assets which the court ordered forfeited.

## 5.4 Summary

This chapter first compares and analyzes the judicial definitions of digital currency in laws and judicial practices in China and the US. At the same time, because of the anonymity of Bitcoin achieved with the help of mixers, Bitcoin is widely used in illegal activities such as ransomware, drug trafficking, and sexual and terrorist crimes. This chapter further summarizes the methods and legal means of regulating illegal digital currency transactions in China and the US. Finally, this chapter further compares the regulatory systems of Bitcoin in various countries worldwide.



## Summary



## Summary

### Outlook and Policy Recommendations

This report analyzes the development history of and factors driving digital currency from the perspectives of history and functional utility, and notes that advances in digital technology, changes in production methods, and the background of globalization are key elements driving development of digital currency. On the user side, digital currency not only eases online payments and protects privacy, but also entices investors and aids cross-border payments and digital service purchases. It plays a key part as the infrastructure of the Web3.0 ecosystem. At the macro level, digital currency has reshaped the global monetary system, had a profound impact on the international financial architecture, and provided new circumvention solutions for countries confronting financial sanctions.

This report also conducts a comparative analysis of the development status of private digital currency, central bank digital currency, and digital assets in various countries, and probes the integration of digital currency and emerging digital technologies, particularly how technologies such as smart contracts, metaverse and artificial intelligence (AI) promote the development of the digital currency industry. As regards private digital currency, this report analyzes the development status of Bitcoin, Ethereum and stablecoins, and explores the different adoption levels and regulatory policies of these currencies in various countries, especially the regulatory dynamics of stablecoins in the US and Hong Kong, China, and their potential impact on yuan internationalization. The central bank digital currency section explores the development motivations of mainstream central bank digital currencies, while the digital asset section introduces the features of DeFi protocols and differences in their adoption by various countries. Further analysis focuses on the effect of private digital currency and central bank digital currency on currency internationalization, noting that the anonymous nature of private digital currency facilitates cross-border illegal transactions, while central bank digital currency assists in promoting the internationalization of sovereign currencies. This report also discusses

the impact of digital currency on residents' consumption and cross-border trade settlements.

As to risk analysis, this report summarizes four major risks, among them technical security and privacy leakage, market volatility and speculation, legal compliance and regulatory uncertainty, and scalability, including problems of digital currency in respect of privacy leakage, price volatility, global regulatory differences and technical scalability. Lastly, this report carries out a comparative analysis of the judicial definition of digital currency, illegal transaction supervision, and the global Bitcoin regulatory system in China and the US, revealing the regulatory practices and legal approaches of various countries in the realm of digital currency.

Looking forward, the global digital currency industry will continue to undergo profound changes and expansion. The continuing advance of digital technology and economic changes in the context of globalization will further promote innovation in and application of digital currency. With the gradual introduction of central bank digital currency, the internationalization process of sovereign currency will accelerate, and a new pattern may form in the global monetary system. This will advance the efficiency of cross-border payments, while enhancing the financial system's inclusiveness and security. Private digital currencies and stablecoins will play an increasingly key part in payments, investments, and cross-border transactions, especially in the areas of digital assets and DeFi.

However, these developments will also be attended by challenges in technical security, privacy protection, market volatility, and legal oversight. As regulatory frameworks in various countries gradually improve and global cooperation strengthens, the digital currency industry's risk management will improve, while the scalability and compliance of technology will also be enhanced. The integration of digital currency with emerging technologies such as AI, smart contracts, and the metaverse will likely lead a new

round of technological revolution and advance the comprehensive digital transformation of the economy and society. Therefore, the development of the global digital currency industry will not only change the financial market's terrain, but will also deeply impact the structure of the international economic system and the dynamics of the global economy.

This report finds that, seen from the perspective of digital currency industrial policy, digital currencies will see a long-term coexistence of native tokens, stablecoins, and central bank digital currencies in the future. Although are a large number of illegal transactions occur in private digital currencies such as Bitcoin, and they are not controlled by regulatory authorities, they will continue to exist along with demand and utterly eliminate them will prove difficult. Some stablecoins will gradually migrate closer to regulatory authorities and gradually enter the global digital payment system after their inclusion in the regulatory framework. Major economies should actively develop stablecoins or central bank digital currencies based on their own currencies to welcome the new development needs of the digital era. At the same time, in this new era of digital economy, they should actively expand the payment ratio of their own currencies in the metaverse and blockchain worlds, making them the anchor currency for various digital assets. Based on smart contract technology, the issuance of central bank digital currencies is regulated, and combined with digital asset investment and cross-border central bank digital currency bridges to extend the globalization of digital currencies. At the same time, the application of digital currencies should also be actively explored in the digital economy and the real economy, and the high-quality development of industries such as the metaverse, digital manufacturing, and digital supply chain promoted.

Viewed from the perspective of regulatory policies, this report holds that regulatory agencies in various countries should adopt a guiding

rather than an entirely prohibitory regulatory policy to shield the reasonable investment needs of ordinary investors, curtail demand for cross-border capital flows, and severely crack down on the demand for use of digital currencies to commit crimes. Specifically, regulatory authorities should proactively employ Big Data and AI technology to monitor the flow of private digital currencies, and collaborate with digital currency exchanges to share KYC data so as to attain a certain degree of 'regulatory background real-name' for private digital currencies, so that, while supplying the investment needs of investors, they can prevent the possible risks of money laundering and illegal crimes using various private digital currencies.

In short, from the perspective of factors favorable to the development of the digital currency industry, the continuous development of the global digital economy and various digital currency derivative industries, as well as the innovative integration of digital currencies and various emerging digital technologies, have all advanced the sustainable development of the digital currency industry to a certain degree. However, the uncertainty of private digital currencies in regulatory policies, as well as the competition among countries for predominance of currency internationalization in the course of developing central bank digital currencies, have introduced myriad uncertainties into the future development of the digital currency industry, and policymakers need to strengthen international coordination and collaboration.



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## International Finance Forum (IFF)

The IFF is an international, independent, non-profit, non-governmental organization. It was founded in October 2003 by G20 countries and international organizations such as the United Nations, the World Bank, and the International Monetary Fund, and is a high-level permanent institution for dialog and multilateral cooperation in the field of global finance. The IFF is also known as the 'F20 (Finance 20)'.

The IFF's goal is to establish a platform for strategic dialogue, exchange and cooperation, practical innovation, academic research, and talent cultivation in fields such as the global economy, finance, and public policy through an international, market-oriented, and professional operating mechanism, as well as to promote the world of financial services along with comprehensive and sustainable development.



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## International Finance Forum (IFF) REPORT ON THE DEVELOPMENT OF GLOBAL DIGITAL CURRENCIES

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