



ECONOMIC ANNALS-XXI

ISSN 1728-6239 (Online)
ISSN 1728-6220 (Print)
<https://doi.org/10.21003/ea>
<http://www.soskin.info/ea/>

Volume 176 Issue (3-4) 2019

Citation information:

Vozniuk, A., & Tytko, A. (2019). Cryptocurrency: present-day challenges and prospects of development. *Economic Annals-XXI*, 176(3-4), 49-55. doi: <https://doi.org/10.21003/ea.V176-05>

UDC: 336.743



Andrii Vozniuk

D.Sc. (Law), Associate Professor,
Head of the Research Laboratory,
National Academy of Internal Affairs
1 Solomianska Sq., Kyiv, 03035, Ukraine
vaa.999999@gmail.com
ORCID ID: <http://orcid.org/0000-0002-3352-5626>



Anna Tytko

PhD (Law),
Leading Research Fellow,
National Academy of Internal Affairs
1 Solomianska Sq., Kyiv, 03035, Ukraine
hanna.tytko@gmail.com
ORCID ID: <https://orcid.org/0000-0002-5669-2208>

Cryptocurrency: present-day challenges and prospects of development

Abstract. Due to digitalisation processes in economic, civic and social areas, we observe acceleration in certain processes, in particular the saturation of the financial market with modern digital means, including cryptocurrencies, which has led to the choice of the subject for the present article.

This article is aimed at the analysis and systematisation of the notion of cryptocurrency on the basis of selected digital and electronic money characteristics, including the determination of its place in the system of market values along with the classification of approaches to the regulation of cryptocurrency flows in European countries. Also this paper provides an individual interpretation of Burniske's formula to calculate the cryptocurrency monetary supply at global financial markets.

The research stipulates the use of morphological and synthesis, structural and functional, and comparative legal types of analyses, including generalisation.

The paper provides an analysis of the category and concept framework of digital currencies, in particular cryptocurrencies from the standpoint of tools used to develop the crypto infrastructure. The electronic currency as a means of value has certain advantages, if compared to the fiat currency, yet a lack of proper legal mechanism leads to collapse in its functioning in the financial market. It is also established that cryptocurrencies have high volatility resulting in the limitation of its functioning in certain states (Ecuador, Iceland, India, China, etc). The authors reveal characteristics and legal content of Burniske's formula which justifies the proportional relation between the product of currency flow velocity and gross monetary supply and the product of monetary supply price and circulation volume.

National legislation must identify cryptocurrency as a financial means - an alternative for the unstable banking system and extension of economic rights of individuals and legal entities.

Keywords: Digitalisation; Electronic Currency; Transactions; Digital Currency; Cryptocurrency; Bitcoin

JEL Classification: F30; K30; O10

Acknowledgements and Funding: The authors received no direct funding for this research.

Contribution: The authors contributed equally to this work.

DOI: <https://doi.org/10.21003/ea.V176-05>

Вознюк А. А.

доктор юридичних наук, доцент, завідувач наукової лабораторії,
Національна академія внутрішніх справ, Київ, Україна

Титко А. В.

кандидат юридичних наук, провідний науковий співробітник,
Національна академія внутрішніх справ, Київ, Україна

Криптовалюта: сучасність і перспективи розвитку

Анотація. У статті розглянуто основні підходи до визначення понятійного апарату віртуальної валюти, зокрема виокремлено основні ознаки та властивості криптовалюти. Визначено перспективи обігу криптовалюти на міжнародному фінансово-економічному ринку з точки зору переваг та недоліків у системі трансформаційних змін. Наведено системний аналіз можливих наукових розвідок у напрямку використання криптовалюти у міжнародній грошовій системі.

Сформовано висновки щодо необхідності врегулювання правового статусу криптовалюти та розмежування ключових ознак криптовалюти, фіатної валюти, цифрових та електронних грошей. На рівні наукового дослідження розкрито значення волатильності криптовалюти для прогнозування загальної грошової маси криптовалюти (формула К. Бурніске). Розглянуто криптовалюту як ефективний фінансовий інструмент

Ключові слова: цифровізація; електронна валюта; транзакції; цифрова валюта; криптовалюта; біткоїн.

