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THE CHANGE OF THE MONETARY PARADIGM: FINANCIAL SECURITY AND CRYPTOCURRENCY

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Abstract

This study aims to investigate the economic characteristics of cryptocurrencies and assess the current legal framework regarding the potential to regulate transactions involving cryptocurrencies and other virtual assets. To achieve this goal, a complex set of general scientific and specialized research methods was applied, including comparative legal analysis, system-structural examination, generalization method, as well as methods of analysis and synthesis, DFD to build a model of the influence of cryptocurrency on the financial security of the state. As a result, we delved into the economic essence of blockchain-based cryptocurrencies as an alternative to traditional fiat currencies based on the principle of decentralization. It has been established that Bitcoin has a unique "hardness", due to which this cryptocurrency is rightly called «digital gold». The article analyzed the dynamics of the development of the use of blockchain technologies for 2009-2022, the results of which indicated the continuation of their annual growth in use. The article presents the results of a study on the introduction of cryptocurrency in Ukraine, which made it possible to systematize the main risks associated with it. In further research, it is possible to continue studying the economic-legal mechanism of the introduction of the national cryptocurrency in Ukraine and the use of blockchain in other financial processes at the state level.

JEL classification: G15, G20, G32

Keywords: Financial Security, Bitcoin, Hard Money, Cryptocurrency, Virtual Assets, Monetary System, Financial System

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Introduction

In the 21st century, we have witnessed a financial revolution – the emergence of a fundamentally new decentralized monetary system and a novel form of non-governmental currency, known as Bitcoin.

According to the 2022 Global Crypto Adoption Index (The 2022 Global Crypto Adoption Index: Emerging Markets Lead in Grassroots Adoption, 2022), Ukraine ranked 3rd in the world for transactions with cryptocurrencies. Users increasingly prefer cryptocurrencies not only for international payments, but also for the needs of the domestic market. This trend underscores the vibrancy of the decentralized financial sector and effectively acknowledges cryptocurrencies as a legitimate form of payment.

After the Russian invasion in early 2022, cryptocurrencies emerged as one of the most substantial and efficient channels for funding Ukraine's humanitarian and military requirements.

The rise of Bitcoin, whose roots can be traced back to the ideas of proponents of the Austrian economic school and libertarian philosophy, is closely linked to the cryptoanarchist movement. Notably, individuals (Back, 2002; Dai, 2021; Szabo, 1996; May, 1988) were key figures in this movement. They stood against government interference in the economy and aimed to safeguard people's financial privacy and independence through technological advancements.

The centralized monetary system, founded on the concept of state regulation of the economy through the manipulation of interest rates and the money supply, demonstrated its inability to prevent financial crises. Despite international initiatives aimed at reforming monetary systems, particularly those put forth by the International Monetary Fund and the Bank for International Settlements, they were unable to effectively enhance global financial stability in the face of these challenges.

Instead, a decentralized monetary system built upon blockchain technology emerged (Saleh et al., 2020; Mihus, 2022; Alazzam et al., 2023), which is resistant to censorship and not monopolized by a single entity within the system. This system has demonstrated its capability to offer society a form of money that can convey accurate information about the prices of goods and services without the need for a central bank as an issuing authority and regulatory body. This includes not only present but also future price.

In 2008, when the world was in the grip of a financial crisis, a Whitepaper surfaced, attributed to an individual Satoshi Nakamoto (2008). This document introduced the concept of Bitcoin, a global network that relies on open-source software and lacks a single centralized owner or overseeing organization.

Bitcoin relies exclusively on cryptography, economic principles, and game theory. Its programming ensures that just under 21 million bitcoins will ultimately be introduced into circulation, with a predetermined release schedule. Initially, upon Bitcoin's inception, the reward stood at 50 bitcoins per block, and this rate undergoes a halving approximately every 210,000 blocks, which occurs roughly every four years. This phenomenon is known as "halving." Following the last halving event in 2020, the reward now stands at 6.25 bitcoins per block. As a result, the inflation rate is projected to diminish to zero around the year 2140, at which point the Bitcoin mining process will conclude.

With its fixed total supply, the Bitcoin ecosystem operates in an effectively deflationary manner, as users inevitably lose access to some Bitcoins over time. This deflationary approach aligns with the Austrian theory of capital and positions Bitcoin as "hard money" or "digital gold" in contrast to the "soft money" of state-issued currencies (Saleh et al., 2020).

The term "hard money" originally referred to currency backed by gold, but its conceptual meaning has evolved over time. Gold, while valuable, presented challenges in terms of storage and practical use for transactions. To address this issue, fiat money was introduced, which initially represented certificates of ownership of actual gold reserves. However, as time went on, states began to centralize gold holdings in their banks and eventually decoupled money from the precious metal, transforming it into standard paper currency.

The concept of the "hardness" of money is indeed inversely related to monetary inflation, which represents the gradual decline in its real value and purchasing power over time. In essence, it pertains to how much money can be created before its value diminishes significantly (due to factors like increased production costs), to the point where production is no longer economically viable. A "hard" form of money is one that resists inflation and maintains its value relatively well over time, while "soft" money tends to lose value more rapidly.

Indeed, the key distinction between "hard money" and fiat money lies in their supply mechanisms. "Hard money" has its supply determined by market demand, essentially its price, which means that the cost of producing it will naturally gravitate towards its market price. In contrast, fiat money's supply is controlled by the government or central authority, making it more susceptible to manipulation and often leading to inflationary pressures. The market-driven supply of "hard money" tends to align production costs with its market value more closely.

