

Crypto-Assets: Economic Nature, Classification and Regulation of Turnover

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Abstract

The article is devoted to the study of the economic nature of crypto-assets, the development of their original classification, and determination of the main directions of regulation of their turnover. These issues are within the framework of the modern discourse of international organizations such as the International Monetary Fund (IMF), the World Bank (WB), the Group of 7 (G7), the Group of 20 (G20), the World Trade Organization (WTO), the Organisation for Economic Co-operation and Development (OECD), the Bank for International Settlements (BIS), and the Financial Stability Board (FSB). This article reviews the modern discourse of international organizations regarding crypto-assets, presents an interpretation of crypto-assets as a new class of financial assets, justifies the classification of crypto-assets, and identifies the main types and economic characteristics of digital assets. The study was conducted using a system-functional and system-structural method.

On the basis of this study, it is concluded that the activities of international organizations are focused on developing recommendations and principles for regulating transactions with cryptocurrencies and global stablecoins, prudential supervision of their issuers, and unifying approaches to taxation and countering illegal transactions using crypto-assets. The study understands crypto-assets to be private digital assets that are recorded digitally in a distributed ledger and that can be used as a means of exchange and/or an investment tool and/or a means of access to goods and services of the issuer. Crypto-assets are divided into two main types: virtual currencies and digital tokens. Virtual currencies are a means of exchange or payment as well as a means of saving. Digital tokens represent digital rights and are issued for investment functions or consumer purposes.

The study found that there is no international regulation of crypto-asset turnover. National regulation is significantly differentiated between countries due to the lack of common interpretation and classification of crypto-assets and different assessments of economic risks of their turnover for national financial systems. In most developed countries—the U.S., European Union (EU) countries, and the UK, among others—a flexible approach to regulating various types of crypto-assets and their issuers prevails. In emerging market countries, such as China, Turkey, and Russia, regulation is more stringent and characterized by the widespread use of prohibitive measures. The main problem of the legal regulation of crypto-assets in Russia is its fragmentation and the predominance of a prohibitive bias. The modern regime of regulation of crypto-assets in Russia is weakly related to their economic nature and is not equivalent to the risks of turnover of crypto-assets.

Keywords: international organizations, crypto-assets, distributed ledger technology (DLT), nature and classification of crypto-assets, virtual currencies, cryptocurrencies, stablecoins, digital tokens, investment tokens, utility tokens

For citation: Kochergin D. (2022) Crypto-Assets: Economic Nature, Classification and Regulation of Turnover. *International Organisations Research Journal*, vol. 17, no 3, pp. 75–130 (in English). doi:10.17323/1996-7845-2022-03-04

Introduction

In recent years, the financial sector has undergone fundamental changes due to the widespread introduction of new information technologies, such as *distributed ledger technology (DLT)*, *artificial intelligence (AI)*, and *big data*. In turn, the distributed ledger technology¹ and *blockchain, as one of its forms*,² is a connecting, end-to-end technology that offers a universal platform for recording, storing, and transmitting information about financial transactions.³ As a result of the application of distributed ledger technology in recent years, a new asset class has appeared in the financial sector—*crypto-assets* or *virtual assets*, which are treated in Russia as digital financial assets.⁴

Due to the rapid development of the crypto-assets market and the cross-border nature of transactions involving their use, the topic of the crypto-assets' development has recently become one of the most widely discussed both at the level of international organizations and at the level of national regulators. However, there is still no unified definition of the term “crypto-assets” in economic science. There is also no consensus among economists, international organizations, and financial regulators on what types of assets can be considered as crypto-assets, or on what criteria these assets differ from each other. As a result, crypto-assets can include assets of different economic nature: monetary, debt, equity, and hybrid assets, issued both in a decentralized and centralized manner. At the same time, the issues of essential interpretation and classification of crypto-assets are especially important for understanding the functions that such assets perform, defining the property rights that they allow to be realized, as well as for choosing the most appropriate regime for regulating the turnover of crypto-assets both at the national and international level.

The purpose of this study is to determine the economic nature of crypto-assets, develop their original classification, and identify the main directions of regulating their turnover. It reviews the modern discourse of international organizations in relation to crypto-assets, analyzes various approaches to the interpretation and classification of crypto-assets, substantiates the author's interpretation and classification of crypto-assets, identifies the main economic features of various types of crypto-assets, and determines the main economic and legal directions for regulating their turnover in developed countries and Russia. The study was conducted using a system-functional and system-structural method.

¹ Distributed ledger technologies allow nodes in the network to safely offer, verify and record changes about data in a synchronized ledger that is distributed across network nodes [BIS, 2017, p. 2]. In the domestic economic science, this term has received an author's interpretation in relation to cryptocurrencies in the works of S.A. Andryushin, D.A. Kochergin, and others. Thus, the term “distributed ledger” refers to a decentralized or distributed unified system for recording data on financial transactions, consisting of chains of generated transaction blocks built according to certain rules, which are used in decentralized virtual currency schemes [Kochergin, 2017, p. 124].

² Blockchain is an accounting technology consisting of a chain of blocks, each of which stores information about previously performed transactions. One of the main differences between distributed ledger technology and blockchain is that in case of distributed ledger, a situation is possible in which one management body can directly control the operation of all nodes and control the functioning of a decentralized network [Andryushin, 2019, pp. 233–41].

³ According to expert estimates, currently most of the surveyed experts consider China and the United States to be the world leaders in terms of investment in blockchain (30% and 18%, respectively) [Vailshery, 2022].

⁴ It should be noted that the term “digital financial assets” used in Russia is narrower than “crypto-assets” and does not include assets issued in a decentralized manner.

Crypto-Assets Discourse in International Organizations

The topic of crypto-assets has been the subject of extensive discussion by international organizations since late 2017—early 2018, in the wake of the significant capitalization of leading cryptocurrencies and the rapid development of new financing mechanisms for venture and fintech projects through the issue of digital tokens. Leading international organizations, such as the International Monetary Fund (IMF), the World Bank (WB), the Group of Seven (G7), the Group of Twenty (G20), the World Trade Organization (WTO), the Organisation for Economic Co-operation and Development (OECD), the Bank for International Settlements (BIS), the Financial Stability Board (FSB), the European Commission (EC), as well as international institutions that set standards in the financial sector, such as the Basel Committee on Banking Supervision (BCBS), the Committee on Payments and Market Infrastructure (CPMI), the International Organization of Securities Commissions (IOSCO) have published a number of scientific studies and reports to crypto-assets.

The main tasks facing international organizations are the unification of regulatory approaches related to the issue and turnover of crypto-assets at the international level, in particular, transactions with cryptocurrencies and global stablecoins and the development of unified regulation of the activities of crypto-assets issuers, considering different degrees of risk due to the differentiated nature of crypto-assets issued. The solution of these tasks is complicated by the trans-boundary nature of the crypto-assets market, the decentralized nature of the tools used, and the presence of numerous national regulators which use different approaches to the interpretation and classification of crypto-assets and often adhere to opposite approaches regarding the risks of their widespread use and regulation of crypto-asset turnover.

In its research, the IMF focuses on the main types of risks of crypto-asset turnover, among which it includes investor risks (operational and cyber risk of digital wallets and trading platforms suppliers; market, credit and default risk of cryptocurrencies issuers and digital tokens; liquidity risk of issuers and service providers; risk of fraud in crypto-assets allocation; and market integrity risk), money laundering and terrorist financing risks, and prudential and system risk [Cuervo, Morozova, Sugimoto, 2019; Schwarz et al., 2021]. In this regard, regulation, according to the IMF, should cover the following areas: allocation/issue of crypto-assets, trading in crypto-assets, storage of crypto-assets, and prudential regulation of crypto-assets issuers [IMF, 2021a].

IMF economists point to the growth of “cryptoization” (the increasing role of crypto-assets in the financial systems of individual countries and the growing use of such assets as a means of saving and payment, as well as an investment asset). The cryptoization of the economy is especially characteristic of emerging markets, such as South American countries, Turkey, and Russia. In this regard, the IMF recommends that national regulatory authorities give special priority to the implementation of global regulatory standards in respect of crypto-assets. In addition, national regulators should control the risks of crypto-asset turnover, especially in systemically important financial areas, and coordinate their activities for effective law enforcement and levelling of regulatory arbitration [IMF, 2021b, 2022]. The Joint Financial and Payments Systems Task Team of the IMF notes that one of the most critical issues is reflecting the cryptocurrency transactions in international statistics. Should cryptocurrency be considered as a financial asset, as an intangible asset, or as an analogue of cash, keeping in mind its economic content. In this regard, the most important task is the classification of crypto-assets based on the definition of the economic nature and principles used in macroeconomic statistics [FITT, 2022].

The WB focuses on the problems of the opportunities that new information technologies equivalent to blockchain open up for making digital currencies without the participation of central banks and the way money markets will operate in a decentralized manner without intermediaries. At the same time, WB economists note that the lack of a regulatory framework for transactions involving crypto-assets and transactions using smart contracts creates difficulties in a clear interpretation of such assets and compliance with the requirements for countering money laundering and avoiding taxation of transactions with crypto-assets at the global level. The WB believes that new technologies such as blockchain should be supported at the level of individual countries and at the international level, as they contribute to the development of fair competition, stimulate innovation in other sectors of the economy, and provide an incentive for further digitalization of public services [WBG, 2018].

The WB has also studied the market potential of using cryptocurrencies. Based on the gathered data for more than 130 countries for the period from April 2019 to June 2021, using regression analysis, the WB economists confirmed two hypotheses. First, that cryptocurrencies are used as a risky asset. Second, that users in the vast majority of countries perceive cryptocurrencies as a new hedging instrument, as an alternative to gold, against unfavourable macroeconomic conditions, such as high inflation or depreciation of the national currency. Cross-sectional regressions on the volume of cryptocurrency transactions for 2020 up to the first half of 2021 showed that the use of crypto-assets is higher in less economically developed countries and in developed countries with a higher level of information and communication technologies penetration [Feyen, Kawashima, Mittal, 2022].

The G7 countries are focusing on regulating the turnover of another kind of crypto-asset—stablecoins—and in particular, on the possibilities of their global use in cross-border settlements. The G7 countries pay primary attention to the issues of minimizing legal, regulatory and supervisory risks. Their efforts are aimed at legal certainty of global stablecoin turnover; effective management of the issue, and redemption of stablecoins, including investment rules underlying their stabilization mechanism; countering money laundering and terrorist financing; supporting the efficiency and integrity of the payment system's functioning; cybersecurity and operational stability; protecting the privacy of consumers/investors' personal data; and compliance with tax legislation. In this regard, according to the G7, global stablecoins can create risks not only for the implementation of monetary policy and the maintenance of financial stability, but also for the stability of the international monetary system, fair competition and antimonopoly policy in payments [BIS, 2019a]. These risks are systemic in nature, deserve careful monitoring and require further study. The G7 believes that no project to issue global stablecoins should begin its activities until the legal, regulatory, and supervisory risks mentioned above are eliminated or minimized through compliance with risk-proportional regulation.

The G20 countries, in their approaches to crypto-assets, seek to assess the potential benefits comprehensively and eliminate possible risks to global financial stability arising from the rapid development of technological innovations in the financial sector, including cyber risks and regulatory arbitration. The G20 countries note that due to the rapidly developing crypto-asset markets lacking effective regulation and supervision, it is possible to quickly achieve a situation in which crypto-assets will pose a threat to global financial stability because of their market scale and growing interdependence with the traditional financial system. G20 finance ministers and heads of central banks point to the need for close coordination of the efforts of international bodies setting standards in the financial sector, to accelerate the monitoring and exchange of information on regulatory and supervisory approaches to cryptocurrencies, stablecoins, and decentralized financial services, to eliminate regulatory gaps, and arbitration in order to maintain global financial stability and create the necessary conditions for safe innovation [FSB, 2022b; G20, 2022].

For its part, the WTO draws attention to how the accelerated digitalization of trade, including through the use of new payment instruments and investment mechanisms, can contribute to the financing of small and medium-sized enterprises. WTO economists point out that the use of cryptocurrencies as a means of international settlements could eliminate many shortcomings and increase the efficiency of cross-border payments if their market value were not so volatile [Patel, Ganne, 2021]. At the same time, the introduction of stablecoins to solve the problem of price volatility in international settlements may also be associated with many risks, which include legal uncertainty, reliable reserves management, data confidentiality, and compliance with tax legislation.

Economists of the BIS and the Basel Committee on Banking Supervision mainly focus on the prudential approach to the risks associated with the turnover of crypto-assets. In this regard, crypto-assets are subdivided by the BCBS into groups based on the following criteria: the nature of the obligation and/or the presence of a stabilization mechanism; clarity and legal certainty of rights, obligations, and interests arising from agreements on crypto-assets; the ability to manage economic risks in the issuer's ecosystem; and the presence of regulation and control over the activities of crypto-assets suppliers [BIS, 2021b]. Since the risks for different groups of crypto-assets differ, prudential requirements (requirements for credit and market risk, minimum requirements for leverage ratios and liquidity, disclosure requirements, and others) will also be differentiated.

The OECD, in its publications, pays special attention to the study of the use of new mechanisms for raising funds, such as Initial Coin Offering (ICO), to finance the activities of medium and small enterprises. Thus, OECD economists point out the distinctive features of new mechanisms for fundraising and their advantages and limitations, and also note the need to regulate ICO processes at the level of individual jurisdictions and develop coordinated approaches at the international level [OECD, 2019].

The OECD also pays close attention to the study of the cryptocurrencies' taxation in individual countries, as well as the need to unify fiscal policy (the applicability of value-added tax (VAT), income taxes, property taxes, and so on) in relation to transactions with crypto-assets at the international level. In particular, OECD economists reasonably point out that taxation issues are related to the exact interpretation of cryptocurrencies (for example, whether they are interpreted as property, goods, an analogue of a foreign currency, or otherwise), the definition of a taxable event, and the types of taxes that may be applicable to cryptocurrencies [OECD, 2020, 2022a]. The OECD also pays close attention to the study of new types of crypto-assets such as stablecoins and DeFi tokens, and the tax consequences of transactions involving their use.