Вознюк А. А.

доктор юридических наук, доцент, заведующий научной лаборатории,
Национальная академия внутренних дел, Киев, Украина

Титко А. В.

кандидат юридических наук, ведущий научный сотрудник,
Национальная академия внутренних дел, Киев, Украина

Криптовалюта: современность и перспективы развития

Аннотация. В статье рассмотрены основные подходы к определению понятийного аппарата виртуальной валюты. В частности выделены основные признаки и свойства криптовалюты. Определены перспективы обращения криптовалюты на международном финансово-экономическом рынке с точки зрения преимуществ и недостатков в системе трансформационных изменений. Проведен системный анализ возможных научных исследований в направлении использования криптовалюты в международной денежной системе.

Ключевые слова: цифровизация; электронная валюта; транзакции; цифровая валюта; криптовалюта; биткоин.

1. Introduction

Cryptocurrencies have become a key vector the development of digital economy. Under the conditions of permanent cryptocurrency flows and its popularisation as a payment method relating to products and services, along with accelerated globalisation, many countries face the challenge of how to protect their economic systems from external intrusion. There is no appropriate legal regulation mechanism for a cryptocurrency as a type of digital currency, despite the fact that Ukraine is ranked 10th in the list of countries with the most dynamic cryptocurrency flows. Such a situation requires consideration through the prism of other countries' experience, along with taking into account the procedures relating to digital currency regulation and peculiarities of national economic systems.

2. Brief Literature Review

Many Ukrainian and foreign scholars have studied various aspects of functioning of cryptocurrencies and the relevant legal regulation, with S. Volosovych, S. Verlanov, A. Harkusha, I. Doronin, B. Danylyshyn, V. Mishchenko, A. Protsenko, O. Soslovskiy, V. Stelmakh, W. Buffett, D. Belfort, P. Vigna, M. Casey, D. Matolchey, N. Roubini, A. Hern, T. Lee, M. Taransee, P. Breloff among them.

An important contribution in relation to cryptocurrency studies was made by A. Hofman (Hofman, 2014) [1], P. D. DeVries (DeVries, 2016) [2], A. Kaur and A. Kaur (Kaur & Kaur, 2018) [3], S. Joshi, N. Khatiwada and J. Giri (Joshi, Khatiwada & Giri, 2018) [4].

Studies of the use of cryptocurrencies in the context of money laundering were performed by V. Dintu, V. Fetysova, D. Vakhrushev, A. Uvarova, A. Rybin and M. Mitrovanov.

3. The purpose of the article is to reveal the legal essence of cryptocurrency depending on its type (digital currency and electronic money). Due to the method of comparative analysis, a certain parallel is drawn between the electronic cryptocurrency, the cryptocurrency and the digital currency. The authors structure and classify positive and negative aspects of currency flows as alternative to the fiat currency.

4. Results

4.1. Cryptocurrency, digital currency, electronic and fiat money: similarities and differences

To reach the goal established in this article, it is necessary to define the content of the concept «cryptocurrency» in the modern economic system, classify different cryptocurrency types according to levels of liquidity and shape the perspective of the cryptocurrency evolution, advantages and challenges of its flows in the international financial system.

Article 15 of the Law of Ukraine «On Payment Systems and Money Transfer in Ukraine» defines electronic money as a value unit kept on an electronic device and accepted as a means of payment by any person except the emitter and is considered to be a monetary obligation, either in cash or non-cash form [5].

Taking into account provisions of legislative acts regulating electronic money transactions, we can state that electronic money emission may be carried out exclusively by a bank; its emission is carried out by providing the users or commercial agents with such money via exchange for cash or non-cash assets. The bank is entitled to emit electronic money of value which does not exceed the value of the received money. The bank emitting electronic money is obliged to redeem the emitted amount of electronic money upon the user's request. The procedure regulating the performance of digital financial operations and the maximum amount of electronic money at user's disposal on a certain device is regulated by the guidelines on electronic money use in Ukraine [6, 15].

