

Legal Framework of Crypto-Assets and Their Legal Challenges

Jordan DELEV¹

Nazife Jakupova DOMAZET²

¹Associated Professor, Faculty of Law, International Vision University, jordan.delev@vision.edu.mk, ORCID: 0000-0003-3852-0565

²Teaching and Research Assistant, Faculty of Law, International Vision University, nazife.yakup@vision.edu.mk, ORCID: 0009-0002-5106-535X

Abstract: With the development of technologies in recent years, radical changes have occurred in the financial sector. Technologies such as virtual currency, digital currency, cryptocurrency, tokens, blockchain, and artificial intelligence have emerged. The legal regulation of these and similar financial technologies (FinTech) is a developing field with constantly changing dynamics. Since law generally follows technology, it takes time to identify problems that may arise and to take precautions on these issues. Crypto assets are considered one of the most important innovations of the digital age, but their legal regulations still contain uncertainties. Therefore, the legal regulation of crypto assets varies greatly from country to country. While some countries apply their existing financial laws to these assets, others have developed new specific regulations. Cryptocurrencies are often described as 'digital assets' and in some cases are considered 'securities'. In other words, cryptocurrencies can be anonymous because they do not require people's real identities and enable payments to be made easily, quickly and at low cost. However, despite these benefits, it creates some problems such as not being properly controlled by the competent state authorities, not being regulated and not being subject to a control mechanism, not having a central interlocutor, and the use of crypto assets in criminal activities. The failure of national regulatory bodies and legislators to make clear and uniform regulations on this issue brings with it a number of legal and financial uncertainties and risks. Therefore, the future of crypto assets will be shaped by regulatory approaches and international cooperation. The main purpose of this article is to reveal the legal problems experienced by touching on the legal regulations of crypto assets, especially cryptocurrencies, and to offer solution suggestions..

Key Words: crypto-asset, cryptocurrency, regulation, FinTech, legal challenges.

1. INTRODUCTION

Crypto-assets represent a significant aspect of the digitalized global economy. This development gained prominence in financial and legal systems following the introduction of Bitcoin in 2009, which is viewed as a pivotal moment in the annals of financial history. A defining characteristic of crypto-assets is their foundation in blockchain technology, facilitating transactions independent of centralized authorities. This technology is perceived as transformative not just for financial exchanges but also for the automated enforcement of contracts. Conversely, because current legal frameworks are predominantly founded on national jurisdiction and regulatory oversight, they encounter considerable difficulties in adjusting to this innovative technology.

Significant ambiguities remain, particularly with regard to crypto-asset definitions, property rights, taxation, and investor protection. Due to the reactive nature of the law in acting in response to developments in technology, delayed regulation is frequently observed with varying degrees in different jurisdictions (Gitmez, 2023). At European Union level, adoption of the Markets in Crypto-Assets (MiCA) Regulation aims at setting up a harmonized framework for its members. Germany had already classified crypto-assets as "financial

instruments" through the Federal Financial Supervisory Authority (BaFin) and subjected crypto service providers to licensing requirements even prior to the adoption of MiCA and made it a frontrunner in regulation in the European Union (Cindemir, 2025). On the contrary, Turkey completely incorporated crypto-assets in its national legislature for the first time upon enactment of Law No. 7518 in 2024 (Koç, 2025). North Macedonia still hasn't specifically set up a crypto-asset-specific legislation; it is yet a candidate for European Union membership, though an endeavor is expected in alignment with MiCA Regulation (Ristoska & Veternik, 2022).

This reflects the presence of different regulatory regimes at the regional level and highlights the need for comparative study. The transnational and deconcentrated nature of crypto-assets leads to considerable divergence in their legal classification. Whereas some regulatory agencies treat them as securities while some include them in the broader definition of "digital assets" (Üzümcü & Yıldırım, 2022). Moreover, money laundering, terrorism financing, and tax evasion are amongst the key issues for regulatory agencies (Genççelep, 2022). As such, the creation of an integrated legal framework for crypto-assets is imperative not only for economic security but also for ensuring legal certainties for investors as well as protecting

investors' rights. So, the main objective of this article is to interpret the applicable laws relating to crypto-assets—in particular cryptocurrencies—draw attention towards the current legal hitches prevailing in the system, and make recommendations for solutions.