On the other hand, the supply of fiat money is not contingent on market demand but is instead deter-

mined by deliberate government policies. These policies often aim to fund government operations, primarily through the profits generated by the issuer's monopoly, which is shielded from market competition. This approach can lead to a more discretionary and potentially inflationary management of the money supply.

The aim of this study is to provide an economic rationale for the characteristics of cryptocurrencies and to analyze the existing legal framework concerning the potential for regulating transactions involving cryptocurrencies and other virtual assets.

Literature review

The emergence of cryptocurrencies has initiated a transformative shift in the monetary paradigm, directly implicating financial security at both state and enterprise levels. This literature review explores the current scholarly dialogue surrounding the regulatory, legal, and economic dimensions of cryptocurrencies, informed by a selection of recent publications that provide insight into the challenges and opportunities presented by this digital revolution Rushchyshyn et al. (2021) delve into the critical aspect of the regulatory and legal frameworks that underpin the state's financial security in the face of evolving cryptocurrency markets. Their study underscores the necessity for robust legal measures that can adapt to the innovative nature of cryptocurrencies while safeguarding financial stability. The authors argue that the absence of comprehensive regulation contributes to the vulnerability of financial systems, highlighting the urgent need for legislative evolution that can address the unique challenges posed by digital currencies. Blikhar et al. (2022) expand the discourse to the enterprise level, examining how the management and legal aspects of economic security are influenced by the integration of innovations, including cryptocurrencies. Their research emphasizes the dual role of cryptocurrencies as both a potential enhancer of economic security for enterprises through innovation and as a source of risk due to regulatory uncertainties. The findings suggest that a balanced approach, incorporating both innovative practices and risk management strategies, is crucial for leveraging the benefits of digital currencies while mitigating their inherent risks.

Abdelhamid et al. (2023) explore the transformative potential of blockchain technology and smart contracts beyond cryptocurrencies, focusing on their application in redefining governmental services. Their study presents an optimistic view on how blockchain can enhance transparency, efficiency, and trust in public services. By leveraging the decentralization and security features of blockchain, governments can offer more reliable and secure services, thereby strengthening the financial security and economic stability of the state. Sylkin et al. (2021) provide a broader context by examining the socio-economic impacts of the crisis in a post-pandemic society, with implications for the adoption and regulation of cryptocurrencies. Their research highlights the accelerated shift towards digital economies in response to the pandemic-induced disruptions. This transition underscores the importance of cryptocurrencies in the evolving socio-economic landscape and the need for adaptive policies that can secure economic stability while fostering innovation.

Alazzam et al. (2023) proposed an innovative model for e-commerce development to enhance business economic security. This model's relevance to our findings lies in the underlying technology of cryptocurrencies—blockchain—that serves as a backbone for both secure e-commerce transactions and the decentralized nature of digital currencies. The emphasis on innovation in Alazzam et al.'s study mirrors our observation of the continuous growth in blockchain applications, suggesting a broader trend towards digital transformation in economic activities. Gollapalli et al. (2023) explored the predictive modeling of NEAR cryptocurrency pricing, taking into account the influence of Bitcoin market movements. Their focus on the interconnectivity between different cryptocurrencies and the broader market dynamics complements our study's findings on the economic characteristics of cryptocurrencies. The deep learning approach employed by Gollapalli et al. to predict cryptocurrency pricing underscores the increasing complexity and sophistication of digital currencies, aligning with our analysis of Bitcoin's unique economic attributes. Sylkin et al. (2021) discussed the intensification of economic security management for enterprises in the post-pandemic space, highlighting the critical role of digital technologies in adapting to new economic realities. This perspective aligns with our study's implications regarding the potential of cryptocurrencies to contribute to the financial security of states and enterprises by offering alternative monetary systems and facilitating innovative business practices. Kopytko et al. (2023) introduced a methodological approach to optimize financial resources to enhance economic security in dynamic environments. Their approach, focusing on optimizing financial resources, resonates with our analysis of cryptocurrency adoption in Ukraine, particularly in terms of identifying and managing the risks associated with digital currencies.

The reviewed literature collectively emphasizes the profound impact of cryptocurrencies on the monetary paradigm, underscoring the critical need for dynamic regulatory frameworks that ensure financial security. From the perspectives of state regulation, enterprise management, governmental services, and socio-economic resilience, the evolving discourse reveals a consensus on the importance of embracing techno-

logical innovations while diligently addressing the legal and economic challenges they present.

Methodology

Comparative legal analysis is a methodical approach that involves comparing legal systems, laws, and regulations across different jurisdictions. In the context of our study, this method allows for a comprehensive examination of the existing legal frameworks governing cryptocurrencies and virtual assets across various countries. By identifying similarities and differences, we can derive insights into the effectiveness of different regulatory approaches and their impact on financial security. This comparative perspective aids in understanding how diverse legal environments respond to the challenges posed by digital currencies and what lessons can be learned for developing robust legal frameworks. System-structural examination is a holistic method used to analyze the components of a system and their interrelations. This approach is particularly valuable for understanding the intricate ecosystem of cryptocurrencies and how various elements (such as blockchain technology, digital wallets, and exchanges) interact within the broader financial system. By dissecting the structural components and their interactions, we can better comprehend the systemic impact of cryptocurrencies on financial security and identify potential vulnerabilities or strengths.