Electronic money is transferred into fiat currency, whereas the digital currency has no fiat equivalent.

Fiat money is understood as any payment tool, established and emitted by the central public authority; it is accepted by citizens in exchange for goods and services, provided there exists a certain legislative background and a certain level of trust to this authority [7].

Thus, electronic money is a mechanism for digitalised exchange of the fiat currency - it is used as a special currency transaction format and given a status of a means of legitimate payment.

We do not consider the cryptocurrency to be electronic money as it does not have certain typical features - it has no monetary equivalent; the emission of a cryptocurrency is performed by the owner and does not stipulate the replacement of fiat money.

In our opinion the cryptocurrency should be considered to be a type of digital currency. The digital currency may be used as a means of numerical expression, non-fiat currency or electronic money (fiat currency). It is often used as a synonym for virtual currency.

In modern conditions, cryptocurrencies have become a necessary electronic means for the performance of international transfers and a means of payment for goods and services. A Cryptocurrency is an integral part of the functioning of digital economy - its existence is maintained at the dominating level with the use of innovative technology [8, 109].

This hypothesis is backed with Chris Rose's statements on advantages of cryptocurrencies, which are uniquely adapted to our digital economy.

Despite a set of advantages relevant to cryptocurrencies, a high level of liquidity still dominates at the global financial market which, in turn, results in poor state support, if compared to other types of currency [9, 617-621]. Cryptocurrency value spikes in the market are mostly purely speculative.

A virtual currency is defined as a means of value which can be subject to trade in a digital format and functions as an exchange tool, a monetary account unit and/or a means of value conservation, however it is not granted the status of a means of legitimate payment, i.e. it is not officially recognised as an applicable and legitimate means of payment in any jurisdiction [10].

It is interesting to note the definition provided by the Ministry of Justice and Human Rights of Argentina, which defines a digital currency as an equivalent of value expressed in a digital form. A virtual currency may be an object of electronic trade and perform functions of an account unit or a means of turnover (accumulation) [11].

Therefore, a digital currency is considered by some scholars, e.g. V. Shaidulina, as a type of electronic currency [12], others still tend to refer cryptocurrency to one of the decentralised virtual currency types [13, 137-142].

A Cryptocurrency has its own unique features - it is a digital currency based on cryptography principles; it combines anonymity and independence from the central authority; it ensures protection from any misuse or double expense.

A cryptocurrency is understood as a digital currency type generated by selected calculations of specific functions which are easily checked by depictive mathematical operations (its key schemes are the principal proof of any operation performance) [14].

It should be noted that a similar definition is found in Article 1(1) of the draft Law of Ukraine «On Stimulation of the Cryptocurrency Market» which recognises cryptocurrency as a «decentralised digital measure of value expressed in relevant format, functioning as exchange/value conservation means or account item based on mathematical calculations, presenting its result and possessing the cryptographic account protection» [15].

Digital money is based on a digital currency or electronic money (fiat currency). A digital currency may be presented in different types depending on whether it is converted into a fiat currency or not.

The availability of an equivalent price in a fiat currency and the opportunities for relevant exchange prove convertibility of a digital currency (Bitcoin, e-Gold, LibertyReserve, Second Life Linden Dollars and Web Money).

According to E. O. Halushka and O. D. Pakon, the functional purpose of the cryptocurrency is similar to the functional purpose of electronic money, however the main features that distinguishes a cryptocurrency from any other type of money are the principles of full anonymity, lack of control and limited release, and, above all, the fact that this currency is protected from inflation [16, 635].

According to Article 32 of the Law of Ukraine «On the National Bank of Ukraine», emission and circulation of other means of payment and use of monetary substitutes as a means of payment is prohibited within the territory of Ukraine. Therefore, we can state that dissemination of cryptocurrencies is under prohibition [17].

The abovementioned assumption is also justified by the official statement of the National Bank of Ukraine, where Bitcoin is defined as a monetary substitute with no real value supporting it, which is not allowed to be used by individuals and legal entities within the territory of Ukraine as a means payment as it contradicts the provisions of the national legislation [18].