2. CONCEPTUAL AND LEGAL FRAMEWORK

2.1. The Concept of Crypto-Assets

The notion of crypto-assets, which is regarded as one of the most prominent features in digitalized financial landscapes, has been addressed in scholarly literature in numerous means. One such key distinguishing aspect of crypto-assets is their exemption from issuance by any form of a central agency, distinguishing crypto-assets from ordinary monies (Külekçi, 2020). Overall, a crypto-asset is conceptualized as a digital value stored electronically, protected by cryptographic means, and stored on a blockchain. As a generic class at large, crypto-assets encompass an assortment of subclasses such as cryptocurrencies, non-fungible tokens (NFTs), utility tokens, and security tokens (Uysal, 2019). To elaborate further, crypto-assets denote digital entities which attest, safeguard, and register transactions based on cryptographic axioms and decentralized blockchain protocols. Such assets not only encompass major cryptocurrencies like Bitcoin and Ethereum but are also manifested in a number of functional purposes in forms of different sorts of tokens (Tangem, n.d., para. 1).

Markets in Crypto-Assets (MiCA) Regulation passed by the European Union in 2023 refers to crypto-assets as "a digital representation of value or rights which may be transferred and stored electronically, using distributed ledger or similar technology, and which can be used for payment or investment purposes" (Cindemir, 2025). Such a definition is an indication of a position where crypto-assets are not only perceived as innovation in technology but an entity on its own which needs regulation in a financial market setting.

Academic discourses in the literature frequently underscore the dualistic character of crypto-assets, which oscillate between the realms of "currency" and "securities". A segment of scholars categorizes crypto-assets predominantly as a vehicle for investment (Özsoy, 2019), whereas others contend that they are merely an advancement in technology. Consequently, ascertaining the legal classification of crypto-assets bears substantial ramifications for both private and public law domains. Hence, the notion of crypto-assets ought not to be confined to a mere technical interpretation; instead, it must be

regarded as a legal construct that is in a state of perpetual development and subject to diverse interpretations within various national and international regulatory contexts.

Crypto-assets are generally referred to as digital assets and, in some cases, are regarded as securities. These assets are able to be traded without the intervention of a central entity and often provide a degree of anonymity. In Turkey, there is still an insufficient definition pertaining to the legal status of crypto-assets. However, organizations such as the Capital Markets Board (Sermaye Piyasası Kurulu - SPK) and the Central Bank have made a series of releases concerning this matter. Here, Koç (2025) undertakes an analysis of Law No. 7518, highlighted including issues such as crypto-asset confiscation, their hereditability (i.e., transmission by inheritance), and their use as investment vehicles.

2.2. Cryptocurrencies and Digital Money

Cryptocurrencies are digital currencies that are derived from blockchain technology and are best known as the primary form of crypto-assets. The first such example was Bitcoin in 2009, which brought out a de-centralized digital currency which does not depend upon any central agency and is secured through cryptographic techniques (Nakamoto, 2008). The basic aim behind cryptocurrencies is enabling fast, low-cost, direct transactions between users. These characteristics distinguish them from traditional fiat currencies.

The notion of digital currency, nevertheless, pertains to a more extensive classification than that of cryptocurrencies. Digital currency comprises all forms of value that are present in an electronic format and are capable of being transferred digitally. This category includes central bank digital currencies (CBDCs), electronic money, and also virtual currencies found within gaming environments (Koç, 2020; Öztürk & Acar, 2021). Consequently, cryptocurrencies represent merely a subset of digital currency.

In scholarly literature, there is a tendency for confusion between the terms "digital money" and "virtual money." According to the European Central Bank (ECB), virtual money is defined as "a sort of unregulated, digital money, which is generated and usually governed by its authors, and used and accepted by users of a specific virtual community" (European Central Bank [ECB], 2012). Therefore, virtual money lacks a broader scope when compared with cryptocurrencies and is typically tied in with its application within a specific framework or game world.