The generalization method involves distilling broad patterns or principles from specific observations or empirical data. In our research, this method is applied to synthesize findings from diverse sources and case studies, facilitating the identification of overarching trends and implications of cryptocurrency adoption on state financial security. Through generalization, we aim to abstract from the specifics to draw broader conclusions that can inform policymakers and stakeholders about the implications of digital currencies. Analysis and synthesis are fundamental scientific methods employed to dissect complex phenomena into their constituent parts (analysis) and then integrate these parts to form a cohesive understanding (synthesis). In studying cryptocurrencies, analysis enables the detailed examination of individual aspects, such as transaction mechanisms, security features, and economic impacts. Synthesis, on the other hand, allows us to reassemble these insights to construct a comprehensive picture of how cryptocurrencies influence financial security, highlighting the interdependencies and interactions between various factors.

The use of Data Flow Diagrams (DFD) provides a graphical representation of the flow of data through systems, making it an essential tool for modeling the influence of cryptocurrency on financial security. By mapping out how information and transactions move within the cryptocurrency ecosystem, we can visualize potential risks, bottlenecks, and areas for regulatory intervention. DFDs facilitate a clearer understanding of the operational mechanisms of cryptocurrencies and their potential effects on the stability and security of financial systems.

Since the inception of Bitcoin in 2009, the integration of cryptocurrencies into the global economy has become increasingly evident to the public. This new form of currency has gained widespread popularity and acceptance worldwide thanks to its autonomy and user-friendly nature (Table 1).

Table 1: Evolution of Blockchain Technology Adoption, 2009-2022

At the onset of the year	The quantity of blocks in the blockchain	Annual growth, %
2009	16,285.0	100.00
2010	32,622.0	100.32
2011	100,590.0	208.89
2012	160,189.0	58.97
2013	214,724.0	34.04
2014	278,200.0	29.56
2015	337,025.0	21.14
2016	391,316.0	16.11
2017	446,188.0	14.02
2018	502,116.0	12.53
2019	556,607.0	10.85
2020	610,864.0	9.75
2021	664,061.0	8.71
2022	716,770.0	7.94

Source: Compiled by the authors using data from Binance (2023).

It's worth noting that by the end of 2022, there were 20,268 cryptocurrencies in existence, with a combined market capitalization of $1.025 trillion USD. Among these cryptocurrencies, Bitcoin and Ethereum are the most prominent, with Bitcoin boasting the highest current market capitalization of over $420 billion USD, which is twice as much as its closest competitor Ethereum.

Indeed, this type of cryptocurrency possesses deflationary characteristics, resistance to censorship, and offers a secure means of storing, sending, and protecting personal data. In recent years, its market value has surged by an astonishing 3,000%. Compared to other assets like gold, real estate, and securities, leading cryptocurrencies have been experiencing rapid increases in value. This is largely a result of their high liquidity and strong demand, making them convenient for buying, selling, carrying, sending, and securely storing. We are currently witnessing a Bitcoin revolution, often referred to as "gold 2.0." It's not surprising that cryptocurrencies are gradually gaining prominence in the global financial market and are considered progressive and promising investment assets.

Moreover, it's worth noting that despite more than a decade passing since the first Bitcoin transaction, the international cryptocurrency market continues to expand. As of the beginning of 2022, available estimates indicate that cryptocurrency ownership on a global scale averaged around 4.2% (up from 3.9% in 2021), with over 320 million cryptocurrency users worldwide (compared to 300 million in 2021) and more than 18,000 companies engaged in cryptocurrency transactions.

An analysis of the international cryptocurrency market within regional segments reveals distinctive characteristics. As of the data provided, the distribution of cryptocurrency users is as follows:
- North America: 51 million users,
- South America: 27 million users,
- Europe: 43 million users,
- Africa: 53 million users,
- Asia: 130 million users,
- Oceania: 1 million users.

The price of cryptocurrencies is highly volatile and subject to daily fluctuations. In April 2021, Bitcoin reached a peak price of $63,285.57 USD. Coin Gecko, a cryptocurrency data aggregator, estimated the total cryptocurrency market capitalization to be over $3 trillion USD during the same month. This data underscores the upward trajectory of cryptocurrencies, which is likely to attract an increasing number of users in the future as they continue to gain traction and recognition in the financial landscape.

It is appropriate to analyze trends in the annual growth of the number of active addresses and the price of Bitcoin (Table 2).

Table 2: Annual Growth Trends of Active Addresses and Bitcoin Prices (%)

Year	Rise in the number of active addresses	Price increase
2011	100.00	100.00
2012	1,244.30	760.00
2013	334.43	579.82
2014	251.73	5,699.02
2015	149.12	41.68
2016	295.20	138.50
2017	111.28	228.99
2018	208.62	1,349.13
2019	44.52	28.59
2020	121.31	187.44
2021	190.78	407.72
2022	74.29	161.29

Source: Compiled by the authors using data from Binance (2023).

An analysis of the data in this table reveals a remarkable expansion in the metrics of Bitcoin, the foremost cryptocurrency in the global market. On January 1st, 2011, there were 903 users, whereas by 2022, this number had surged to 740,109 - an increase of nearly 820 times. In terms of price, Bitcoin commenced 2011 at $0.3 USD but began 2022 at $47,344.84 USD, signifying substantial growth of over 157 thousand times. Notably, the highest annual rates of price growth (at the beginning of the year) were observed in 2014 and 2018.

The top 10 cryptocurrencies as of the beginning of May 2023 are depicted in Figure 1.