In its advisory report on the unification of the reporting system for crypto-assets and amendments to common standards, the OECD considers the issues of reporting requirements' formalization, in particular the introduction of a requirement for service providers related to crypto-assets to provide reports on transactions and to apply due diligence procedures (for individual users of crypto-assets, for legal entities, and requirements regarding self-certification procedures). In addition, the OECD proposes to include information on the turnover of crypto-assets, including data on cryptocurrencies and their derivatives, in the system of automated exchange of tax information in the G20 countries [OECD, 2022b]. This would require crypto exchanges and other intermediaries to collect and provide tax authorities with data on the owners and participants of transactions with crypto-assets, similar to data on traditional financial transactions.

The activities of the FSB are aimed at eliminating potential risks of financial stability associated with digitalization. According to the FSB, it is critical to comprehensively eliminate emerging risks of financial stability in the crypto-assets markets to avoid fragmented approaches

that may lead to regulatory arbitrage. When assessing the risks of financial stability in transactions with crypto-assets, the FSB suggests dividing crypto-assets into groups according to the criterion of potential threats. At the same time, we are talking about four transmission directions of crypto-assets' impact on the financial system: welfare effects, trust effects, the impact on the financial sector, and application in payments and settlements [FSB, 2022].

In general, it should be noted that international organizations need to give priority to cross-border and intersectoral cooperation in the field of crypto-asset turnover, considering the international nature of their market.

Interpretations of Crypto-Assets

Despite the widespread use of the term “crypto-assets” in the economic literature, there is currently no generally accepted definition of this term. International organizations, financial regulators, and banking institutions use various definitions of crypto-assets to control their turnover and supervise the activities of their issuers.⁵

The target group of the European central bank on crypto-assets defines them in a quite narrow manner as any asset registered digitally which is not and does not represent a financial requirement of any person or a legal entity and which does not contain a proprietary right with regard to a legal entity [ECB, 2019; Manaa et. al., 2019]. The International Organization of Securities Commissions defines crypto-assets more broadly as private assets that depend on cryptography and distributed ledger technology or similar technology, which are part of their inherent value. Such assets may represent a currency, commodity or security, or be a derivative instrument for a commodity or security [IOSCO, 2020].

The FSB cites a definition of crypto-assets similar to that given by the International Organization of Securities Commissions [FSB, 2020], while the G7 Working Group on Stablecoins of the BIS considers crypto-assets primarily as means of payment [BIS, 2019a]. In turn, the Banking Supervision Committee of the BIS, adhering to the position of the G7 working group, draws attention to the fact that crypto-assets are not a legal means of payment and are not supported by any government or public authority [BIS, 2019b].

The European Securities Market Supervision Authority defines crypto-assets in the same way as the FSB. At the same time, it should be noted that the European Supervisory Authority uses the term “crypto-assets” to refer to both virtual currencies and digital tokens. The latter are defined as any digital representation of an economic interest that may represent value, the right to receive income, perform certain functions, or not have a specific purpose or designated direction of use [ESMA, 2019]. The European Securities Market Supervision Authority also draws attention to the fact that crypto-assets are digital assets that are not issued by central banks.⁶

In turn, the European Banking Supervision Service defines crypto-assets as assets that: depend on cryptography and distributed ledger technology, which are part of their inherent value; are not issued or guaranteed by a central bank or government authority; and can be used

⁵ Despite the fact that the term “crypto-assets” is becoming more common in the economic literature, a number of scientific studies and regulatory documents use narrower terms to designate a new class of financial assets, such as virtual currencies, cryptocurrencies, tokens, and so on. See BIS [2019b] and E. Su [2020]. Most of these terms are more appropriate to use for naming specific types and subspecies of crypto-assets, and it will be shown that there is a semantic relationship between these assets within the developing structure of a new asset class.

⁶ The observation that crypto-assets are not issued by state authorities, such as central banks, is fundamentally important for the subsequent classification of crypto-assets. This makes it possible to exclude both digital currencies of central banks and state virtual assets from the class of crypto-assets.

as a means of exchange and/or for investment purposes and/or to access a product or service [EBA, 2019]. The EC defines crypto-assets more broadly and technologically neutrally as a digital representation of value or rights that can be transferred and stored electronically using distributed ledger technology or similar technology, and which can potentially bring significant benefits to both market participants and consumers [EC, 2020]. Likewise, the OECD interprets crypto-assets as a digital representation of value based on a cryptographically secure distributed ledger or similar technology used to verify and protect transactions [OECD, 2022b].

An analysis of the approaches proposed by international financial organisations and European regulators to the term “crypto-assets” shows that, except for the definition given by the European Central Bank’s Target Group on crypto-assets (which, apparently, due to the specifics of the organization’s powers, covers only classic cryptocurrencies), all of the above definitions have a wide scope of application. Two recurring elements contained in different definitions of crypto-assets should be mentioned: first, the private nature of the asset and, second, the use of cryptography and DLT or similar technology. In fact, these elements are pivotal to the interpretation of crypto-assets.

This study adopts a definition of crypto-assets that is broad in an economic sense and technologically neutral, which makes it possible to include various types and varieties of virtual assets within it. According to this definition, crypto-assets are a new class of private digital assets that are not issued and are not guaranteed by state authorities, that embody values or rights recorded electronically in a distributed registry protected cryptographically and are used as a means of payment and savings and/or for investment purposes and/or for access to a certain product or service on the issuer’s platform as a result of the presence of public consensus. These characteristics of crypto-assets distinguish them from both traditional assets and digital currencies of central banks and so-called national virtual assets.

Modern Classification of Crypto-Assets⁷

Having formulated the definition of crypto-assets, let us now turn to the identification of the criteria used for their classification. The first criterion can be conditionally called institutional and emission criterion. This criterion is used by the ECB target group on crypto-assets. It allows classifying crypto-assets rather narrowly, as one of several types of a set of digital assets (Fig. 1).

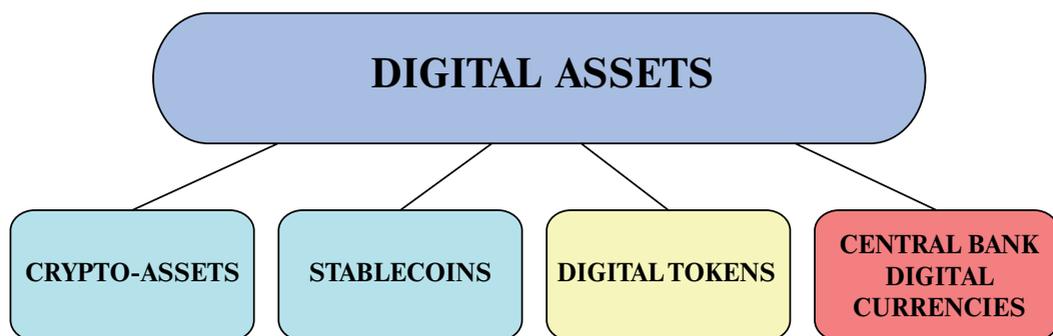


Fig. 1. Classification of Crypto-Assets by Institutional Emission Criterion

Source: Compiled by the author based on D. Bullmann, J. Klemm, and A. Pinna [2019].

⁷ In mid-May 2022, there were more than 19.4 thousand crypto-assets in circulation, and their total capitalization exceeded \$1.28 trillion. At the same time, these assets differed significantly in their nature and economic and functional characteristics [CoinMarketCap, n.d.a].

As can be seen in Fig. 1, according to the institutional and emission criterion, digital assets are divided into four groups, namely: crypto-assets (only cryptocurrencies are included here), stablecoins, digital tokens, and digital currencies of central banks [Bullmann, Klemm, Pinna, 2019]. This classification allows for a distinction between decentralized and centralized digital assets (in the case of cryptocurrencies and stablecoins respectively and focuses on specific issuers of digital assets—private or public (in the case of stablecoin/digital tokens and central bank digital currencies, respectively). At the same time, this classification criterion does not make it possible to fully disclose the economic features of certain types of crypto-assets, since, in fact, with this approach, crypto-assets become similar to cryptocurrencies.

Some economists [Maas, 2019] and regulators in developed countries, such as the UK, Switzerland, and the U.S.,⁸ propose a broader classification of crypto-assets. The criterion they use can be conditionally called functional (Fig. 2).

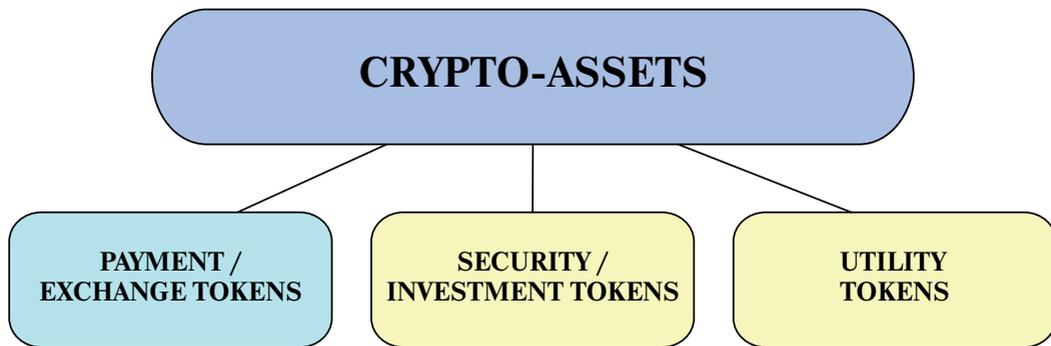


Fig. 2. Classification of Crypto-Assets by Functional Criterion

Source: Compiled by the author based on J. Clayton [2017], the FCA [2019], and FINMA [2018].

As can be seen in Fig. 2, according to the functional criterion, crypto-assets are divided into three main types: payment/exchange tokens (tokens used for payment purposes), security/investment tokens (tokens as digital analogues of traditional financial instruments), and utility tokens (tokens that perform application functions on the issuer's platform). In fact, payment or exchange tokens in this classification act as analogues of virtual currencies. Security/investment tokens are a digital analogue (in terms of rights and obligations) of traditional financial instruments, such as stocks and bonds. On the contrary, utility tokens grant holders the right to access a current or prospective product or service sold on the issuing company's platform. Such a classification is useful for understanding the initial approaches to the regulation of these assets. However, this classification has two significant drawbacks. First, cryptocurrencies belong to the category of tokens, which is not accurate from both economic and technology points. So, unlike tokens, cryptocurrencies do not embody the rights to any asset or any property powers. In addition, cryptocurrencies, unlike tokens, are issued, as a rule, based on a native blockchain. Second, it is not clear what place in this classification is taken by stablecoins, which need to be differentiated from both cryptocurrencies and investment tokens. The classification of all crypto-assets through tokens is inaccurate, since it includes in the composition of tokens other types of assets that are not tokens.

Another approach to the classification of crypto-assets was proposed by the EC and the Council in the draft EU Directive "On the Market of Crypto-Assets" [EC, 2020]. In this case,

⁸ For more details, see J. Clayton [2017], the FCA [2019], and FINMA [2018].

the criterion of targeted use is implemented, which can equally be called economic and legal (Fig. 3).

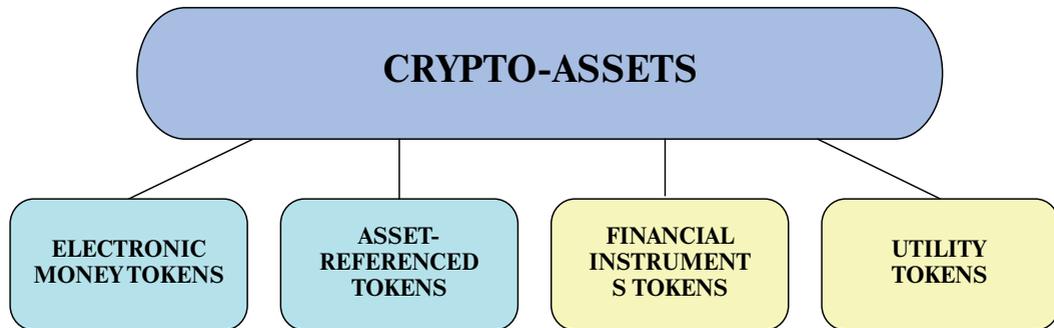


Fig. 3. Classification of Crypto-Assets by Intended Use

Source: Compiled by the author based on EC [2020].

As can be seen in Fig. 3, according to the intended use and the economic and legal nature of crypto-assets, it is proposed to divide them into electronic money tokens (tokenized e-money), asset-referenced tokens, tokens-financial instruments,⁹ and utility tokens. According to the proposals of the European Commission, electronic money tokens and asset-referenced tokens are used primarily for payment purposes (in fact, being stablecoins), while tokens-financial instruments and utility tokens perform investment and application functions, respectively. The disadvantage of this classification is that it does not include decentralized assets, such as cryptocurrencies, and also does not consider hybrid tokens in its structure, which include tokens of decentralized financing projects (DeFi tokens). Apparently, decentralized assets are excluded from the classification by the EC due to the absence of clearly identifiable issuers of such assets who answer for monetary or financial obligations and whose activities can be regulated. Such an exception, in fact, contradicts the broad definition of crypto-assets used by the EC itself, which includes the digital embodiment of both values and rights.

Finally, a peculiar approach to the classification of crypto-assets was proposed by the IMF in 2021 [FITT, 2022]. In this case, the criterion used can be conditionally called the counterclaim criterion (Fig. 4).