In Turkey, a 2021 enacted regulation prohibited crypto-asset use for payment purposes; nonetheless, investment/trading activity in cryptocurrencies is still allowable. Cryptocurrencies appear to occupy a unique position within the broader framework of digital currency (Koç, 2025). In Germany, cryptocurrencies were legally defined as "financial instruments" by the Federal Financial Supervisory Authority (BaFin). A 2020 regulation not only attributed cryptocurrencies within this designation but also established a requirement for licensing crypto service providers, making Germany one of the leaders within EU states in attributing a definitive legal status to cryptocurrencies (Cindemir, 2025). North Macedonia remains without any adopting specific legal definition or regulatory framework for cryptocurrencies. At present, no specific definition for crypto-assets is found within the legislation, placing it within a state of legal uncertainty. Securities and Exchange Commission in North Macedonia has released public warning notices about severe risks in crypto-asset investment; nonetheless, it is still without a formal regulatory framework. Although crypto-currency trading is not directly prohibited within the country, a lack of regulation results in significant uncertainty for investors. From an EU integration standpoint, it is expected that North Macedonia shall ultimately adopt regulatory provisions consistent with those found in the MiCA Regulation (Ristoska & Veternik, 2022).

Although blockchain technology improves security capabilities and crypto transaction efficiency, it simultaneously generates fresh legal issues for safeguarding protection for private information, anti-money laundering controls, and supervisory oversight. Consequently, nations have established for the most part "Know Your Customer" (KYC) and "Anti-Money Laundering/Combating the Financing of Terrorism" (AML/CFT) controls over crypto transactions made over blockchain (Gençcelep, 2022).

2.3. Types of Tokens and Their Legal Status

Tokens are an important subcategory in crypto-assets since they are digital values developed on the blockchain for particular applications. Tokens in research are defined in varying classifications such as the most prominent categorizing it into utility tokens, security tokens, and payment tokens (Külekçi, 2020).

From a legal standpoint, classification of tokens is critically significant for a number of reasons: investor protection, taxation, issue procedures, and regulation itself are all founded in large measure upon what class a token belongs in (Özsoy, 2019).

BaFin in Germany employs distinct regulatory regimes for utility and payment tokens but requires security tokens for a licence, which it treats as securities (BaFin, 2020). According to Turkish Law No. 7518, no exhaustive definition is made for tokens, but a significant amount of regulatory power is vested in the Capital Markets Board (SPK) by suggesting crypto-assets may come within capital markets legislation (Koç, 2025).

Moreover, in recent years, the rise in popularity of non-fungible tokens (NFTs) sparked legal and scholarly debates. NFTs are representative signs for unique digital items and are commonly used for digital pieces of art, in-game items or collectibles. Despite their continued indeterminate classification in law, NFTs also bear a direct connection with intellectual property law (Regner, Urbach, & Schweizer, 2019).

3. COMPARATIVE COUNTRY REGULATIONS

3.1. Regulation of Crypto-Assets in the European Union

The European Union (EU) in 2023 made a key step towards crypto-asset regulation in passing the Markets in Crypto-Assets Regulation (MiCA). MiCA is the first legally binding instrument in effect throughout the entire EU specifically outlining the legal characterization of crypto-assets. Enforcement of MiCA started gradually in 2024 and is set to fully enforce in all EU nations by 2025 (Cindemir, 2025).

MiCA establishes a definition for crypto-assets and classifies them into three categories: asset-referenced tokens, e-money tokens, and other crypto-assets. Beyond this, it lays down overarching licensing for service providers and issuers. Its main aim is encouraging European Union legal harmonization as well as investor protection. As per Cindemir (2025), a main aspect of MiCA is setting up a harmonized regulatory framework at an EU level. Prior to this, a member state had established crypto-assets based upon national legislation in force within it, which had given rise to a fragmented regulatory framework. With an implementation of MiCA, harmonized regulations for use within the entire EU have been established.

Enactment of Markets in Crypto-Assets (MiCA) framework is paramount not only for European Union member nations but also offers direction for candidate nations for European Union membership. Specifically, such nations like North Macedonia are bound for alignment with MiCA values in times ahead. In this respect, MiCA is a standardization

tool, extending its reach even beyond borders of the EU in a wider regional environment (Koç, 2025).

3.2. Regulation of Crypto-Assets in Germany

Before the introduction of harmonized EU regulations, Germany emerged as one of the first countries to adopt real measures in respect to crypto-assets. BaFin, in 2020, released a regulation in which cryptocurrencies and other crypto-assets were referred to as "financial instruments" such that a licensing requirement for participants in their intermediation and trading was established (Cindemir, 2025). Such a redefinition constituted a substantial shift in perspective such that crypto-assets were now not only regarded as a novelty in respect to technology but as financial instruments subject to direct market regulation.