At the same time, we find other opinions concerning the regulation of cryptocurrencies, in particular, at the summit of the Group of Twenty in 2018, it was offered to use a concept crypto assets instead of the definition of cryptocurrency, where it is directly emphasised that crypto assets have no key attributes of sovereign currencies [19].

The virtual currency is not emitted and is not supported by any jurisdiction; these functions are performed only upon mutual consent of the cryptocurrency users' community. The digital currency is absolutely different from the fiat currency (real money, real currency or national money) which is presented in the form of paper and metal legitimate means of payment. The digital currency is not similar to electronic money which presents a digital form of the fiat currency and used for electronic transfer of the value expressed in the fiat currency.

Taking the abovementioned into account, we conclude the following:

- 1) cryptocurrency is a means of payment exempt from taxation in many states - that is a positive step for mining companies;
- 2) the use cryptocurrency is organised in the context of adhering to the following principles: an objective analysis of all capacities of the cryptocurrency, comprehensive evaluation of business-models using cryptocurrency and thorough monitoring and analysis of financial market.

Under the current conditions of accelerated informatisation and digitalisation of society and global economic environment, capitalisation of cryptocurrency sharply increases due to artificially stimulated high demand and interest of digital currency market players.

To prove the presented assumption we should note that different EU member-states established certain functioning procedures for selected cryptocurrencies (Table 1).

Table 4:
Cryptocurrency legal regulation in EU states

State	Taxation format	Cryptocurrency status
Switzerland	Operations with cryptocurrency are exempt from VAT; Operations with cryptocurrency require license	Foreign currency
Germany	Operations with cryptocurrency (sale/purchase) are covered with VAT + sumptuary tax	Account unit, private asset, financial tool
UK	Operations with cryptocurrency (sale/purchase) are covered with VAT; Operations with cryptocurrency require license	Private asset (unique combination of digits resulting from complex mathematical calculations and algorithms)
USA	Operations with cryptocurrency (sale/purchase) are covered with VAT; Operations with cryptocurrency require license	Money (analogue), property and stock item
Japan	Exempt from VAT	Defendable asset used as payment means
Netherlands	Operations with cryptocurrency (as payment means) are exempt from VAT	Payment means, commodity (if sold as independent object)
Finland	Cryptocurrency is covered with sumptuary tax and capital gain tax	Financial tool
Sweden	Operations with cryptocurrency don't require license; It is exempt from VAT (except cases when the cryptocurrency is used to obtain profit within a considerable period of time and allows to obtain profit which exceeds 25 units per year)	Official currency

Source: Compiled by the authors based on [21]

It is obvious that in many EU member-states cryptocurrency is given a status of an official currency and is generally trusted. Nevertheless some developed countries, for example Ecuador, India, Iceland and China, have prohibited the use this currency, which is reflected in certain legislative provisions.

S. Chaplian spoke about a variety of legal regulations of cryptocurrencies, claiming that the cryptocurrency is recognised by the majority of countries as a means of exchange and payment [21].

This attitude originates from the high crypto volatility level - fluctuations are detected within certain periods.

Also, legal regulation of cryptocurrencies is unlikely to reach a high level of alignment due to the peculiarities of national economic systems and the development of financial markets. Countries use both free rules and licenses for crypto flows and special guidelines and procedures for any operations with cryptocurrencies.

Based on a comparative analysis, we have drawn a conclusion that certain legal the regulation practices in the USA, the UK, Japan and Switzerland are worth implementing with regard to the national legislation. Any activity and financial services related to cryptocurrencies must be certified by the state with issuance of licenses for certain professional activities.

Some experts think that the state must establish a system of registration (licensing) of crypto exchange offices. Still, it is necessary to oblige these exchange offices to collect the clients' data and ensure proper regulation of activities of companies selling commodities and services for cryptocurrencies (as done by PayPal, Braintree and other payment systems) [22, 69-72].