As can be seen in Fig. 4, in addition to the intended use (as a medium of exchange or a digital security) the IMF proposes to separate crypto-assets by the presence/absence of a counterclaim to another institutional unit: crypto-assets with a corresponding obligation and crypto-assets without a corresponding obligation. To a large extent, this classification is due to the IMF's attempt to distinguish between those types of crypto-assets that can be considered financial for macroeconomic accounting purposes (digital securities, pegged/backed stablecoins, digital currencies of central banks) and those that should be treated differently—as a new hybrid asset class (cryptocurrencies, payment tokens without counterclaim). The disadvantage of this classification is that it is not complex. It not only does not cover new varieties of crypto-assets such as DeFi tokens or NFT tokens, but also does not consider the fundamental difference between crypto-assets (assets of private issuers) and digital currencies of central banks (state

⁹ The definition of financial instruments in EU countries is contained in article 4 (15) of Directive 2014/65/EU of the European Parliament and of the Council of 15 May 2014 on Markets in Financial Instruments and Amending Directive 2002/92/EC and Directive 2011/61/EU [EC, 2014].

assets). This difference is important for the purposes of regulating the turnover of crypto-assets, both at the level of a separate jurisdiction and at the intercountry level.

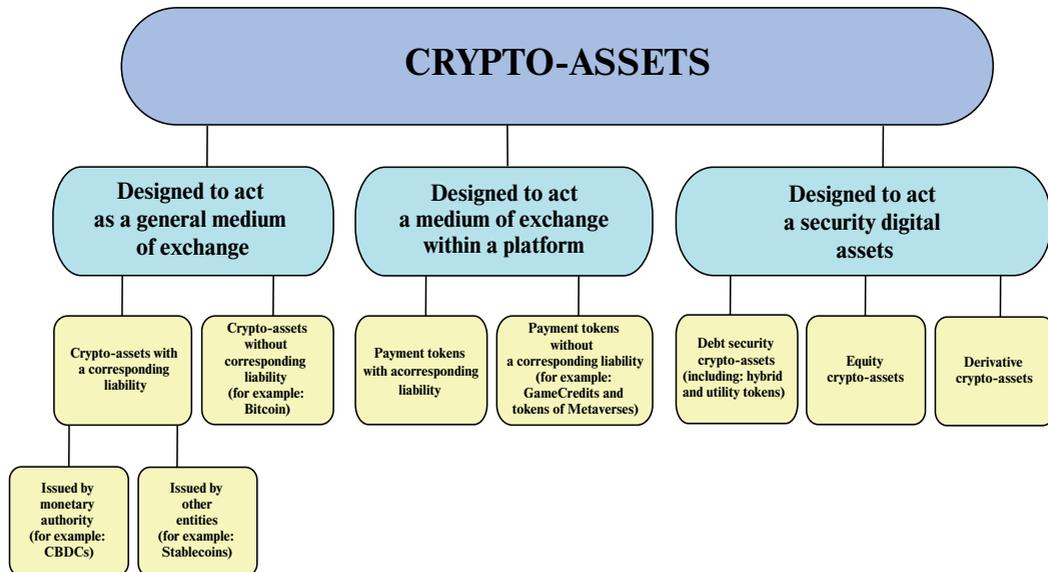


Fig. 4. Classification of Crypto-Assets by the Presence of a Counterclaim

Source: Compiled by the author based on FITT [2022].

All of these classifications have obvious disadvantages associated with the lack of a comprehensive and more detailed approach to the disclosure of the nature of crypto-assets and their systematization. A multi-criteria approach to the classification of crypto-assets will make it possible to take into account both the economic-functional and economic-legal specifics, as well as the emission-institutional features of various virtual assets in circulation.

Economic, Emission, Functional, and Legal Features of Crypto-Assets

From an economic perspective, all crypto-assets can be divided into two main types: virtual currencies and digital tokens. Virtual currencies include two main subtypes: cryptocurrencies (decentralized virtual currencies without binding or collateral) and stablecoins (virtual currencies with fiat, commodity, or other collateral/binding, which can be issued both centrally and in a decentralized manner). Theoretically, both cryptocurrencies and stablecoins can be used as an alternative to traditional fiat money in settlements between economic agents, performing basic monetary functions in one way or another. Digital tokens, on the contrary, are a type of crypto-asset that grants their holders certain economic and/or financial rights, such as the right to certain assets, products or services (or the right to access products, services or platforms). Digital tokens, in turn, can be divided into investment and utility tokens. At the same time, it is not always possible to accurately determine the true nature of digital tokens since they may have hybrid characteristics. To reveal the economic nature and determine the economic features possessed by a variety of crypto-assets in circulation, we will examine them in more detail.

Virtual currencies were the first type of crypto-asset that appeared as part of the initial stage of the development of the digital assets market (2008–15). From a functional standpoint, a virtual currency can be defined as a digital expression of value (price), which can be bought and sold digitally and function as a means of exchange and/or a unit of account and/or a means of preserving value but does not have the legal status of money at the national level (that is, it is not, from a regulatory perspective, a legal means of payment in most developed and developing countries). From an institutional perspective, virtual currency can be interpreted as a digital expression of value, which is issued by non-traditional issuers of modern forms of money—by the Central Bank, credit institutions or specialized issuers of electronic money—but at the same time can be used only as an alternative to generally recognized forms of money in settlements carried out in electronic networks.¹⁰

Among virtual currencies, the most important place is occupied by *cryptocurrencies*, which are their decentralized subtypes. Cryptocurrencies do not embody any obligation and do not have a clearly identifiable issuer. In this regard, the essential characteristics of cryptocurrencies are as follows.

The first is the trust mechanism of value formation. Cryptocurrencies are assets whose value is determined by supply and demand. Thus, their value (value) is based on a similar concept to commodities such as gold. However, unlike rare earth metals, which have a natural rarity, the volume of cryptocurrencies in circulation is regulated by a computer algorithm, which is a kind of artificial limiter of the value of their total emission volume. Moreover, unlike commodities such as gold, most cryptocurrencies do not have obvious alternative spheres of use. Cryptocurrencies are unsecured assets whose value is based on the belief that they can be useful in the future, for example, exchanged for other goods or services, or a certain amount of national currency [BIS, 2015].

The second is the presence of a built-in mechanism of a direct value exchange. The key innovation introduced by cryptocurrency systems is the use of distributed ledger technology (blockchain), which guarantees the remote exchange of value in the absence of trust between the parties. Such an exchange is carried out without the participation of intermediaries due to the implementation of various consensus algorithms that allow confirming the authenticity of transactions on the network. The presence of a mechanism for direct value exchange allows cryptocurrencies to be traded, likening them to cash in this characteristic.

The third is an institutional mechanism in which information and financial transactions are managed without the participation of intermediaries. In most cryptocurrency systems, there are no administrators managing the systems' functioning. The decentralized nature of cryptocurrencies also implies the absence of any identifiable operators, which in traditional payment systems are credit institutions or specialized payment service providers [Kochergin, 2017]. In fact, the study of the cryptocurrencies' nature goes far beyond the category of crypto-assets and concerns not only the issues of attributing them to a certain type of assets, but also touches on a much wider range of issues of monetary evolution and the principles of the monetary systems' modern and future structure.

Currently, there is no consensus in economics regarding the nature of cryptocurrencies (whether it is monetary or not, and if so, whether cryptocurrencies are a new kind of money or not). On the one hand, most national monetary regulators do not consider cryptocurrencies as money since the mechanism of their creation and management contradicts the principles of modern monetary systems and the nature of modern fiat money. However, even vociferous sceptics who do not consider cryptocurrencies to be a new kind of money indicate that cryptocurrencies have monetary functionality [Lee, Martin, 2020]. On the other hand, some econo-

¹⁰ For more details, see D.A. Kochergin [2017].

mists consider the leading cryptocurrency Bitcoin as a potentially new type of money—money of the first level (monetary reserves), which can be the foundation for building a new monetary system [Bhatia, 2021], as well as a full-fledged currency with an intrinsic value, acting as a kind of digital analogue of gold [Andryushin, 2019].

However, the costs associated with mining or forging/stacking cryptocurrencies do not give cryptocurrencies value by themselves. In this regard, it is not so essential whether cryptocurrencies have an intrinsic value or not, they must be socially useful. The market value of cryptocurrencies is determined primarily by the immediate possibilities of their current or future use. At the same time, certain types of virtual currencies may have the properties of commodity and credit money and even combine these properties, which distinguishes them from fiat money. Nevertheless, like fiat money, an essential characteristic of virtual currencies is their fiduciary nature (the presence of a trust value), which manifests itself in cryptocurrencies most clearly, due to the absence of a clearly identifiable issuer.

In fact, the first successful cryptocurrency was the Bitcoin cryptocurrency, launched in 2008.¹¹ Although Bitcoin was initially introduced as an electronic analogue of cash for inter-user settlements in a closed network environment,¹² its functionality later expanded. Over time, Bitcoin has become more often used as a means of saving and as an object of investment. Moreover, recently, many entirely new cryptocurrencies have appeared with specialized functionality that go beyond the means of payment and savings. So, in mid-May 2022, there were more than 10 thousand cryptocurrencies in circulation. At the same time, the total capitalization of the 10 leading cryptocurrencies was about \$953.8 billion or 74.9% of the total crypto-assets market capitalization [CoinMarketCap, n.d.b].

Like other subtypes of crypto-assets, cryptocurrencies are characterized by heterogeneity. They can be differentiated by different criteria, for example, by the nature of their occurrence, the process of generating new value units, the type of blockchain used, and the consensus algorithm, among others. At the same time, differences in the concept of creation and technological aspects of the issue of cryptocurrencies affect their economic and functional characteristics. For example, such characteristics include: the total supply of cryptocurrency units in circulation, the amount of remuneration for miners, the speed and cost of performing calculations in the blockchain, and user functionality. From an economic perspective, an important difference between cryptocurrencies is their intended use. Some cryptocurrencies, due to the technological features of their implementation and functional characteristics, are the most suitable for use as a means of savings and/or as a reserve asset (Bitcoin), others—for use as a means of payment (for example, Litecoin and Bitcoin Cash), and others—for use less as a means of payment and more as a tool/a platform for implementing decentralized applications based on smart contracts (for example, Ethereum, Cardano, EOS and TRON).¹³

Due to the decentralized nature of the issue, cryptocurrencies do not embody any requirement to the state, credit institution, or other issuer and therefore, from the perspective of banking regulators, are not absolutely safe to use as a means of exchange [BIS, 2019c]. In conditions of a limited number of cryptocurrencies holders and alternative directions of their use, as well as due to the lack of regulation of the volume of market supply, cryptocurrency rates are highly volatile. High volatility and a limited number of use cases do not currently allow cryptocurren-

¹¹ Bitcoin is the first successful cryptocurrency created by a programmer or a group of programmers known under the nickname Satoshi Nakamoto, which, due to its wide popularity and high capitalization, is currently a system-forming asset on the crypto-assets market.

¹² For more details, see Nakamoto [2008].

¹³ Smart contract is a program code written in a distributed ledger containing the terms of a contractual relationship and providing for their automatic execution in the future.

cies to perform monetary functions to a high degree.¹⁴ There are other problems with the use of cryptocurrencies. Also, many cryptocurrencies still do not scale adequately.¹⁵

The problems of price volatility and insufficient scalability of cryptocurrencies can currently be compensated for by modifying either the blockchains themselves, or by introducing technological solutions that increase the speed of transaction processing within existing systems.¹⁶ In addition, retail outlets or payment providers can use mechanisms for rapid exchange conversion of cryptocurrencies into fiat currencies immediately after receiving them in a payment transaction. However, as a consequence of cryptocurrencies' decentralized nature, there is virtually no possibility of complete levelling of their price volatility. In this regard, in the second half of the 2010s, the question arose of creating a kind of virtual currency that could simultaneously ensure the stability of the market rate and the issue of which could be better administered.

As a result, at the second stage of the development of the crypto-assets market (2015–present), stablecoins appeared.¹⁷ *Stablecoins* are sometimes defined as private cryptocurrencies with a fixed exchange rate or as cryptocurrencies that are resistant to significant price fluctuations due to a set of stabilization tools [Bullmann, Klemm, Pinna, 2019]. Such interpretations are not accurate, as they do not consider the essential features of stablecoins. By their nature, stablecoins are not cryptocurrencies or a variety of them, but are separate subtypes of virtual currencies. Stablecoins, as a rule, are secured/tied to the price of another reliable and highly liquid asset or asset pool, which ensures the stability of their value [OMFIF-IBM, 2019].

Unlike cryptocurrencies, which are usually issued in a decentralized manner and do not have a clearly identifiable issuer or, at least, an institution that would be financially responsible to users, stablecoins represent a “claim” on a specific issuer (on its underlying assets, funds or other rights) [BIS, 2019a]. In fact, stablecoins combine innovative mechanisms of direct value exchange and financial transaction management without the participation of intermediaries with centralized emission mechanisms and differentiated methods of maintaining price stability. Thus, the economic substance of stablecoins is manifested in the following properties. First, they are issued by identified issuers on the blockchain in the form of circulating digital monetary obligations or certificates of deposit. Second, they maintain the stability of the exchange rate by pegging to the basic low-volatility monetary or commodity security or through the use of algorithmic technologies. Third, they can be used as a means of exchange and/or a means of payment, as well as savings funds from individuals besides the issuer.

The first stablecoin secured by the U.S. dollar, Tether USD (USDT),¹⁸ was issued in 2015 by Tether Limited, a company associated with the Bitfinex crypto exchange. Later, many stablecoins emerged with different security methods and mechanisms to support a stable price. So, in mid-May 2022, there were more than 90 thousand cryptocurrencies in circulation. The total capitalization of the 74 leading stablecoins was \$161.1 billion, or 12.6% of the total capitalization of the crypto-assets market. At the same time, the trading volume of stablecoins was

¹⁴ Thus, former Fed Chair A. Greenspan called Bitcoin irrational money, comparing it with an early form of American money, the so-called “continental currency” [Moyer, 2017].