An extensive analysis of Germany's regulatory framework reveals that crypto-asset service providers are required to obtain a BaFin license. Further, the establishment of transparency obligations for investor protection purposes and ensuring financial stability has seen an infrastructure set up allowing for regulation of crypto-assets in line with capital markets legislation (BaFin, 2020). Further still, Germany actively participated in the establishment of European Union's MiCA Regulation, harmonizing its national legislation with MiCA towards ensuring regulatory convergence. As one of the few EU member states which had before MiCA's establishment outlined crypto-asset's legal status before its enactment, Germany faced no serious compliance challenge when it implemented MiCA (Koç, 2025).

In addition, German academic debate has increasingly focussed on security tokens and Initial Coin Offerings (ICOs). Even though security token classification in the framework of securities law is regarded as a beneficial step towards investor protection, critics assert such regulatory action would hinder innovation and limit the development of new forms of financing. (Zetsche, Buckley, Arner, & Föhr, 2019).

3.3. Regulation of Crypto-Assets in Turkey

A study of the Republic of Turkey shows that its crypto-asset regulatory framework was drafted at a later period in comparison with global trends even though it had gained tremendous pace in recent years. Its first significant legislation was introduced by Central Bank of the Republic of Turkey on April 16, 2021, in its version referred to as the "Regulation on the Prohibition of the Use of Crypto-Assets in Payments". Such legislation forbade the utilization of crypto-assets for paying purposes while leaving their utilization for investment and

buying/selling purposes unregulated. As a result, crypto-assets utilization in paying mechanisms was put in a state of restriction while their characterization as an "investment instrument" became a matter of controversy (Külekçi, 2020).

A significant supervisory measure in 2024 was Law No. 7518, referred to as the "Law Amending the Capital Markets Law and Certain Other Laws." Such a piece of legislation creates the first holistic framework expressly including crypto-assets in Turkey's laws. It establishes a definition for a "crypto-asset" as an incorporeal asset which is formed, transferred, and stored on digital networks, and it imposes a licensing requirement for crypto-asset service providers (brokers/exchanges and platforms), which are subject to supervision by the Capital Markets Board (SPK) (Koç, 2025).

Furthermore, Turkey, through the Financial Crimes Investigation Board (MASAK), has imposed reporting requirements for suspicious transactions involving crypto-asset businesses in its anti-money laundering and terrorism financing campaign. Such a policy is an exhibition of compliance with the FATF's international standards (Gençcelep, 2022).

Yet a close look at the Turkish regulatory framework reveals that specific guidelines for classifications of tokens, non-fungible tokens (NFTs), and applications for decentralized finance (DeFi) are still lacking.

3.4. Regulation of Crypto-Assets in North Macedonia

In North Macedonia, the regulatory framework for crypto-assets remains underdeveloped and fragmented. Precisely, crypto-asset legal status is still unclear. So far, there is no promulgation of legislation dealing specifically with cryptocurrencies or even tokens. Nevertheless, crypto-asset-related activity is subject to some level of supervision in a framework integral to greater financial marketplace regulations. We find both the Central Bank and also the Financial Intelligence Office having highlighted for North Macedonia crypto-asset transaction issues concerning risks for money laundering as well as those of terrorism financing; still, a clear legislative framework is not yet in place for reducing such risks (Ristoska & Veternik, 2022).

Exchanges and crypto-asset service providers neither enjoy direct licensing powers in the country at present. As a result, business operations are primarily carried out through overseas platforms, which does not provide effective protection for local users. Although some court decisions have shown hints at crypto-assets representing "property

value" in private law relationships, such an assumption is not yet legalized in statutory law.

As the state continues towards its EU membership path, inclusion of MiCA provisions in national legislation seems certain. As a result, crypto-assets' future legislative status in North Macedonia shall largely depend upon their compliance with EU legislation.

4. LEGAL CHALLENGES AND REGULATORY DIFFICULTIES

4.1. Uncertainties in Definition

As identified above, one key concern for crypto-asset legal status is related to confusion over their classification. Cryptocurrencies are defined in some jurisdictions as "securities," while in some jurisdictions, they remain treated no more than "digital assets" or even "property value." Such divergence creates a lot of risks for investor protection and can cause problems of conflict of laws in international transactions. (Külekçi, 2020; Özsoy, 2019).