Table 3: Top 10 Cryptocurrencies as of the beginning of May 2023

No.	Name	Price	1h %	24 h %	7d %	Market Cap	Volume (24h)
1.	Bitcoin	-28,114.66	0.30	-0.82	4.07	43644938,047.00	18193872,394.00
							649,370.00 BTC
2.	Ethereum	-1,824.05	0.63	0.60	5.56	219721565,543.00	9383153,084.00
							5179,111.00 ETH
3.	Tether	1.00	0.00	0.01	-0.01	79917204,737.00	32769339,378.00
							32772845,904.00 USDT
4.	BNB	-310.47	0.19	-0.99	0.05	49020167,409.00	713395,843.00
							2301,04.00 BNB
5.	USD Coin	0.99	-0.03	-0.01	-0.01	32653176,216.00	4605566,831.00
							4607366,324.00 USDC
6.	XRP	-0.50	-0.53	-3.86	2.40	25670835,984.00	1563753,663.00
							3139648,053.00 XRP
7.	Dogecoin	0.10	-0.64	25.56	36.56	13721497,282.00	4578086,968.00
							46509611,943.00 DOGE
8.	Cardano	0.39	-0.57	-2.43	12.59	13620331,394.00	607530,336.00
							1557506,562.00 ADA
9.	Polygon	1.11	0.03	-0.43	5.43	10073893,416.00	325746,174.00
							294477,028.00 MATIC
10.	Solana	20.53	-0.34	1.47	3.03	7973479,799.00	413059,075.00
							20117,273.00 SOL

Source: Compiled by the authors using data from Binance (2023).

Among the over 20,000 cryptocurrencies in existence worldwide, the most popular and valuable as of January 2023 include Bitcoin, Ethereum, Tether, USD Coin, BNB, XRP, Binance USD, Dogecoin, Cardano, and Polygon (Table 3).

Table 4: Popular Cryptocurrencies and Their Market Capitalization as of the Beginning of January 2023

No.	Name	Price		Capitalization		Year change, %
1.	Bitcoin	848,281.00	23,064.000	16358067945,931.00	444364508,427.00	-37.65
2.	Ethereum	59,079.00	1608.160	7091741330,589.00	193525512,984.00	-34.77
3.	Tether	36.78	0.999	2472787146,372.00	67131678,503.00	-0.23
4.	USD Coin	36.76	0.999	1595880052,535.00	43339418,985.00	-0.41
5.	BNB	11,220.20	305.210	1512179620,777.00	41142000,310.00	-20.75
6.	XRP	15.12	0.411	767333393,664.00	20872342,119.00	-33.73
7.	Binance USD	36.75	0.999	570527718,719.00	15503808,544.00	-0.27
8.	Dogecoin	3.18	0.086	438037689,128.00	11922898,587.00	-39.90
9.	Cardano	13.93	0.379	487949341,552.00	13267799,463.00	-63.77
10.	Polygon	40.28	1.094	360589839,128.00	9132774,338.00	-30.26

Source: Compiled by the authors using data from Binance (2023).

Currently, BTC is trading at $28,114. At the $28,400 mark, buyers took the initiative, pushing Bitcoin to the 3D exponential moving average EMA 200, from which a technical bounce in the instrument occurred. As a result, the daily candle closed around $27,800, allowing for another upward push to the $28,800 resistance level from the current levels.

Since March 18, the asset has been moving within a broad range of $26,500 to $29,000. A breakthrough beyond one of these boundaries will indicate the further course of events. Until this breakout occurs, all trading is taking place within the mentioned range.

According to Crypto Rank data, BTC concluded the first quarter of this year with a gain of 72.3%. This represents the largest increase since Q1 2021. Furthermore, Bitcoin's profitability significantly surpasses the performance of major stock indices and funds.

If we take Q1 by months, January was the most profitable for traders, with a gain of +39.9%. The average asset price in this quarter stood at $28,488. For

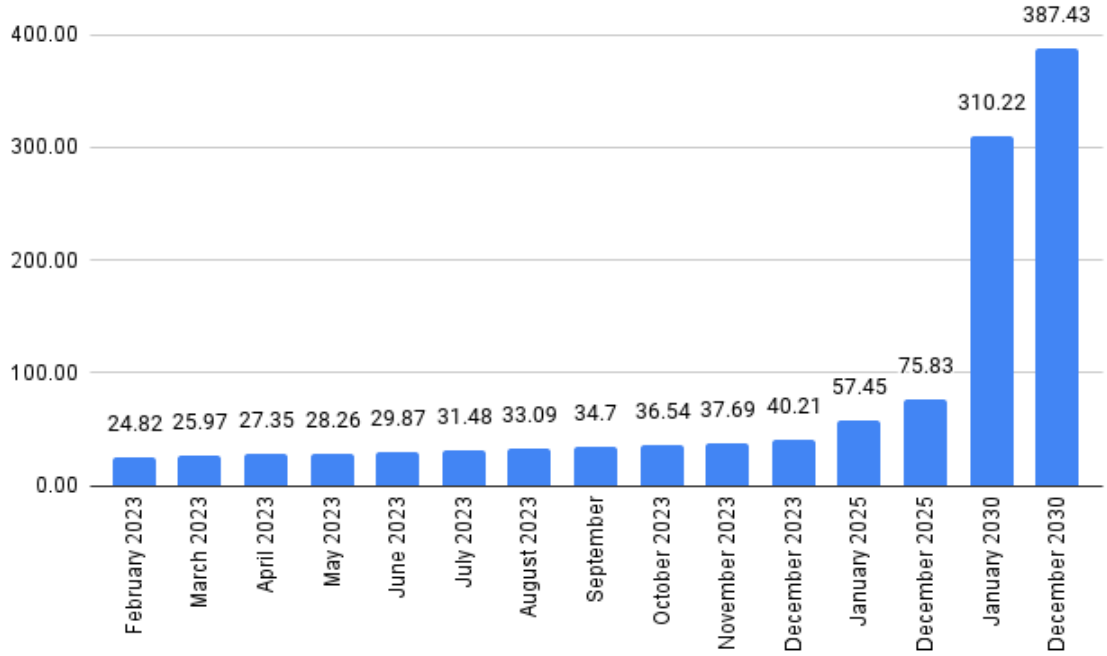
comparison, in Q4 2022, BTC closed with a loss of -14.9%, with an average asset price of $16,536 – the expected conclusion to a very difficult year for Bitcoin.