¹⁵ Cryptocurrency scalability is the ability of a cryptocurrency blockchain to cope with an increase in the number of transactions processed per unit of time by adding architected resources without compromising the quality of the blockchain.

¹⁶ One of such solutions is the use of a special Lightning Network, which is a protocol of the second layer of blockchain networks that allows for an increase in the scalability of cryptocurrencies and reduces transaction fees.

¹⁷ The concept of linking virtual currencies to certain assets was first proposed in a white paper by Masstercoin [Willett, 2012].

¹⁸ Initially, USDT was fully secured by U.S. dollars, but in early 2019, the company reported mixed collateral. Such collateral, in addition to U.S. dollars, includes commercial paper and other liquid assets of the issuer.

\$81.92 billion, or about 89.23% of the total daily trading volume on the crypto-assets market [CoinMarketCap, n.d.c].

Due to the technological features of the issue, as well as due to various ways and mechanisms to support price stability, stablecoins can differ significantly from each other [Houben, Snyers, 2020]. Stablecoins can be divided according to different classification criteria: the mechanism of stabilization of their market price (assets and technologies used to ensure price stability), the design of implementation (economic and legal characteristics), and systemic significance (scale and geography of use).

Thus, according to the mechanism of stabilization of the market rate, stablecoins can be divided into the following groups: with pegging to/backed by traditional assets, with pegging to/backed by crypto-assets, and unsecured (algorithmic).¹⁹ The main ways to secure stablecoins tied to traditional assets are fiat currencies,²⁰ commodities (such as rare earth metals and hydrocarbons),²¹ and other assets characterized by low price volatility.²² The accessibility of traditional assets, their high liquidity, and predictable value make these assets a frequently used means of securing stablecoins.²³ However, since stablecoins linked to traditional assets are not only issued centrally, but also centrally redeemed, their circulation may be associated with credit risk. Also, a prerequisite for the widespread use of such stablecoins is public trust in the issuer, which controls their issue and backing. The most well-known examples of stablecoins pegged to traditional assets are: Tether USD (USDT), USD Coin (USDC), Binance USD (BUSD), TrueUSD (TUSD), Pax Dollar (USDP) and Pax Gold (PAXG).

The main ways to secure stablecoins pegged to crypto-assets are via individual native tokens/cryptocurrencies and baskets of cryptocurrencies. Such stablecoins are designed to solve the main problem of stablecoins backed by traditional assets (centralized stablecoins)—to reduce credit risk, as well as the risk of storing reserve assets. In the case of stablecoins pegged to crypto-assets, their collateral is in the same blockchain as the stablecoins themselves. Thanks to this, the stablecoins secured with cryptocurrencies are controlled by the code and the obligations are repaid automatically. Nevertheless, such stablecoins are characterized by a less stable reserve asset price than in case of fiat collateral, as well as the possibility of automatic liquidation of stablecoins during the depreciation of the underlying cryptocurrency and greater complexity in the mechanism of maintaining the stablecoin rate. Typical examples of such stablecoins are Dai (DAI), Neutrino USD (USDN), sUSD (SUSD), and Liquidity USD (LUSD).

Unlike secured stablecoins, the market rate of unsecured (algorithmic) stable coins is not directly supported by a reserve of fiat currencies, commodities or cryptocurrencies. In this case, a trust model is used to ensure the value of stablecoins similar to that used in the issue of fiduciary money, but only with the use of algorithmic technologies that regulate the aggregate volume of the market supply of stablecoins and maintain the stability of their prices. Currently, there are three main mechanisms for stabilizing unsecured stable coins: one at the applications level,²⁴ one at the protocols level, and a hybrid that combines elements of the first two mechanisms.²⁵

¹⁹ This classification criterion reveals to the greatest extent the economic nature of this subtype of virtual currencies. That is why it will further be used for stablecoins in the author's classification of crypto-assets.

²⁰ In some studies, such varieties of stablecoins are distinguished into a separate variety, calling them tokenized cash. For more details, see D. Bullmann, J. Klemm, and A. Pinna [2019].

²¹ Currently, gold is most often used as commodity collateral.

²² For more details, see D.A. Kochergin [2020].

²³ Stablecoins backed by traditional assets accounted for over 85% of total stablecoin market capitalization in May 2022 [CoinMarketCap, n.d.c].

²⁴ The most famous is the concept of the so-called "seigniorage shares," proposed by Robert Sams [2015]. It is based on the idea that it is possible to create a smart contract on behalf of the issuer that will control the volume of the market supply of a stablecoin in order to maintain its fixed exchange rate against the U.S. dollar.

²⁵ For more details, see D.A. Kochergin and A.I. Ivanova [2022].

Among modern examples of algorithmic stablecoins are TerraUSD (UST), USDD (USDD), Fei USD (FEI), and Frax (FRAX). One of the main problems of the development of unsecured stablecoins, primarily regulated at the application level, is the difficulty in realizing the main advantages of such stablecoins without control over the activities of issuers and or auditing of their financial condition.²⁶

According to the implementation design (economic and legal characteristics), stablecoins can be divided into the following groups: tokenized electronic money (stablecoins linked to fiat currencies), asset-referenced stablecoins (stablecoins backed/pegged to goods and baskets of currencies/goods/assets), and algorithmic stablecoins. This classification is due to various economic and legal consequences and financial risks that arise as a result of the use of various mechanisms to ensure the price stability of the stablecoin [EC, 2020].

In the case of stablecoins linked to fiat currencies, such stablecoins will represent a new form of electronic monetary obligation of the issuer, that is, they are a tokenized form of electronic money.²⁷ In the case of stablecoins pegged to assets, stable coins will embody the property right to a unit of the underlying asset that serves as their backing and will not represent a monetary obligation.²⁸ For example, stablecoins pegged to gold can certify the ownership of a stablecoin holder for one ounce of gold stored in the issuing company's bank depositories, thereby being a digital analogue of deposit certificates. In practice, the differences between electronic money tokens and asset-referenced stablecoins may not be so obvious without clear legal and regulatory frameworks in most countries. Thus, the issuer of stablecoin pegged to a fiat currency may not undertake to repay the stablecoins at a fixed rate or change the conditions/mechanisms for ensuring its price stability after putting the stablecoins into circulation. In this case, stablecoins can no longer be interpreted as electronic money tokens.

In order of systemic significance (scale and geography of the use of the stablecoin), stable coins can be divided into local and global/significant ones (see Fig. 5). Local stablecoins (LSC) are usually issued by financial or fintech companies directly or indirectly associated with large cryptocurrency exchanges, such as Bitfinex, PayPal, and Gemini, engaged in the trade with crypto-assets. Global/significant stablecoins (GSC) [BIS, 2019a] can be issued by large investment banks and banking consortia, for example, JPM Coin (JPMorgan Bank), Signet (Signature Bank), and others. However, of most interest are the global/significant stablecoins²⁹ developed within their own ecosystems by multinational bigtech companies such as Diem Association (Fig. 5).³⁰

As can be seen in Fig. 5, global/significant stablecoins can also be divided into significant electronic money tokens and significant asset-referenced stablecoins, while algorithmic stablecoins do not yet have signs of significance.

²⁶ For example, as a result of capital outflow and depreciation of the LUNA token, which underlies the pegging of the TerraUSD stablecoin exchange rate to the U.S. dollar, from 9 May 2022, TerraUSD lost its exchange rate pegging and ceased to function as a stablecoin.

²⁷ Electronic money tokens are a type of crypto-asset, the main purpose of which is to use them as a means of exchange, and which are designed to maintain their price stability by pegging to the value of fiat currency, which is a legal payment instrument [EC, 2020].

²⁸ Asset-referenced stablecoins are defined as a type of crypto-asset in which price stability is maintained by pegging to the value of several fiat currencies that are legal payment instrument for one or more goods or one or more crypto-assets, or a combination of such assets [EC, 2020].

²⁹ In some publications, global/significant stablecoins are also referred to as systemic stablecoins. See Bank of England [2021].

³⁰ On the characteristics of these stablecoins see Z. Amsden et al. [2020].

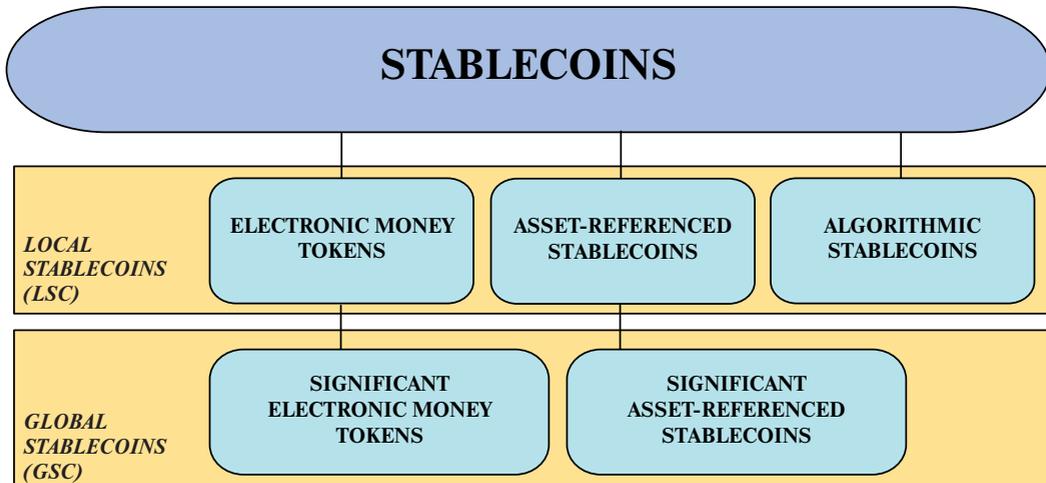


Fig. 5. Classification of Stablecoins According to Implementation Design and System Importance

Source: Compiled by the author based on EC [2020] and HM Treasury [2021].

It should be noted that stablecoins can have a number of common characteristics with digital tokens, and sometimes even be identified as tokens.³¹ Like tokens, stablecoins are usually issued not on the original, but on an existing blockchain and represent a requirement for an identifiable issuer or assets serving as collateral. However, this approach seems not really justified. While digital tokens are issued with very specific functions or for a specific purpose (for example, to grant their holders ownership rights and/or the right to receive dividends, or to grant access rights to a specific product or service), stablecoins, as a rule, do not provide such functions. Stablecoins are intended to be used as a universal means of exchange, payment, and savings, used both in trading on the exchange market and in the retail market of goods and services [Houben, Snyers, 2020]. However, stablecoins and investment tokens can function in a hybrid way, in which such crypto-assets will be classified as hybrids.

Digital tokens, as well as stablecoins, appeared at the second stage of the development of the crypto-assets market and reached the highest issuing volumes in 2017–18 [2019]. Digital tokens are digital assets that are issued by clearly identified issuers using distributed ledger technology (usually on the blockchain) and give to their owners' debt, equity, and dividend rights or access rights to the consumption of certain goods on the issuer's platform. Unlike virtual currencies, digital tokens are issued to raise capital for the implementation of new venture projects, as well as to finance startups or the development of innovative products or services. The two main subtypes of digital tokens are investment tokens and utility tokens.

Investment tokens grant their owners economic rights in the form of ownership rights and/or rights to receive interest income or dividends. Investment tokens are often issued for raising capital through the mechanisms of initial coin/token offering (ICO/ITO)³² or initial exchange

³¹ For example, Coinmarketcap.com, the largest information aggregator of the crypto-assets market, identifies stablecoins Tether, DAI, and others as tokens.

³² At the beginning of the second stage of the development of the cryptocurrency market, the term ICO was mainly used to refer to the pre-sale offer of tokens (crowdsale) to attract investment in order to cover the costs of developing new cryptocurrencies. Particularly, as a result of such crowdsales, the costs of creating the Ethereum (ETH) and Cardano (ADA) cryptocurrencies were covered. Currently, the term ICO has become widely used by economists and regulators to denote the mechanism for issuing digital tokens by fintech compa-

offering (IEO)³³ and demonstrate similarities with traditional debt and equity instruments placed through an IPO³⁴ [Blemus, Guegan, 2020]. Nevertheless, not every token issued under the ICO/IEO can be positioned by the issuer and qualified by the regulator as a security. In this regard, in the process of ICO evolution, a specialized mechanism for fundraising through the initial security token offerings (STO) has appeared. Such tokens are initially qualified as digital securities and their issuers are subject to national regulatory requirements for the issue of financial instruments.

Despite the large number of ICOs held annually, only a small number of them attract a sufficient amount of capital and an even smaller number of companies that have raised funds for investment projects are successful.³⁵ In this context, many crypto exchanges have issued their tokens through IEOs, which are often considered by economic agents as more promising. Examples of such tokens are Huobi Token (HT), the token of the Huobi crypto exchange, and KuCoin Token (KCS), the token of the KuCoin crypto exchange. These examples of tokens usually belong to the group of tokens-securities. At the same time, recently, investment tokens created as a result of the so-called tokenization of traditional assets (both financial and non-financial) have been actively distributed.³⁶ Such tokens belong to a group of tokenized assets. If, in the case of tokens-securities, we are talking about the offering of rights to new digital assets, then in the case of tokenized traditional assets, we are talking about the digitalization of existing ones, in the form of a record in the blockchain. The latter may be attributed not only to financial assets, but also to any low-liquid traditional assets, such as real estate or works of art.