4.2. Risks of Money Laundering and Terrorist Financing

The anonymous/pseudonymous and borderless nature of crypto-assets has unfortunately also rendered them appealing tools for terrorist financing as well as for money laundering. Consequently, regulatory agencies have attempted to enhance AML/CFT controls, yet are frequently unable to maintain abreast of the swift evolution in technologies (Gençcelep, 2022).

4.3. Taxation Issues

Although there is an ever-growing economic value in crypto-assets, there is no consistent framework for their taxation. Ambiguity in their classification in a judicial setting directly impacts taxation mechanisms employed. In certain nations, gains realized in crypto-assets are regarded as income tax whereas in certain such gains are regarded as capital gains; further in certain jurisdictions even cryptocurrencies are regarded as commodities or currency. These distinctions render investors unsure about which regulations apply and lead towards a loss in revenue in taxes for administrations (Oral & Yeşilkaya, 2021).

At the global level, international organizations like the OECD and the EU were involved in drawing up standards for crypto-asset taxation while placing a particular focus on tax compliance in transactions involving a crossing of borders. There is a need for

plugging in tax legislation gaps not only in national laws but also in worldwide cooperation.

4.4. Investor Protection and Market Stability

The high volatility inherent in crypto currency markets in combination with unregulated operations in certain platforms creates serious risks for investors. Specifically, fraudulent schemes and manipulation in the financial markets, such as those involving "pump and dump" schemes, undermine investor protection. These risks highlight why institutional frameworks for investor protection should strengthen their mechanisms while stabilizing their financial market. (Koç, 2025).

4.5. The Technology–Law Conflict

The immutable and indelible nature of blockchain technology directly conflicts with data protection laws. For example, the "right to be forgotten" enshrined in the European Union's General Data Protection Regulation (GDPR) and Turkey's Law on the Protection of Personal Data (KVKK) is incompatible with blockchain's permanent records (Özer, 2020). This illustrates the broader challenge of reconciling technological innovation with fundamental rights, highlighting the need for comprehensive regulatory frameworks across jurisdictions.

5. CONCLUSION

In recent years, technological developments have brought about profound shifts in the financial sector. Innovations such as virtual currencies, digital currencies, cryptocurrencies, tokens, blockchain technology, and artificial intelligence emerged. The regulatory framework for such and further financial technologies (FinTech) is a constantly evolving field characterized by rapidly changing developments. As legislation generally lags behind technology advancements, detection of issues and enactment of preemptive measures often takes ample time.

Crypto-assets represent one of the most consequential advancements within the financial system. Nevertheless, the ambiguity surrounding their legal classification, regulatory structures, and the varying methodologies employed by different nations has resulted in considerable uncertainties. The European Union has attempted to mitigate these issues through the implementation of the MiCA Regulation, which is designed to create standardized regulations while emphasizing the protection of investors and the integrity of the market. Germany, recognized as one of the pioneering regulators in this domain, took the initiative by categorizing crypto-assets as "financial instruments" via BaFin, thus establishing a

framework that is largely congruent with MiCA. Turkey, having initiated a partial prohibition in 2021, enacted a comprehensive regulatory framework in 2024 with the passage of Law No. 7518. In contrast, North Macedonia has yet to formulate specific regulations pertaining to crypto-assets; however, as an EU candidate nation, it is anticipated to conform to MiCA in the foreseeable future. The examples of the EU, Germany, Turkey, and North Macedonia exemplify four distinct approaches to regulatory development, all encountering similar obstacles. This analysis unequivocally underscores the necessity for cohesive and uniform regulations within this sector.

Regulation is hindered significantly by definitional uncertainties, money laundering and terror financing risks, tax problems, investor protection loopholes, as well as technology versus law conflicts. These issues, which sprang up with the development and consumption of crypto-assets, are best addressed internationally rather than by national regulations. They are best solved by international cooperation and harmonization such as regional regimes in the form of the EU's MiCA or universal standards such as those set up by the FATF.

The direction in which crypto-assets are headed in the future is heavily dependent upon regulatory approaches favored. To effectively foster innovation while at the same time protecting investor rights, a balanced framework needs to be developed. Without such a balance in place, there are risks for either choking innovation in technology or putting investors at severe risk. As a result, a proper balance between legal security and technical progress which is just, flexible in nature, and sustainable needs to be considered an overarching legal and political objective for the times ahead.

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