Regarding major funds and indices, BTC has outperformed them significantly. The profitability of S&P 500 in Q1 2023 was 5.5%, Nasdaq 100 posted a gain of 19%, and ETF iShares 20+ Year Treasury Bond had a profitability of 5.3%.

The second-largest cryptocurrency by market capitalization, Ethereum, began the day with sideways movement. At the time of writing, ETH is trading at $1,825. The 24-hour trading volume stands at $9.39 billion, which is 28.85% higher than the previous day. The asset's price has established itself above the $1,805 trading level, and if the daily candle closes above this level, Ethereum is likely to continue its upward movement towards the $1,850 resistance level.

Nevertheless, it is worth considering that Bitcoin is the most expensive and popular cryptocurrency. Therefore, it is advisable to review the exchange rate forecast compiled by MOFT experts based on data from global analytical platforms.

Figure 1: Bitcoin Price Forecast for 2025 and 2030 (in thousands of US dollars)



Source: Compiled by the authors using data from Binance (2023).

According to a survey conducted by the Pew Research Center from July 5-17, 2022, 46% of cryptocurrency holders in the United States reported receiving returns on their investments that were lower than what they had anticipated. Concurrently, 15% of Americans stated that their investments performed better than their expectations, 31% indicated that their investments performed as expected, and an additional 8% expressed uncertainty about their outcomes. Furthermore, the survey revealed that the overall percentage of US adults who have engaged in cryptocurrency investments, trading, or usage remained unchanged from September 2021 (Faverio & Massarat, 2022).

It's evident that the interest of US citizens in investing in Bitcoin has not waned even in the face of its price fluctuations. Despite the inherent volatility, Bitcoin continues to maintain its popularity and remains a promising avenue for investment.

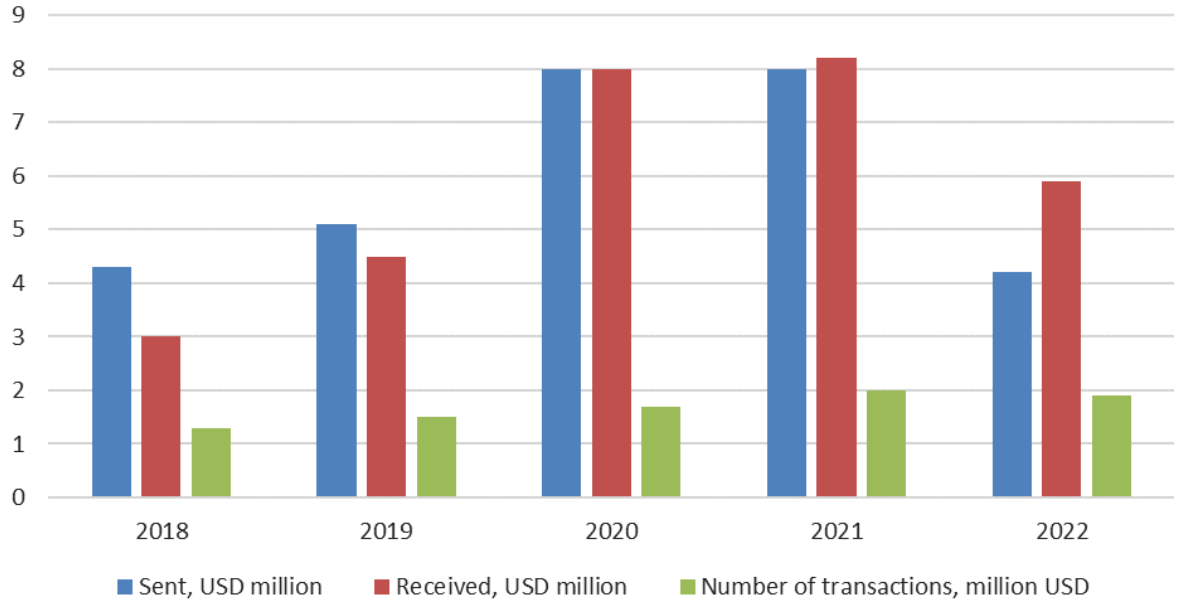
As previously mentioned, Ukrainian society actively utilizes cryptocurrencies, with users increasingly favoring them not only for international transactions but also for domestic market needs. Despite the robust activity within the decentralized financial sector and the de facto recognition of cryptocurrencies as a means of payment, the legal status of cryptocurrencies in Ukraine remains uncertain.

To enhance competitiveness in international cryptocurrency markets and create a favorable investment climate, the Ministry of Digital Transformation, along with Binance International Company, signed a Memorandum of Understanding and Agreement in 2019 to collaborate on creating a conducive environment for the cryptocurrency industry in Ukraine.