Just as in the case of investment tokens, *utility tokens* are issued to raise funds, usually to finance the further development of the issuer's application, product or service. However, unlike investment tokens, the main purpose of utility tokens is not to generate future cash flows for investors, but to provide access through the issuer's blockchain infrastructure to products or services, as well as to form a user base. The value of utility tokens, as a rule, derives from their functionality.³⁷ Among the most well-known examples of utility tokens are Golem (GNT), Filecoin (FIL), and Basic Attention Token (BAT), each of which facilitates access to a specific service—computing power (GNT), data storage (FIL), and advertising content (BAT). Utility tokens can also be used as a means of payment for goods or services in the issuer's infrastructure, as is the case with the Binance exchange token, Binance Coin (BNB). However, they cannot be used for payments beyond its scope. This fundamentally distinguishes utility tokens from cryptocurrencies and stablecoins, which is due to the different nature of these assets.³⁸

Both investment and utility tokens can grant their holders certain management rights when issued, for example, the voting rights on profit distribution (investment tokens) or the right to vote

nies in order to attract investors' funds to the project in exchange for fiat money or other crypto-assets. Therefore, today the abbreviation ICO can be more accurately deciphered as "initial crypto-assets offer."

³³ A more advanced mechanism for the initial placement of tokens through the mediation of crypto exchanges, which is more reliable but also more expensive.

³⁴ Unlike IPOs, ICO/IEO mechanisms are characterized by the use of a simplified and shorter time of offering, wider access for potential investors, and fewer requirements of financial reporting.

³⁵ The most successful in terms of the amount of funds raised are the initial offers of crypto-assets of the following projects: EOS ICO (\$4.1 billion), Telegram ICO (\$1.7 billion), and Bitfindex IEO (\$1.0 billion). For more details, see PWC [2020].

³⁶ The tokenization concept is based on the capabilities of distributed ledger technology to create a system of asset ownership rights management by creating and fixing their unique digital representations. Tokenization is the process of creating a unified identifier in a distributed ledger in the form of a token [Heines et al., 2021]. Thus, a unique and permanent link can be established for the digital representation of almost any asset, both financial and non-financial [Harwood-Jones, 2019].

³⁷ For more details, see C. Brown, T. Dolan, and K. Butler [2019].

³⁸ In this case, an analogy is appropriate with electronic money, which is accepted as a universal means of payment, while prepaid single-use instruments are only used to pay for goods/services from their issuer.

on updates in the functional infrastructure of the issuer's services (utility tokens). After the issue, both subtypes of tokens can be traded on secondary markets (crypto exchanges), where transactions with them can be made both for fiat money and for cryptocurrencies. Although theoretically, it is possible to make a clear separation between investment and utility tokens, in practice it is not always possible to attribute a crypto-asset to a certain subtype. This is because digital tokens can have mixed characteristics. For example, digital tokens represent a combination of an investment and/or utility token and/or a payment instrument. Thus, tokens can be created and positioned by the issuing company as utility tokens, but actually function as investment ones.³⁹ Companies or exchanges can issue tokens as investment tokens, but in the future they can also be used for payment purposes.⁴⁰ Digital tokens that embody combinations of the above characteristics can be described as *hybrid tokens*. One of the first known examples of the hybrid token is Crypterium (CRPT), which can be used both to pay a transaction fee when using the issuer's services and to receive a discount on future services, as well as a share in the issuer's profit.

A separate type of hybrid token is the so-called *decentralized finance ecosystem token*, or DeFi token.⁴¹ As a rule, DeFi tokens give their holders the right to vote and control the development direction of the basic protocol of the blockchain platform. Such tokens can have a credit nature or be derived from other digital assets. Most typically, the so-called mechanisms of initial DEX offering (IDO) are used to offer DeFi tokens. The essence of IDO is that the tokens issued by issuers are already provided with pools of investor liquidity on decentralized exchanges, which allows their underwritten offering. Examples of DeFi tokens are Uniswap (UNI), Chainlink (Link), and Aave (AAVE) [CoinGecko, n.d.].

Another type of tokens, which can also be classified as hybrid, is the *non-fungible token*, or NFT tokens. Non-fungible tokens can be defined as digital tokens issued for declaring ownership rights, or granting rights to an object, or fixing a specific right, which are unique, and a record of which is fixed in the blockchain. Such tokens are non-fungible, that is, they cannot be replaced with the same amount of the same kind of crypto-asset. Non-fungible tokens have unique properties that distinguish them from other types of crypto-assets. Specifically, NFT tokens are incompatible (they cannot be used on other platforms), indivisible (tokens cannot be divided into smaller parts or nominal values), indestructible (token data is stored in the blockchain using a smart contract so it cannot be destroyed, deleted or replicated, unrestricted in the ownership rights (the tokens are owned by collectors, not the companies that create them),⁴² and verifiable (NFT tokens store historical data on the current and previous owners of the token in the blockchain, providing the necessary authentication). Currently, the IDO mechanism is used for the initial offering of NFTs, as in case of DeFi tokens. The main examples of NFT tokens are gaming tokens, tokens for works of art, music, media, and sports events, collectible tokens, and tokens for physical assets.

The above study of economic, functional, emission, institutional, and other features of diverse crypto-assets makes possible the following classification (Fig. 6).

³⁹ The most famous example is the GRAM (Telegram) token, implemented on the Telegram Open Network (TON) blockchain platform. The token was positioned by the company in the financial market as a utility token. However, in 2019, after studying the nature and functionality of the token, the U.S. Securities and Exchange Commission (SEC) determined that the token is of the investment type.

⁴⁰ For example, the BNB token was initially positioned by Binance as an investment token, but now it can also be used to pay for various exchange services.

⁴¹ Decentralized Finance (DeFi) is a platform model for organizing financial relations without the participation of intermediaries using distributed ledger technology, in which transactions are automated through smart contracts.

⁴² This contradicts modern ways of purchasing digital goods, such as music or movies on streaming platforms, where users do not actually own what they purchase, since they only pay a license to listen to music or watch movies.

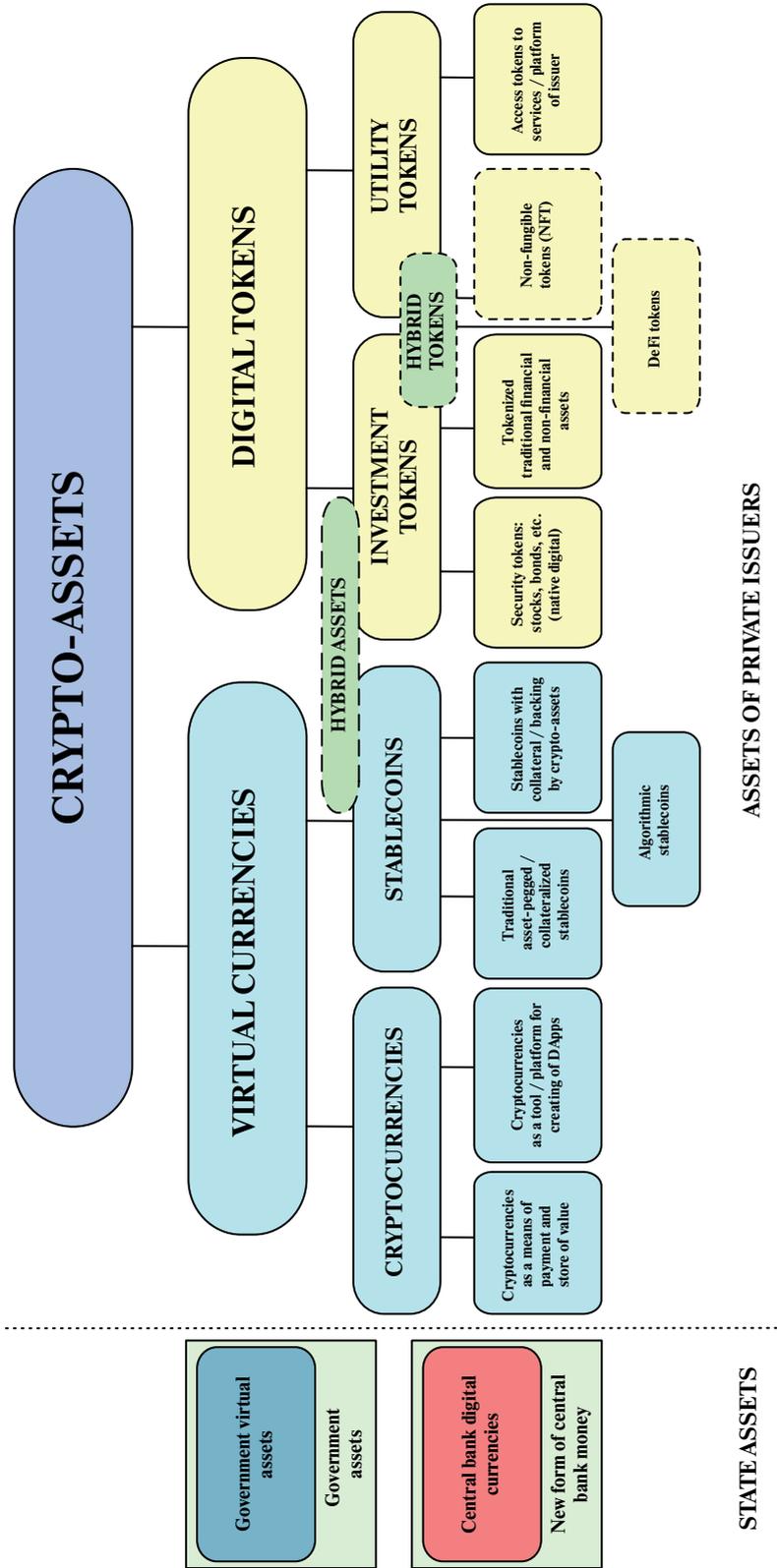


Fig. 6. Classification of Crypto-Assets Based on a Multi-Criteria Approach

Source: Compiled by the author.

As can be seen in Fig. 6, crypto-assets are one of the types of digital assets that are issued by private issuers using cryptographic technologies and distributed ledger technology. There are also digital assets that are not crypto-assets by their very nature. For example, *national virtual assets*, as well as *digital currencies of central banks*, do not fall under the definition of crypto-assets, since their issuers are state authorities or institutions and, as a rule, centralized accounting technologies are used in their issue, which is why such assets have excellent characteristics.

National virtual assets are issued, as a rule, in countries that are in a difficult financial situation, aggravated by economic sanctions. Such assets are sometimes mistakenly referred to as state cryptocurrencies or simulated to digital currencies of central banks (see, for example, A. Kiselyov [2019]). In fact, these assets have more in common with stablecoins and hybrid tokens. Thus, on the one hand, it is declared that the issue of such assets is secured by real assets (petroleum or gold, for example). On the other hand, the release of these assets is carried out through the mechanism of initial offering of tokens, implemented by state authorities to attract external financing and normalize settlement relations, bypassing economic sanctions. Examples of national virtual assets are El Petro and PayMon, which are issued on a centralized basis under the control of the state authorities of Venezuela and Iran, respectively.

Central bank digital currencies (CBDCs) can be defined as an electronic obligation of the central bank, expressed in a national monetary unit and acting as a means of payment and a means of saving [Kochergin, 2021]. Unlike crypto-assets, digital currencies of central banks are issued by the state, not by private issuers. Also, digital currencies of central banks, unlike crypto-assets and national virtual assets, are a new form of money that acts as a legal means of payment within the national jurisdiction.⁴³ The CBDC issue is aimed at maintaining demand for central bank money, developing monetary policy tools, improving the security and efficiency of payment systems in the conditions of digitalization of non-cash money circulation, and the widespread use of virtual currencies.⁴⁴ Examples of central bank digital currencies in circulation are Sand Dollar (Central Bank of the Bahamas) and DCash (Eastern Caribbean Central Bank) [Auer et al., 2021].

At the same time, the largest CBDC project currently is the digital yuan (e-CNY) issue project implemented by the People's Bank of China (PBC) [Working Group on E-CNY Research and Development, 2021]. Currently, dozens of central banks, including the European Central Bank [2020a], the Bank of England [2020], and the Central Bank of Russia [2021a] are informing about the development of their national digital currencies.⁴⁵

Summing up the study of the economic features of various crypto-assets, it should be noted that their market continues to develop rapidly, so any current classifications may undergo changes in the future due to the emergence of new types and subtypes of crypto-assets. Nevertheless, the classification of crypto-assets presented in this article is currently the most comprehensive and omnifaceted and allows for the consideration of economic, emission, and functional features (among others) of various crypto-assets, as well as the substantiation of the main approaches to their regulation.

⁴³ Despite the fact that there are a number of similar characteristics of national virtual currencies and digital currencies of central banks with crypto-assets, such as issue-accounting technology (the issue of national virtual currencies and digital currencies of central banks can also be carried out in the form of digital records in a distributed registry) and intended use (use as a means of payment and/or for investment goals), the economic nature of these instruments and their institutional frameworks differ.

⁴⁴ In fact, the motives for issuing central bank digital currencies can be more diverse—from solving the problems of financial inclusion to controlling the targeted use of funds. For more details, see D. A. Kochergin [2021].

⁴⁵ For more details, see: R. Auer et al. [2021].

The Main Approaches to Regulating Crypto-Asset Turnover

The study of the world experience in regulating transactions with crypto-assets shows that the main regulatory problems in this area are related to the practical lack of fundamental research on the economic nature of virtual assets, which leads to significant differences in the regulation of transactions with crypto-assets at the state level. As a result, the regulatory and legal regimes for the turnover of crypto-assets are not always adequate to the risks of their use in the payment and investment spheres. Of course, the lack of regulatory control of transactions with crypto-assets is fraught with widespread use of these assets in the shadow economy (money laundering, terrorist financing, tax avoidance, and so on), which can destabilize the functioning of national financial markets and payment systems and lead to significant financial losses for economic agents. At the same time, excessively strict regulation of transactions with crypto-assets can slow down the innovative development of the financial and payment spheres and reduce market competition and investment attractiveness.