Cryptocurrencies have become a truly important means of payment which deeply stimulates the digitalisation process and accelerates the globalisation of economic domains in the context of innovative development.

4.2. Model of cryptocurrency value calculation (by Chris Burniske)

The cryptocurrency is not recognised today as a reliable digital currency due to high volatility accompanied by sharp fluctuations and exchange rates at stock markets, which leads to the so called symmetry. In order to support this theory, D. G. Baur and T. Dimpfl stress on crypto volatility which depends heavily on positive economic changes instead of negative ones - this is the cause of asymmetry which is not typical for stock markets [25].

Ben Popper also mentioned the high volatility of cryptocurrency due to speculations which impede the general recognition of this currency as a commercial tool [23].

In our study, we used the model offered by Chris Burniske who was the first to design the mechanism of cryptocurrency price formation.

He proposed to use the special Formula 1:

$$M \times V = P \times Q, \quad (1)$$

where:

M (monetary base) - gross monetary supply;

V (velocity) - the velocity of currency flow within certain period;

P (price) - the price of provided digital resource;

Q (quantity) - the quantity of provided resources.

With the use of Bitcoin as example we can calculate the gross monetary supply (M). The total number of Bitcoin transactions in 2018 was estimated as USD 3.3 billion (the product of P and Q) and, according to Buriske, the flow velocity (V) is approximately 14 [24, 256].

Therefore, the value of any cryptocurrency is calculated with the use of the Formula 2:

$$M = P \times Q / V \text{ (USD 3.3 billion / 14 = USD 235.7) .} \quad (2)$$

Formula 2 may be considered to be the best option for the calculation of the digital currency global supply.

Burniske's proportion demonstrates an interdependence between the product of gross monetary supply, the flow velocity and the price of provided financial resources.

K. Samani agrees with this opinion, defining the asset flow velocity as the key factor which impacts the long-term and non-speculative value of a crypto asset [26].

These risks lead to low trust of large investors in economic systems and form a negative image of unstable financial market units.

Cryptocurrencies are also very vulnerable to cyberattacks and hacking, which is a major risk for owners.

Cryptocurrencies are scarcely protected and, due to a high level of anonymity and impossibility to be traced, the owners often use them to finance transnational organised crime, money laundering, terrorism, etc.

Virtual currencies are not just a tool used to commit crimes - criminals offer a variety of programs and tools used to conceal personal identification data, completed transactions, communication channels and information stored at HDDs along with the so called «carousel payments».

5. Conclusion

We have identified that cryptocurrencies should be referred to digital currencies. A digital currency may be a means of digital expression or virtual currency (non-fiat money) or electronic money (fiat currency), which is why the synonym «virtual currency» is usually used.

One of the key problems for the EU member-states is a lack of legal regulation of crypto flows at financial markets, since low stability and incomplete understanding of the currency functioning mechanism lead to certain tension and refusal to accept this means in certain economically developed countries.

Nevertheless, cryptocurrencies ensure a higher level of anonymity, if compared to traditional non-cash transfers. Its advantages are as follows:

1. The virtual currency functioning system provides proper financing of different activities, also it ensures payments for commodities and services without direct interaction with clients.
2. The open code of virtual currency algorithm allows everyone to obtain a cryptocurrency.
3. Immunity against inflation generated by the ability of such currencies to «program emission» with fixed indicators allows to establish the level of inflation/deflation in advance.
4. There is no control over transactions and payments in the crypto flow system.
5. Cryptocurrencies have a decentralized format in the form of separate cryptowallets.
6. A special individual cryptographic code protects such a currency from multiple replications.

At the same time there are several disadvantages, among which is high volatility which forms a negative image of cryptocurrencies as unstable account units. The absence of efficient mechanisms of technical and legal regulation results in a lack of guarantees for the maintenance of electronic cryptowallets.

Burniske's formula proves the dependence of the cryptocurrency price on volatility, price dynamics, the volume of the currency within the market and gross monetary supply.

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Received 6.03.2019

Received in revised form 22.03.2019

Accepted 27.03.2019

Available online 20.08.2019