As a result, the world's largest cryptocurrency exchange, Binance, opened an account with the Ukrainian IBOX BANK at the beginning of 2020. This led to the

taxation of cryptocurrency transactions in Ukraine, allowing the population to freely buy and sell virtual assets. The dynamics of cryptocurrency adaptation in Ukraine over the past years are illustrated in Figure 3.

Figure 2: Dynamics of cryptocurrency adaptation in Ukraine as of the beginning of 2023



Source: Author's own work.

Results

On February 17, 2022, the Verkhovna Rada of Ukraine adopted the Law "On Virtual Assets", which defined a virtual asset as an intangible good that is the object of civil rights, has value and is expressed by a set of data in electronic form (On virtual assets. Law of Ukraine, 2022).

As stated in the law itself, it will come into effect after changes regarding the taxation of virtual asset transactions are made to the Tax Code of Ukraine. However, whether the regulation of cryptocurrency circulation will become transparent after this depends on the specific details and provisions included in the law and its implementation.

The absence of specific definitions for terms like cryptocurrency, crypto asset, and token in the Law "On Virtual Assets" can indeed lead to confusion and uncertainty in its interpretation and implementation. The lack of clarity on whether virtual assets can be recognized as a means of payment or exchanged for goods, services, or property raises questions about the practical implications of the law. Additionally, the distinction between virtual assets and cryptocurrencies remains unclear.

Indeed, the recognition of virtual assets as intangible goods and objects of civil rights in the Law "On Virtual Assets" creates opportunities for further development of the regulatory environment and the inclusion of crypto assets in various aspects of Ukraine's economic and legal life.

Anticipated changes to Article 177 of the Civil Code of Ukraine (Civil Code of Ukraine, 2017), which would allow the inclusion of crypto assets in the statutory capital of companies and regulate inheritance issues, could promote the development of new forms of entrepreneurship and provide legal clarity regarding the ownership and transfer of these assets.

The proposed changes to the Tax Code of Ukraine (Tax Code of Ukraine, 2010) aim to establish the taxation framework for virtual assets as outlined in the Law "On Virtual Assets". These changes address the taxation of both corporate and individual participants involved in transactions with crypto assets.

Specifically, the changes define the procedures for declaring income and profit, as well as the payment of applicable taxes. They also outline the requirements for maintaining accounting and tax records of virtual asset transactions.

One significant proposal is the exemption from value-added tax (VAT) for transactions involving virtual assets and services provided by service providers related to virtual assets.

In essence, these changes are designed to bring clarity and consistency to the tax treatment of virtual assets, promote transparency in financial reporting,

and create a tax environment that encourages the development of the cryptocurrency industry in Ukraine while ensuring that tax obligations are met.

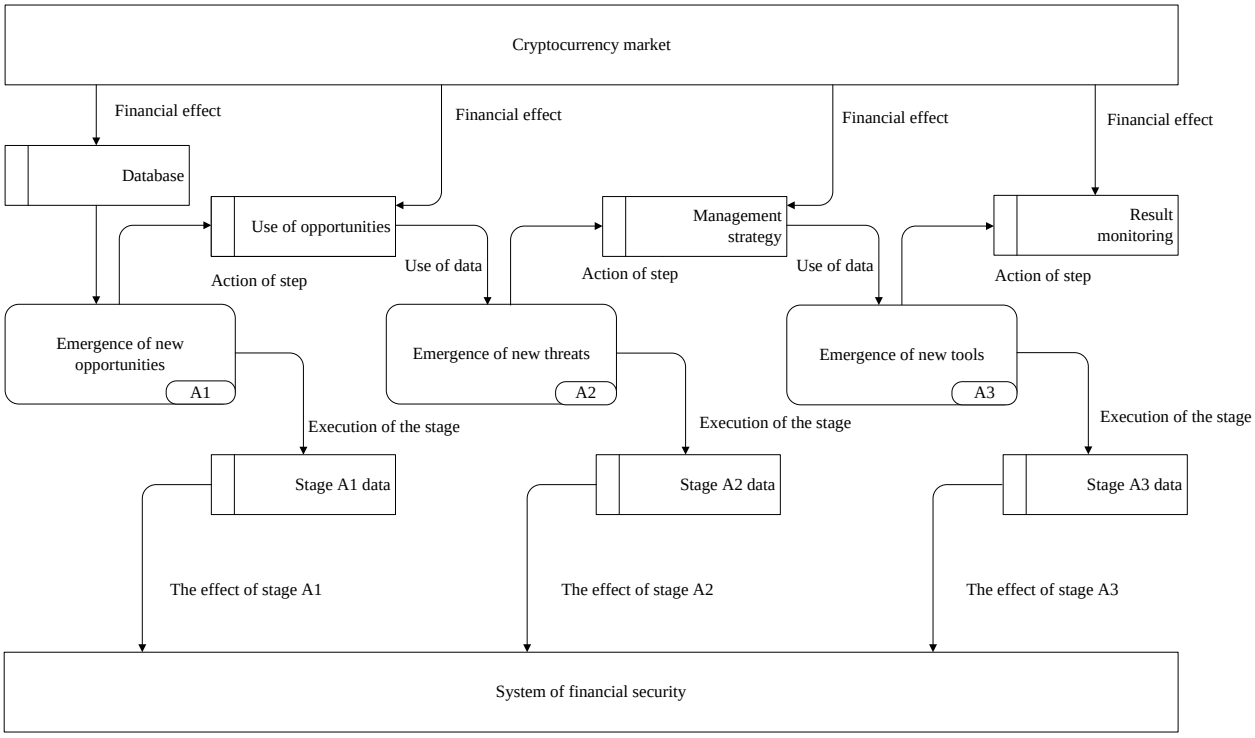
Additionally, the proposed changes include a preferential tax regime for a period of 5 years for investment income from operations with virtual assets and services provided by service providers related to virtual assets. Under this regime, the tax rate for corporate income tax is set at 5% of the investment income, and for individuals, the tax rate on personal income is also 5% for income derived from operations with virtual assets.