The main difficulties of modern crypto-asset turnover regulation primarily relate to their decentralized kinds (cryptocurrencies, algorithmic stablecoins, hybrid tokens, and so on), which is due to the peculiarities of their economic, technological and institutional features. Such assets are managed by internal protocols and algorithms, and external regulation of their turnover, which often cannot be directed at specific issuers, cannot fully offset the economic risks associated with the growing use of such assets. Special attention should be paid to regulating the turnover of global/significant stablecoins due to the large-scale and wide geography of their potential use as a means of payment and savings. The search for a “golden mean” in the regulation of decentralized and significant crypto-assets is a modern challenge for regulators around the world.

Recommendations of International Organizations

Currently, there is no unified system of international regulation of crypto-asset turnover. However, many international institutions, primarily the FSB, in cooperation with the members of the G7 and the G20, as well as the OECD, are making attempts to unify certain approaches and rules, as well as to exchange information related to the turnover of crypto-assets at the international level.

Thus, the FSB, in relation to the turnover of crypto-assets, points to the following areas that require constant monitoring by national regulators: an increase in the participation of the banking sector in ecosystems of crypto-assets not covered by regulation control, an increase in investments of institutional investors in crypto-assets using high leverage, an increase in the acceptance of crypto-assets in payment transactions, an increasing role of platforms for trading crypto-assets in the financial market, growing financial losses due to the volatility of crypto-asset rates, loss of confidence in stablecoins and sale of reserve assets, rapid growth of the DeFi sphere without identifiable intermediaries responsible for managing their ecosystem, and finally, growing differences in the regulation of crypto-assets between countries, leading to the emergence of regulatory arbitration and systemic risks [FSB, 2022a].

The FSB also pays special attention to the unification of requirements for global stablecoin arrangements (GSC arrangements). In this regard, in October 2020, the FSB published the so-called high-level recommendations on the regulation and supervision of global stablecoin arrangements. Recommendations are as follows:

- 1) authorities should have and utilize the necessary powers and tools, and adequate resources, to comprehensively regulate, supervise, and oversee a GSC arrangement and its associated functions and activities and enforce relevant laws and regulations effectively;

2) authorities should apply comprehensive regulatory, supervisory and oversight requirements, and relevant international standards to GSC arrangements on a functional basis and proportionate to their risks;

3) national regulators should cooperate and coordinate with each other, both domestically and internationally, to foster efficient and effective communication and consultation in order to support each other in fulfilling their respective mandates and to ensure comprehensive regulation, supervision, and oversight of a GSC arrangement across borders and sectors;

4) authorities should ensure that GSC arrangements have in place a comprehensive governance framework with a clear allocation of accountability for the functions and activities within the GSC arrangement;

5) national regulators should ensure that GSC arrangements have effective risk management frameworks in place, especially with regard to reserve management, operational resilience, cyber security safeguards, and AML/CFT measures, as well as “fit and proper” requirements;

6) authorities should ensure that GSC arrangements have in place robust systems for collecting, storing and safeguarding data;

7) authorities should ensure that GSC arrangements have appropriate recovery and resolution plans;

8) national regulators should ensure that GSC arrangements provide users and relevant stakeholders with comprehensive and transparent information necessary to understand the functioning of the GSC arrangement, including with respect to its stabilization mechanism;

9) national regulators should ensure that GSC arrangements provide legal clarity to users on the nature and enforceability of any redemption rights and the process for redemption, where applicable;

10) authorities should ensure that GSC arrangements meet all applicable regulatory, supervisory, and oversight requirements of a particular jurisdiction before commencing any operations in that jurisdiction, and adapt to new regulatory requirements as necessary [FSB, 2020].

According to the FSB, consistent application of the recommendations outlined above by all authorities in countries where global stablecoin arrangements operate can help ensure comprehensive regulation and reduce the possibility of regulatory arbitration. Integrated surveillance systems should also solve such important tasks as countering money laundering and terrorist financing, ensuring cybersecurity and protecting the confidentiality of market participants’ data, and maintaining fair competition.

For its part, the OECD makes many recommendations to national regulatory authorities regarding the taxation of virtual currencies. Thus, the OECD points out the need to develop a clear legislative framework for virtual currencies, justify the adopted tax regime for transactions with virtual currencies, decide whether the tax regime of virtual currencies will correspond to the tax regime of other assets, decide whether it is possible to provide a simplified tax regime for individual transactions with crypto-assets/stablecoins or individual companies (small/medium-sized enterprises and retail outlets), and decide how the tax regime in relation to virtual currencies will be consistent with the objectives of fiscal and monetary policy [OECD, 2020, 2022b].

The Main Approaches to Regulating the Turnover of Crypto-Assets in Developed Countries

Currently, regulators in economically developed countries use the so-called technologically neutral approach to the regulation of crypto-assets. The essence of this approach is that assets

of the same economic nature that cause similar economic risks, regardless of the technology of issue, accounting and/or settlement used, should be regulated similarly. Although this approach is theoretically sound enough, it has certain drawbacks. In particular, new information technologies used in financial assets affect the directions of use and the breadth of such assets' turnover, making them more universal when using on the one hand, but on the other hand, generating new risks. An example is tokenized electronic money or significant stablecoins.

Modern regulation of crypto-assets at the state level can be considered in three main directions: in the monetary/payment and investment spheres, in the field of countering money laundering and the financing of terrorist activities, and in the field of taxation.

In most developed countries, three main interpretations used to regulate the turnover of cryptocurrencies prevail: property (U.S., UK, and Russia), currency/means of payment⁴⁶ (Germany and Japan), and good (China and France). Although each of these interpretations of crypto-assets has its advantages and disadvantages, the interpretation of cryptocurrencies as property seems the most justified from a regulatory perspective, since it allows for the inclusion of a wide list of assets in its composition: money, goods, financial instruments, and others. According to the degree of rigidity of regulation of cryptocurrency turnover, all countries can be divided into six groups.

The first group includes countries in which the Bitcoin cryptocurrency is recognized as a legal means of payment (El Salvador and the Central African Republic). In these countries, Bitcoin can be used in all payment transactions along with the U.S. dollar and the Central African CFA franc, respectively. All trading and service points in these countries are required to accept Bitcoin on a par with fiat currencies.

The second group includes countries where legislation provides for the use of cryptocurrencies as a means of payment at the national level. At the same time, the norms of the national legislation on countering money laundering and corresponding taxation collection requirements (Japan and Germany) are applied to participants in the turnover of cryptocurrencies [Kochergin, Pokrovskaya, 2020].

The third group includes countries in which the turnover of cryptocurrencies is not regulated in a specific way. In such countries, cryptocurrencies can be used only in certain types of payment transactions at the national level or in certain territories/regions. At the same time, regulatory authorities can consider each case of transactions with digital assets for its identification and regulation. The same legislative norms on countering money laundering and taxation apply to participants in the turnover of cryptocurrencies as to traditional credit and payment institutions (Switzerland, the U.S., the UK, Singapore, and others).⁴⁷

The fourth group includes countries where there is a ban on the use of cryptocurrencies for payment purposes, while trading and investment operations with cryptocurrencies may be partially allowed. As a rule, the tax regulation of cryptocurrency turnover in these jurisdictions is in the process of formation and has not taken a stable form. Such countries include Russia and Turkey.

In the countries of the fifth group, there are significant restrictions or prohibitions on all types of transactions with crypto-assets. Such restrictions or prohibitions are usually associated with the country's consistent policy of strict control over monetary sovereignty and with the

⁴⁶ The term "currency" means in this context a foreign currency.

⁴⁷ Income taxation of crypto-assets generally corresponds to the structure of the tax systems of countries. The greatest detail of the rules of income taxation of digital assets is applied to individuals. At the same time, in almost all developed countries, income related to crypto-assets is subject to corporate income taxes. The greatest concordance among developed countries is observed in approaches to indirect taxation, where transactions with crypto-assets are not subject to taxes on goods and services. For more details, see: D.A. Kochergin and N.V. Pokrovskaya [2020].

purposeful introduction of digital payment technologies by the state, including the introduction of a CBDC. These countries include China⁴⁸ and India.

Finally, in the countries of the sixth group, all types of transactions with cryptocurrencies are prohibited. These bans may be due to the inability of these countries to ensure regulation over the turnover of cryptocurrencies at the national level in conditions of weak development of national financial systems. Such countries are Algeria, Bolivia, Bangladesh, Pakistan, and Vietnam.

It is obvious that there is a relationship between the rigidity of the regulation of cryptocurrency turnover and the general level of development of the national monetary system. First, cryptocurrencies are used as a legal means of payment in countries with a low level of development of the national monetary system, which are thus trying to solve the problem of the economy's dollarization. Second, cryptocurrencies can be used as a means of payment in countries with developed national monetary and payment systems, in which competition is encouraged and innovation is stimulated by private business.

The analysis of the main approaches to the interpretation and regulation of stablecoins in developed countries such as the U.S., EU countries, Great Britain, Switzerland, Japan, and Singapore, among others, testifies to their great differentiation. To a large extent, this is due to the wide variety of stablecoins, which differ both in the mechanisms for achieving price stability and different types of reserve assets, as well as in the implementation design and the systemic significance of stablecoins. In general, in developed countries in the areas of monetary and tax regulation, the following interpretations of stablecoins prevail: electronic money (EU countries, Great Britain, Japan, and Singapore), deposits (Switzerland and the U.S.),⁴⁹ securities or their derivatives (the U.S. and Switzerland), and a variety of crypto-assets with specific characteristics (Malta, BIS, G20 Financial Security Council, and others).⁵⁰ In this regard, in some countries, both the legal payment and banking regulation and the norms of legislation in the field of securities can be applied to stablecoins and their issuers [Overall, Adams, 2019]. Among the main problems of using stablecoins today are the need for rational management of the ecosystem of stablecoins and the investment rules underlying the stabilization of their value, control over the efficiency and integrity of the payment systems functioning, countering money laundering and financing terrorism [FATF, 2019a; 2019b; 2020], ensuring cybersecurity, protection of personal data and consumer rights, and tax discipline issues.⁵¹ Global stablecoins can create risks to conducting monetary policy, ensuring financial stability, and the stability of the international monetary system [Adachi et al., 2020; Malloy, Lowe, 2021].

Despite the difference in regulatory approaches in developed countries, stablecoins are primarily payment instruments issued by clearly identifiable issuers. Therefore, when stablecoins are backed with fiat money and embody the issuer's monetary obligation in digital form, the current regulatory regimes of electronic money issuing institutions, payment institutions, or money transmitters may be applied to such stablecoins and their issuers, depending on the jurisdiction. Nevertheless, the traditional legislation regarding electronic money should be modified to consider the increased risks associated with the tokenized form of monetary obligations, which allows them to trade on crypto exchanges and to circulate. The rapid development of stablecoins in the coming years may require the adoption of separate regulatory and legal norms

⁴⁸ At the end of September 2021, the PBC announced the introduction of a complete ban on transactions with crypto-assets, which began to be considered as illegal financial activity [2021].

⁴⁹ In the EU countries, certain varieties of stablecoins can be interpreted as "electronic money" and are regulated by the Electronic Money Directive, EMD2 [EC, 2009]. Other varieties of stablecoins can be interpreted as "funds" and are regulated by the Payment Services Directive, PSD2 [EC, 2015].

⁵⁰ For more details, see Kochergin [2020].

⁵¹ For more details, see D. Arner, R. Auer, and F. Frost [2020] and ECB [2020b].

that consider the increased risks associated with the use of various types of reserve assets by issuers of stablecoins and their widespread use, not only as a means of payment, but also as a new form of money [Bank of England, 2021].

Among the countries that have recently made attempts to regulate the turnover of stablecoins are the EU countries, the U.S., and the UK. Thus, at the end of 2020, the EC published a draft EU directive “On the Crypto-Assets Market” [EC, 2020], which introduced a clear definition of various stablecoins⁵² and provided for the establishment of differentiated regulatory requirements and prudential supervision measures for issuers of electronic money tokens, asset-backed stablecoins, as well as global/significant stablecoins. Such requirements and measures include mandatory licensing, the size of the issuer’s equity, investment directions of reserve assets, and regulatory standards defining the limits of investment concentration.⁵³ In addition, the criteria for classifying stablecoins as significant ones are established. Such criteria are the size of the issuer’s customer base, the number of the issuer’s shareholders or organizations participating in the turnover of the stablecoin, the value of the issued stablecoin or its market capitalization, the number and value of transactions using the stablecoin, the size of the issuer’s reserve assets of the stablecoin, and the significance of the issuer’s cross-border activities [EC, 2020].

In April 2021, the Bank of England published a report called “New Forms of Digital Money” [2021], in which it indicates that payment chains using stablecoins should be regulated in accordance with standards equivalent to those applied to traditional payment chains, namely: the regulation of payments should reflect the risk of financial stability, not the legal form of payment activity; regulation should ensure end-to-end operational and financial stability in all system payment chains; and sufficient information from payment firms should allow monitoring emerging risks to financial stability. If stablecoins are used in system payment chains as monetary instruments, they must comply with standards equivalent to those applied to the money of commercial banks regarding the stability of the money value, the validity of legal claims in case of non-fulfillment of monetary obligations assumed by the issuer, and redemption at face value in fiat currency. In order to justify these requirements for issuers of stablecoins, a basic set of requirements of banking regulation can be applied (legal norms, requirements for the amount of capital, requirements for the amount of liquidity and financial support mechanisms, the formation of reserves, and the use of insurance schemes).⁵⁴

The Bank of England also suggests using one of the four models of stablecoin regulation (a banking model, a model with reservation of highly liquid assets, a model with deposit regulation, and a model with reservation of Central Bank liabilities). The main difference between the models lies in the nature of the reserve assets that serve as collateral for stablecoins. Each of the models provides for interaction between issuers of stablecoins and central banks by standardizing the requirements for reserve assets that serve as collateral for the issue of stablecoins. Such measures are aimed at maintaining a low level of financial risks of stablecoin turnover, which are comparable to the risks of using commercial banks’ money. It is envisaged that in all models there will be a requirement to grant the holder of the stablecoin the legal right to redeem the stablecoin in fiat money upon presentation at par value [Bank of England, 2021].

In recent years, various regulatory and executive bodies of the United States have increased efforts to regulate the turnover of stablecoins. At the same time, interpretations and approaches to the regulation of stablecoins in the United States differ from EU countries and the UK. Thus, in December 2020, the President’s Working Group on Financial Markets (PWG) issued a statement

⁵² In the text of the draft EU Directive “On the Crypto-Assets Market,” all types of stablecoins are called tokens.

⁵³ For more details, see EC [2020] and ECB [2021].

⁵⁴ For more details, see Bank of England [2021].

on key regulatory and supervisory issues related to stablecoins, which indicated that, depending on the issue procedure and collateral, stablecoins can be a security, commodity, or derivative subject to federal laws on securities, commodities, and/or derivatives [PWG, 2020]. The functioning of stablecoin ecosystems must comply with applicable regulatory and supervisory requirements of national legislation, including ensuring the security and reliability of settlements, countering illegal financing, ensuring consumer protection, promoting market integrity and operational stability, ensuring the stability of the payment systems and trading markets functioning, promoting financial and international monetary stability, and comprehensive cross-border supervision. At the same time, stablecoins issuers and other participants in their ecosystems must fulfill all stipulated obligations in the framework of Anti-Money Laundering, Combating the Financing of Terrorism (AML/CFT) and sanctions before they enter the market. In cases where stablecoins used for retail payments are accepted extensively in the United States, the risks associated with this may require additional regulatory measures and guarantees [Ibid.].

In December 2020, the U.S. Financial Crimes Enforcement Network (FinCEN) submitted proposals, according to which the definition of a monetary instrument in the U.S. was expanded to include convertible virtual currencies (CVC). For banks and money transmitters, a requirement was introduced to submit to FinCEN a report containing information on convertible virtual currencies or transactions using digital assets with the status of a legalized means of payment and on their counterparty, as well as to confirm identity if an offline wallet is used and the transaction exceeds \$10,000 [Department of the Treasury, 2020]. In addition, in January 2021, the U.S. Office of the Comptroller of the Currency confirmed the authority of national banks and federal savings associations to participate as validators in distributed ledger networks. Permission was also given for the use of stablecoins in payment and other banking operations [Office of the Comptroller of the Currency, 2021].

Regarding the regulation of digital token turnover and the mechanism for raising funds through STO, transactions with investment tokens in most countries are successfully controlled by regulatory legal acts in the field of traditional financial instruments and stock markets. Such approaches are used, for example, in the U.S. [Securities Act, 1933; Securities Exchange Act, 1934], EU countries [EC, 2014], Singapore [Securities and Futures Act, 2001] and other countries. On the contrary, there is no regulation of the turnover of utility tokens and mechanisms for fundraising through ICO/IEO in many countries, or it is carried out based on individual regulatory assets in a simplified manner. This is because utility tokens are not identified as financial instruments, and the mechanisms for their initial offering differ from both IPOs and crowdfunding. It should be noted that a separate regulation is needed for the turnover of hybrid tokens (DeFi/NFT tokens), which is currently absent in most developed countries. The only exceptions may be those jurisdictions in which such tokens are defined as investment tokens.

Most countries adhere to the recommendations of the Financial Action Task Force (FATF) to counter money laundering and terrorist financing using crypto-assets. According to the updated FATF recommendations on the risk approach to virtual assets (VA) and virtual asset service providers (VASPs) adopted in October 2021,⁵⁵ the definition of virtual assets and their service providers was clarified to avoid cases when the assets in question avoided falling under the FATF standards (either as a virtual asset, or as a traditional financial asset). Second, instructions were given on how FATF standards should be applied to stablecoins. Third, the provisions on risks and measures to reduce them in relation to peer-to-peer transactions using anonymous virtual wallets were explained.⁵⁶

⁵⁵ The FATF recommendations apply regardless of the definition of virtual assets at the national level (property, cash, and other assets).

⁵⁶ For more details, see FATF [2021].

According to the updated FATF recommendations, to manage and mitigate the risks arising from virtual assets, banks and financial institutions⁵⁷ should regulate the activities of virtual asset service providers through their licensing and/or registration, use of effective monitoring systems, and compliance with regulatory measures provided for in the FATF recommendations on new virtual asset technologies. In cases where it is difficult to determine the characteristics of a particular asset, countries should decide which interpretation of the asset is best suited to reduce the risks of its turnover. At the same time, countries should consider the generally accepted use of the asset (for example, whether it is used for payment or investment purposes) [Virtual Assets and Virtual Asset Service Providers, 2021].

According to the provisions of the 6th Anti-Money Laundering Directive (AMLD6), the basic requirements for identifying customers and combating money laundering, previously applied to banks, payment systems, and gambling establishments, now also apply to crypto exchanges and service providers in the field of virtual assets, as well as banks that simultaneously work with virtual and fiat currencies. The main requirements of AMLD6 for operations with virtual assets are as follows: virtual asset trading platforms are required to perform a Customer due Diligence (CDD) and provide Suspicious Activity Reports (SAR); financial information collection units may be instructed to obtain addresses and identify the owners of virtual assets, which makes their anonymous use impossible; and crypto exchanges and companies serving digital wallets for storing virtual currencies will be required to register with regulatory and supervisory authorities at their location and obtain a license to carry out such activities [EC, 2018]. In general, the regulation of crypto-assets in developed countries is differentiated, but not systemic. It depends on many factors, including the interpretation of the crypto-assets' economic nature and the chosen ways to minimize the risks of their circulation.

Specifics of Regulation of Crypto-Asset Transactions in Russia

Unlike most developed countries, the Russian Federation has special legislation designed to regulate the turnover of digital tokens on the territory of the country. Thus, since January 2020, the Federal Law “On Attracting Investments Using Investment Platforms and on Amending Certain Legislative Acts of the Russian Federation” (Federal Law “On Attracting Investments”) came into force, designed to regulate the turnover of utility tokens (utility digital rights, according to Russian legislation) and the order of functioning of investment platforms on which transactions using these digital rights are carried out. According to the text of the law, *utility digital rights* (UDR) are rights created and circulated in an information system to demand the transfer of a thing or intellectual property rights, the right to demand the performance of works, or the provision of services [Federal Law of 2 August 2019 No 259-FZ].

The Federal Law “On Digital Financial Assets, Digital Currency and Amendments to Certain Legislative Acts of the Russian Federation” (Federal Law “On Digital Financial Assets”), which regulates transactions with investment tokens (digital financial assets under Russian law) and procedures for information system operators and digital financial asset exchange operators, also came into force in January 2021. According to the text of the law, *digital financial assets* (DFA) are digital rights, including monetary claims, the possibility of exercising rights attached to equity securities, the right to participate in the capital of a non-public joint-stock company, and the right to demand the transfer of equity securities. The issue, accounting, and circulation of such digital rights are possible only by making (changing) entries in an informa-

⁵⁷ According to the current interpretation of the FATF, virtual assets are a digital representation of value (value) that can be traded and transferred, as well as used for payments and investments. At the same time, virtual assets do not include a digital representation of fiat currencies, securities, or other financial assets.

tion system based on a distributed ledger or in other information systems [Federal Law “On Digital Financial Assets,” 2020]. Although the law does not specify a list of specific regulated assets, except for digital financial assets certifying the rights to participate in the capital of a joint-stock company and digital financial assets certifying the possibility of exercising rights under equity securities, a broad interpretation of digital financial assets provides for the inclusion of any investment token subtypes, as well as some varieties of stablecoins. The law provides for a wide list of transactions with digital financial assets in Russia.⁵⁸

In fact, within the framework of the regulation currently adopted in Russia, differentiation between the two main types of crypto-assets—digital tokens (digital financial assets and utility digital rights) and virtual currencies (digital currencies, according to Russian legislation)—is carried out based on the centralization/decentralization characteristic of their issue (the ability to identify the issuer), as well as the purpose of the issue.⁵⁹ Thus, according to the legislative interpretation, digital financial assets always have one clearly identifiable issuer, and digital currencies can have many issuers that cannot be clearly identified.

According to the current legislation, *digital currency* in the Russian Federation is a set of electronic data (digital code or designation) contained in an information system that can be accepted as a means of payment and/or as an investment, and, in respect of which, there is no person obligated to each owner of such electronic data. At the same time, such a digital currency is not a monetary unit of the Russian Federation, a monetary unit of a foreign state, and/or an international monetary or settlement unit [Federal Law “On Digital Financial Assets,” 2020]. “On Digital Financial Assets” prohibits the use of digital currency as a means of payment, but at the same time allows the issue of digital currency and exchange operations with it, as well as mining activities. It is envisaged that the specific procedure for organizing the issue and circulation of digital currency, as well as the regulation of mining, will be regulated by separate national laws and by-laws of the Bank of Russia.⁶⁰

In January 2022, the Bank of Russia published a consultation report “Cryptocurrencies: Trends, Risks, Measures,” designed to indicate the position of the regulator regarding the further control of transactions with cryptocurrencies and stablecoins in the country [2022]. The Bank of Russia proposed to introduce a ban on the organization of the issue and circulation of digital currencies (cryptocurrencies and stablecoins) on the territory of the country. In particular, to restrict the activities of crypto exchanges, P2P platforms and other exchange services in Russia. The regulator also proposed to ban investments of financial organizations in cryptocurrencies and related financial instruments, as well as the use of Russian financial intermediaries and domestic financial infrastructure for transactions with cryptocurrencies and stablecoins. It was proposed to introduce a ban on cryptocurrency mining in the country. In addition, the Bank of Russia, in addition to introducing a ban on transactions with cryptocurrencies in Russia, proposed to coordinate a prohibitive regime for transactions with cryptocurrencies within the Eurasian Economic Union (EAEU) to exclude regulatory arbitration [Ibid.].

⁵⁸ Federal Law No. 331-FZ of 14.07.2022 “On Amendments to Certain Legislative Acts of the Russian Federation and on Suspension of Certain Provisions of Article 5-1 of the Federal Law “On Banks and Banking Activities” [Federal Law of 14 July 2022 N 331-FZ] prohibits payment for goods and services using digital financial assets and utility rights on the territory of the Russian Federation.

⁵⁹ According to the Russian legislators, the term “digital currencies” was supposed to be equivalent to the term “cryptocurrencies,” in the international sense. However, in fact, the term “digital currencies,” according to the Federal Law “On Digital Financial Assets,” is broader, which allows even electronic bonuses to be attributed to digital currencies.

⁶⁰ The basic provisions of the Federal Law “On Countering the Legalization (Laundering) of Proceeds from Crime” apply to digital currencies and digital financial assets, as well as organizations involved in their turnover [Federal Law of 7 August 2001 No 115-FZ].

The prohibitive approach of the Bank of Russia was motivated by high risks associated with the turnover of cryptocurrencies and stablecoins, namely: violation of financial stability (undermining monetary circulation, loss of monetary sovereignty, capital outflow from the country, and the flow of funds from bank deposits into cryptocurrencies), reduction of the welfare of citizens (high volatility of cryptocurrencies and the possibility of manipulating market prices, limited opportunities for legal protection of investors, and the spread of fraudulent schemes in cryptocurrency trading), expansion of illegal activities (the use of cryptocurrencies for money laundering, terrorist financing, and tax evasion) [Ibid.]. The Bank of Russia also pointed out the existence of risk factors associated with mining activities: the negative impact of mining on the environment, non-productive consumption of electricity, and the formation of demand for the infrastructure of cryptocurrency operations.

Despite the numerous risks, an analysis of the experience of regulating the turnover of cryptocurrencies in developed countries shows that most financial risks can be minimized using extensive regulatory tools. Since the development of distributed ledger and blockchain technology in the financial sector, which led to the emergence of crypto-assets, decentralized finance, and metaverses, is one of the fastest growing, any ban on the issue and use of cryptocurrencies and stablecoins in Russia would not only reduce the pace of the information technology industry's development and lead to the outflow of highly qualified specialists to other countries, but would also facilitate the transfer of cryptocurrency capital from Russia to countries with a more favourable investment climate. We can also expect a significant loss of tax revenues to the budget [Ibid.] and an increase in the costs of tracking illegal actions in the cryptocurrency sphere. World experience shows that the effectiveness of prohibitive measures is low and contributes to the withdrawal of such activities in the field of cryptocurrencies into the gray area.⁶¹ In this regard, the proposals of the Bank of Russia to ban transactions with cryptocurrencies and stablecoins in the country cannot be considered effective or constructive.

In parallel with the Bank of Russia, the Ministry of Finance of the Russian Federation presented its proposals on regulating operations with cryptocurrencies, which were supported by the Government of the Russian Federation [Tetkin, 2022]. The Draft Law "On Digital Currency" proposed by the Ministry of Finance in February 2022 provides, instead of banning, a certain procedure for regulating the issue and circulation of cryptocurrencies in Russia. In particular, the Draft Law proposes: to keep in force the ban on payments using cryptocurrency for goods, works, and services, but at the same time to allow trading and investment transactions using cryptocurrency; to conduct transactions using cryptocurrencies in the framework of the banking infrastructure; to provide for the possibility of transactions by both individuals and legal entities, which will be divided into qualified and unqualified investors; determine that the organizers of the digital currency exchange system can be banks with a universal license; use the transparent blockchain service for monitoring and tracking cryptocurrency transactions;⁶² to use the Swiss Aximetria system as a model for the implementation of the full identification procedure;⁶³ to create digital currency exchange operators that can have basic (P2P model) and universal (exchange model) rights that will be entered into the register of the Central Bank; to develop special rules for regulating mining activities, including maintaining their register and establishing differentiated tariffs for persons engaged in mining.⁶⁴

⁶¹ According to CNBC experts, despite the introduction of a ban on mining in China, illegal Chinese miners still provide about 20% of the Bitcoin hashrate [Sigalos, 2021].