Furthermore, individuals engaging in virtual asset operations will also be subject to a military fee, which amounts to 1.5% of the investment income derived from these operations (Tax Code of Ukraine, 2010).

Despite significant changes in Ukrainian legislation regarding certain aspects of taxing virtual asset transactions, none of the regulatory acts in Ukraine today fully disclose the essence, characteristics, functions, and procedures for using cryptocurrencies. We hope that it's only a matter of time before these aspects are further clarified and regulated.

Next, we will build a DFD model of the influence of cryptocurrency on the financial security of the state (Figure 4).

Figure 3: DFD model of the influence of cryptocurrency on the financial security of the state



Source: Author's own work.

The adoption of the Law "On Virtual Assets" in Ukraine marks a significant step towards integrating cryptocurrencies into the national legal and financial framework. However, such integration poses several risks that need to be managed to ensure the stability and security of Ukraine's financial landscape.

We outline the main risks associated with the implementation of cryptocurrency in Ukraine and propose methods for effectively mitigating these risks.

The main risks associated with the implementation of cryptocurrency in Ukraine are:

1) Regulatory Ambiguity and Compliance Issues: The lack of clear definitions and comprehensive regulatory clarity regarding cryptocurrencies can lead to confusion and inconsistent application of laws. This ambiguity makes it difficult for both users and authorities to understand the rights and obligations associated with the use of virtual assets.
2) Financial Crimes and Security Issues: The pseudo-anonymous nature of cryptocurrencies can facilitate money laundering, terrorism financing, and other illegal financial activities. Additionally, the digital nature of cryptocurrencies makes them susceptible to cyberattacks, fraud, and theft.
3) Market Volatility and Economic Stability: Cryptocurrencies are known for their volatility. Sudden and

significant fluctuations in the value of cryptocurrencies can lead to financial losses for investors and affect the stability of the financial market as a whole.

4) Technological Risks and Infrastructure Issues: The implementation of new technologies often outpaces the development of the necessary infrastructure to support them securely and reliably. Inadequate technological infrastructure can lead to operational risks.
5) Tax Evasion: The decentralized nature of cryptocurrencies can make it difficult to track transactions for tax purposes, potentially leading to tax evasion.

The main risk mitigation methods are:

1) Improving the Regulatory Framework:
   - Clear Definitions and Guidelines: Ukraine can develop clear and precise definitions for terms such as cryptocurrencies, crypto assets, and tokens. Such clarity will help create specific regulatory guidelines that are easy to enforce.
   - Regular Updates: As the cryptocurrency market evolves, regular updates to the regulatory framework can help keep pace with new developments and technological innovations.
2) Enhancing Security Measures and Monitoring:
   - Advanced Security Protocols: Implement cutting-edge cybersecurity measures to protect digital asset exchanges and wallets, including regular security audits and compliance checks.
   - Transaction Monitoring Systems: Develop and deploy advanced monitoring systems to detect suspicious transaction patterns in real time, reducing the risk of financial crimes.
3) Managing Market Risks:
   - Investor Education: Launch educational campaigns to inform citizens about the risks associated with investing in cryptocurrencies.
   - Risk Disclosure Requirements: Implement rules requiring all cryptocurrency platforms to provide users with comprehensive risk disclosures.
4) Building Robust Technological Infrastructure:
   - Investing in Technical Infrastructure: Allocate resources to develop and maintain a robust technological infrastructure capable of supporting secure and efficient cryptocurrency transactions.
   - Public-Private Partnerships: Foster collaboration between government bodies and technology companies to enhance the national blockchain infrastructure.
5) Improving Tax Compliance:
   - Cryptocurrency Tax Guidelines: Amend the Ukrainian Tax Code to include specific guidelines for the taxation of virtual asset transactions, including the declaration and calculation of profits and corresponding taxes.
   - Blockchain for Tax Collection: Implement blockchain technology in tax operations for transparent tracking and recording of transactions, facilitating tax authorities' verification and enforcement.
6) Creating a Legal Framework for Consumer Protection:
   - Consumer Protection Laws: Amend the Ukrainian Law "On Consumer Protection" to safeguard consumers against fraud, deception, and unfair practices in the cryptocurrency sector.
   - Dispute Resolution Mechanisms: Establish effective and accessible dispute resolution mechanisms for complaints related to virtual asset transactions.

By addressing these risks through comprehensive strategies, Ukraine can harness the potential of cryptocurrencies to enhance financial inclusion, increase transaction efficiency, and foster economic innovation while ensuring the stability and security of its financial system. These measures will not only mitigate the inherent risks associated with digital currencies but also create a safe and progressive environment for their adoption.

Discussions

The integration and regulation of cryptocurrencies in Ukraine present a complex and multifaceted challenge that intersects with issues of financial security, economic innovation, and legal clarity. The "Law on Virtual Assets" adopted in February 2022 marked a significant step towards defining and regulating cryptocurrencies within the Ukrainian legal framework. However, the ongoing evolution of the cryptocurrency market necessitates a dynamic regulatory approach that can keep pace with technological advancements and market trends.

Enhancing Legal and Regulatory Frameworks: Firstly, the legal status of cryptocurrencies in Ukraine, while somewhat clarified by the "Law on Virtual Assets", still requires further refinement. The law provides a foundational structure but leaves several critical areas vague, such as the specific definitions of cryptocurrencies, crypto assets, and tokens. This ambiguity could potentially hinder the effective implementation of the law and create uncertainty for investors, users, and regulators. To foster a stable environment conducive to growth and innovation in the cryptocurrency sector, it is essential for further legal provisions to clearly define these terms and outline their practical applications within the economy.

Balancing Innovation with Risk Management: The decentralized and anonymous nature of cryptocurrencies can introduce risks such as money laundering and financial fraud. Therefore, it is crucial for Ukrainian regulators to develop a balanced approach that sup-

ports technological innovation while also implementing effective measures to mitigate these risks. This could include enhanced monitoring systems and cooperation with international regulatory bodies to share best practices and strengthen cross-border compliance.

Promoting Financial Inclusion and Security: Cryptocurrencies offer significant potential to enhance financial inclusion by providing access to financial services for the unbanked or underbanked populations in Ukraine. By leveraging blockchain technology, these digital assets can facilitate faster, cheaper, and more accessible financial transactions. However, to truly capitalize on this potential, it is necessary to educate the public about the benefits and risks of cryptocurrency use. Financial literacy programs tailored to digital currencies and their secure handling can empower more Ukrainians to participate in the digital economy safely.

Economic Implications of Cryptocurrencies: The impact of cryptocurrencies on Ukraine's economy could be profound. By facilitating quicker and cheaper international transactions, cryptocurrencies can enhance the competitiveness of Ukrainian businesses on the global stage. Additionally, as seen in the aftermath of the 2022 invasion, cryptocurrencies have played a crucial role in funding humanitarian and military needs, demonstrating their utility in crisis response.

Future Directions and Research: Further research is needed to explore the optimal economic-legal mechanisms for integrating a national cryptocurrency and blockchain technology in various financial processes at the state level. This research should aim to provide a comprehensive economic rationale for the adoption and regulation of cryptocurrencies and to project future scenarios that help policymakers anticipate changes and plan accordingly.

While the adoption of cryptocurrencies in Ukraine has shown promising developments, the path forward requires a careful and informed approach. By enhancing legal frameworks, balancing innovation with risk management, and promoting financial inclusion and literacy, Ukraine can harness the benefits of digital currencies while mitigating their inherent risks. This balanced approach will be crucial in securing the financial stability of the state and fostering a resilient and innovative economic environment.

Conclusions

The transformative journey of cryptocurrencies within Ukraine's financial and legal landscapes underscores a pivotal shift in the monetary paradigm, characterized by innovation, challenges, and significant potential for economic evolution. As this study has outlined, the regulatory, economic, and technological aspects of cryptocurrencies are integral to understanding their role and impact on financial security and economic stability in Ukraine.

The adoption of the "Law on Virtual Assets" represents a foundational step towards embedding cryptocurrencies within Ukraine's legal framework. However, the necessity for ongoing adjustments and clarifications is evident, particularly in terms of defining key terms and creating a coherent regulatory landscape that can adapt to the rapid pace of digital finance innovation.

While cryptocurrencies bring numerous opportunities for economic growth and financial inclusion, they also introduce risks such as volatility, cyber threats, and potential avenues for illicit activities. The development of comprehensive risk management strategies and robust security protocols is crucial to mitigate these risks while fostering a secure environment for the adoption and growth of digital currencies.

Cryptocurrencies offer a gateway to enhance financial inclusivity, reduce transaction costs, and streamline cross-border financial interactions. They have proven to be particularly valuable in times of economic distress or geopolitical conflict, as evidenced by their role in supporting Ukraine during the 2022 invasion. The potential for cryptocurrencies to contribute positively to Ukraine's economy is significant, provided that there is careful management and strategic planning.

There is a clear need for further research to explore the integration of blockchain technology and the potential introduction of a national cryptocurrency. Such endeavors could enhance transparency, efficiency, and the overall integrity of financial transactions. Policymakers must remain agile and informed by ongoing research and global trends to ensure that Ukraine's legal and regulatory frameworks evolve in alignment with technological advancements.

To maximize the benefits of cryptocurrencies and minimize risks, increasing public awareness and financial literacy regarding digital currencies is essential. Educational initiatives should aim to provide clear, accessible information on how cryptocurrencies work, the risks involved, and the rights and responsibilities of users within the digital finance ecosystem.

As the cryptocurrency market is inherently global, Ukraine's approach to regulation and management should be developed in coordination with international standards and practices. Collaborating with global regulatory bodies and adopting best practices from around the world will be key to ensuring that Ukraine's cryptocurrency landscape is both competitive and compliant.

In conclusion, while the road ahead is complex and fraught with challenges, the strategic adoption and regulation of cryptocurrencies hold the promise of significant benefits for Ukraine. By fostering a regulatory environment that supports innovation while ensuring

robust protections and stability, Ukraine can harness the full potential of digital currencies to propel its economy forward. As this sector continues to evolve, it will be imperative for stakeholders across all levels - from policymakers to the general public - to engage actively with the ongoing developments in the cryptocurrency domain, ensuring that Ukraine remains at the forefront of this digital financial revolution.

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