⁶² A system for analyzing cryptocurrency transactions using artificial intelligence.

⁶³ The system collects and analyzes personal data of customers, starting from passport data and ending with bank account numbers.

⁶⁴ For more details, see Ministry of Finance of the Russian Federation [2022].

Although, in general, the proposals on regulating the issue and circulation of cryptocurrencies in Russia proposed by the ministry of finance are more progressive compared to the prohibitive position of the central bank, there is a risk of excessive regulation (overregulation) of this sphere. So, at the discussion stage, the Draft Law was supplemented with many restrictive measures, which are largely due to the position of the Bank of Russia. For example, there is a ban on the exchange of cryptocurrencies outside licensed exchangers, on the use of non-certified digital wallets for storing cryptocurrencies, and on transfers using cold wallets [Kulikova, 2022]. Thus, the Draft law on regulating transactions with cryptocurrencies in Russia is becoming less and less attractive for both businesses and users. Such bans, coupled with the economic sanctions imposed on Russia in February-March 2022, may contribute to the outflow of crypto-assets from Russia rather than an influx.

In relation to the taxation of transactions involving digital financial assets and utility digital rights in Russia, the Federal Law “On Amendments to Part Two of the Tax Code of the Russian Federation (in respect of the Digital Rights Taxation)” came into force in July 2022 [Federal Law of 14 July. 2022 No 324-FZ]. The Federal Law determined the rates of corporate income tax and personal income tax, as well as the procedure for taxing operations on the sale of DFA and UDR with value added tax. According to the adopted law, the income tax on the sale of digital rights for Russian companies and the personal income tax for residents is 13% (if the tax base exceeds 5 million roubles per year—15% of the excess amount). The income tax on the sale of digital rights for foreign organizations and the income tax on non-resident individuals is 15% [Federal Law of 14 July. 2022 No 324-FZ]. At the same time, value-added tax will not be levied on operations for the sale of DFA on the territory of the country, as well as services of information system operators and DFA exchange operators. Whereby, the financial result of transactions with digital financial assets is determined on the date of income payment.

Currently, a bill on taxation of transactions with digital currencies has also been adopted in the first reading, under which cryptocurrencies are considered as property [Draft Law No 1065710-7]. It is assumed that the proceeds from operations with digital currency will be subject to income tax or personal income tax.⁶⁵ At the same time, transactions with digital currency will not be recognized as an object of VAT taxation. Both Russian legal entities and representative offices of foreign companies, as well as individuals-citizens of the Russian Federation will be required to report on obtaining the right to dispose of digital currency, submit reports on transactions with digital currency and on digital currency balances to the tax authorities. The information is submitted to the tax authority if, for a calendar year, the number of receipts or charges of digital currency exceeds the amount equivalent to 600 thousand roubles in monetary terms. The amount is calculated based on the market price of the digital currency on the date of each transaction. It is stipulated that the procedure for determining the market price for a digital currency should be established by the federal executive authority authorized to control and supervise taxes and fees.

Despite the existence of Federal Laws “On Digital Financial Assets” and “On attracting investments using investment platforms,” as well as tax requirements for transactions with digital rights, the regulation of crypto-asset turnover in Russia can hardly be considered satisfactory. The main problems of the current regulation in Russia are as follows.

First, the Law “On Digital Financial Assets” lacks clear terminology. The definitions used in the text of the law contradict those used in world economic and legal practice. For example, the interpretation of the term “digital currency” is quite broad, but it does not reveal the eco-

⁶⁵ It is proposed, by analogy with the regulation of taxation of digital rights, that the personal income tax rate from transactions with digital currency will depend on the amount of annual income of individuals and will be 13% on income up to 5 million roubles and 15% on amounts exceeding this.

conomic essence of this category, which is especially obvious in light of the introduction of digital currencies by central banks. Also, the text of the law lacks key concepts in the field of crypto-assets, such as “cryptocurrency,” “stablecoin,” “payment token,” “non-interchangeable token,” “decentralized finance,” and so on, which leads to terminological confusion when the Bank of Russia does not make a fundamental distinction between cryptocurrencies and stablecoins.⁶⁶

Second, the Laws “On Digital Financial Assets” and “On Attracting Investments Using Investment Platforms” actually regulate only the turnover of investment tokens and some varieties of stablecoins. It is envisaged that the turnover of digital currencies and mining activities should be regulated by the Law “On Digital Currency.” At the same time, on the part of the Bank of Russia, there is a prevailing tendency to tighten regulation of transactions with cryptocurrencies and maintain a ban on their use for settlements within the country [Nabiullina, 2021]. Under these conditions, it is unclear why companies or financial institutions should issue and trade digital currencies in the Russian market if they cannot be used for their intended purpose as a means of payment.

Third, the issue and use of stablecoins for investment purposes are not prohibited in Russia, but their use as a means of payment is not allowed by the regulator. The Bank of Russia opposes stablecoins as, according to the regulator, this instrument can undermine the mechanism of monetary policy and create risks to financial stability. Like cryptocurrencies, the Bank of Russia considers stablecoins as quasi-money [FinMarket, 2021]. The Bank of Russia also opposes the use of internal accounting units by ecosystems (as a means of payment, accumulation, and means of borrowing).⁶⁷ Such a position is not sufficiently justified. The Bank of Russia should have chosen a more flexible policy regarding the regulation of stablecoin turnover. Thus, the Central Bank could determine the range of possible issuers, develop acceptable models for regulating the issue and circulation of stablecoins, and provide unified mechanisms for backup of their issue, allowing minimizing the economic risks of holders and issuers of stablecoins. Unlike cryptocurrencies, stablecoins may become an important element of the financial and monetary system in the coming years. It should be noted that the proposed draft Law “On Digital Currency” also does not provide for the regulation of the use of stablecoins in Russia.

Fourth, DeFi tokens and NFT tokens actually remain outside the legal field in Russia. The first is due to the decentralized nature of these assets, the second is due to the lack of a way in Russian legislation to transfer copyrights through tokens recorded in the blockchain. Therefore, a transaction using NFT tokens in Russia is considered from a legal perspective as an agreement without compliance with a written form, which in fact does not allow confirming either expenses for tax purposes or the rights of the holder of NFT tokens in case of judicial protection. According to the Law “On Digital Financial Assets,” NFT tokens can be called a digital asset to some extent, since certain rights are transferred through them. However, the implementation of the CFA in Russia is provided only on the corporate blockchain, which in meaning differs from the idea inherent in the concept of the NFT token. Thus, the use of NFT tokens in Russia currently does not have any legal consequences. Apart from the above-mentioned problems of regulating the turnover of crypto-assets in Russia, there are many topical issues related to improving the taxation of transactions with cryptocurrencies, which should be the subject of a separate study.⁶⁸

In conclusion, it should be noted that many difficulties of regulating the use of crypto-assets in Russia can be solved by conducting fundamental scientific research on the economic nature of crypto-assets and qualitative appraisal of any legislative proposals and initiatives, es-

⁶⁶ For more details, see Bank of Russia [2022].

⁶⁷ For more details, see Bank of Russia [2021b].

⁶⁸ For the international experience of crypto-asset taxation, see Kochergin and Pokrovskaya [2020].

pecially those related to the regulation of innovative financial and payment instruments based on the use of new information technologies. Flexible regulation of crypto-asset turnover, considering the interests of a wide range of economic agents, is an important factor in increasing the competitiveness and innovative attractiveness of the domestic financial market. Such attractiveness should not only be associated with the initiatives of the central bank (the issue of a central bank digital currency,⁶⁹ the development of a fast payment system, and so on), but also provide support for private initiatives of credit institutions and fintech/bigtech companies to introduce and use various crypto-assets in the field of payments and investment in Russia.

Conclusion

The activities of international organizations in relation to crypto-assets have focused on unifying regulatory approaches to the issue and circulation of crypto-assets, taking into account the different levels of risk associated with the differentiated nature of crypto-assets. International organizations pay particular attention to the regulation of cryptocurrency and global stablecoin transactions, prudential supervision of their issuers, and the unification of approaches to taxation and countering illegal transactions involving crypto-assets. The accomplishment of these tasks is complicated by the trans-boundary nature of the crypto-assets market, the decentralized nature of the instruments used, and the presence of many national regulators applying different approaches to the interpretation and classification of crypto-assets.

Crypto-assets are presented in this article as representing a new class of private digital assets that are not issued and are not guaranteed by state authorities, embody values or rights recorded electronically in a distributed ledger protected cryptographically, and are used as a means of payment and savings and/or for investment purposes, and/or for access to a certain product or service on the issuer's platform as a result of the public consensus. These characteristics of crypto-assets distinguish them from both digital currencies of central banks and national virtual assets.

An original classification of crypto-assets was proposed, according to which crypto-assets are divided by the economic-functional criterion into two main types: virtual currencies and digital tokens. Virtual currencies, regardless of their subtypes, are a means of exchange or a payment instrument, as well as a store of value. The main difference between stablecoins and cryptocurrencies is the use of stabilization mechanisms designed to offset the risks of price volatility, as well as the presence of a clearly identifiable issuer to which the holder of a digital asset can address financial requirements. Digital tokens, regardless of the subtypes, are issued with specific investment functions or consumer goals. The main difference between investment and utility tokens is that the former provide their owners with various economic rights, while the latter provide access to the consumption of certain products or services on the issuer's digital platform.

The study reveals that cryptocurrencies are the most significant crypto-assets in terms of capitalization and number of transactions, differing in terms of their functionality. Cryptocurrencies can be a means of payment, savings, and/or investments (their performance of monetary functions is not universal), or act as a tool or platform for the implementation of decentralized applications based on smart contracts. Functional features of cryptocurrencies are also premised on emission protocols and consensus algorithms in blockchains. However, the directions of the cryptocurrencies' designated use depend not so much on their functionality, as they are conditioned by the public preferences of economic agents when choosing payment or investment instruments and the regulatory policy of monetary authorities.

⁶⁹ See Bank of Russia [2021a].

Stablecoins are the second most important type of crypto-asset. The differences between stablecoins are caused by the use of various reserve assets and stabilization mechanisms, as well as determined by design features and various systemic significance. In an economic sense, most stablecoins are circulating digital monetary obligations of their issuer. In this regard, it is reasonable to define collateral stablecoins backed by fiat currencies as tokenized electronic money or deposits (depending on the regulatory features of national banking and payment systems). Certain types of stablecoins can be treated as securities or derivatives. At the same time, global/significant stablecoins are of the greatest research interest due to the potential for widespread use of the new form of money.

Investment tokens represent digital property rights embodied in equity, debt, or derivative financial instruments. By their nature, investment tokens are a digital form of securities, information about the issue of which is registered in a distributed ledger or in the issuer's blockchain. On the contrary, utility tokens grant holders the right to access a current or prospective product or service sold on the issuing company's platform. In most cases, investment and utility tokens appear as a result of using new mechanisms for fundraising—an ICO/IEO or STO.

Among digital tokens, a special place is occupied by the so-called hybrid tokens, the economic nature of which is not homogeneous. Hybrid tokens can be created and promoted by the issuing company as utility tokens, but actually function as investment tokens, or can be issued as investment tokens, but later used in payments or for access to other services on the issuer's blockchain platform (DeFi tokens). Hybrid tokens can also be conditionally referred to as NFT tokens, which are issued for declaring ownership right, or granting right to an object, or fixing a specific right, which are unique and recorded in the blockchain. In most cases, hybrid tokens are issued as a result of the use of a new fundraising mechanism—the IDO.

There is no international regulation of crypto-asset turnover. Currently, international organizations are concentrating their efforts on ensuring financial stability by adopting uniform recommendations on minimizing risks and exchanging tax information related to the turnover of crypto-assets. At the same time, the regulation of transactions with crypto-assets at the national level in most countries is aimed at strengthening state control over their turnover and is carried out both in the monetary/payment and investment spheres, as well as in the areas of countering money laundering and taxation.

In most developed countries, the regulation of crypto-assets in the monetary, payment, and investment spheres is not systemic, but consists either in adapting the current legislation (in relation to investment and utility tokens), or in developing special directives regulating the turnover of certain types of crypto-assets (in the case of stablecoins). As a rule, the regulation of cryptocurrency turnover is reduced to the implementation of AML/CFT procedures in national legislation with respect to crypto-asset service providers, in accordance with the FATF recommendations. Procedures are used to reduce financial risks and prudential supervision of crypto-assets issuers' activities, recommended by the FSB and the BIS, as well as tax regulation of transactions with crypto-assets, in accordance with national taxation standards for such types of income.

The regulation of crypto-asset turnover is significantly differentiated between countries. This is due not only to the lack of common interpretative approaches to different types and subtypes of crypto-assets and differences in the assessment of economic risks and consequences of widespread turnover of crypto-assets for national financial systems, but also to the particularities of national legislation and the application of regulatory practices. In most developed countries—including the U.S., EU countries, Great Britain, Switzerland and Japan—a fairly balanced and flexible approach to the regulation of various types of crypto-assets and their issuers prevails. At the same time, in a significant number of emerging market countries, such as

China, Turkey and Russia, regulation is heavier and is characterized by the use of prohibitive measures.

The current regulation of crypto-asset turnover in Russia cannot be deemed satisfactory due to its fragmentation and prohibitive bias. It is a fair assumption to say that at present the regulation of crypto-asset turnover in Russia is carried out outside the framework of the recommendations of international institutions and without due consideration of the experience of developed countries. In particular, there is no clear terminology in the field of crypto-assets in national legislation, the proposed procedure for regulating the issue and circulation of digital currency is excessively strict, and transactions with stablecoins, DeFi/NFT tokens are not regulated at all. The ban on the use of cryptocurrencies and stablecoins in Russia under economic sanctions does not seem justified from an economic point of view. In addition, the procedure for taxation of transactions with crypto-assets in Russia should provide for a preferential regime or a period to stimulate the introduction of a new asset class in the Russian financial market.

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