



NEW FORMAT OF SECURITIES: SECURITIES REGISTERED IN DISTRIBUTED LEDGERS AND THEIR REGULATION IN CERTAIN EUROPEAN COUNTRIES

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ABSTRACT

Like many other subject areas, technological progress is also transforming the world of securities. New technological solutions and opportunities may lead to the emergence of new institutions, including new legal institutions. The distributed ledger technology enabling the operation of well-known cryptocurrencies is – among many other things – a tool suitable for the registration of securities; although it has not yet become widespread, some countries have already established the legal framework for its application. This study presents a comparative analysis of existing European regulatory solutions to demonstrate the options available for establishing an effective regulatory framework for securities recorded on a distributed ledger and the benefits of introducing such a securities registration system from both a regulatory and a practical perspective.

KEYWORDS Securities; distributed ledger technology; crypto-assets

1. The Appearance of Securities Registered in Distributed Ledgers

Besides securities issued in the form of well-known paper-form instruments or electronically stored data (in dematerialised form), a new form of securities is emerging in a growing number of European countries: securities registered in distributed ledgers. For most people, distributed ledger technology (DLT) is a notion associated with the registration of crypto-assets, but it is a technology that can be used not only for crypto-assets but also for recording and registering other data, and can therefore also be used for the registration of securities.

The EU first introduced rules for securities issued via distributed ledger technology (DLT securities) with a 2022 amendment to the MiFID Directive. This

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was implemented by the DLT Regulation, which establishes a pilot regime for market infrastructures using DLT.

Although the European Union regulates various aspects of securities law, from the issuance of securities (Prospectus Regulation) to market infrastructures (CSD Regulation) and the regulatory measures against market abuse, it has not yet adopted a comprehensive set of provisions governing securities law, and there is currently no uniform European substantive securities law and no uniform European definition of securities. As a result, the legal definition of securities falls within the competence of the Member States, which have broad autonomy in determining the regulatory framework for substantive securities law. Most Member States, including Hungary, have not yet taken any real steps to regulate DLT securities beyond the basic technical requirements of transposing the aforementioned amendment to the MiFID Directive into their own legal systems.

Although Hungarian securities law does not yet allow securities to be issued on DLT, several European countries – including Germany, Switzerland, Liechtenstein, Luxembourg, Spain, and France – have already paved the way for doing so. Market participants have responded positively to the possibility of issuing such securities. One of the first major DLT bond issues was undertaken by the European Investment Bank (EIB) in 2021. The EIB's first digital bond has been followed by an increasing number of issues on the capital markets of Member States. According to the German Financial Supervisory Authority (BaFin), a total of 277 DLT securities had been issued in Germany by March 2026. An official list of issued and registered DLT securities is published on BaFin's website.

Despite developments in European legislation, similar regulations have not yet been introduced into the US legal system, which regulates the world's pre-eminent capital market.

The aim of this paper is to present aspects and explore existing regulatory examples that may be relevant to legislators in Member States that have not yet established their own regulatory frameworks. In addition to dogmatic analysis, the study primarily employs a comparative method, analysing regulatory examples that apply the most divergent solutions. Due to space constraints, it was not possible to present all regulatory examples.

2. The Distinction between Crypto-Assets and DLT Securities

Within the sphere of crypto-assets, there are several different types of tokens, depending on their purpose:

- a. *Payment tokens* – often referred to as cryptocurrencies – function as a means of exchange or payment and are intended to be used for the payment of goods and services and the execution of payment transactions. (In addition to this basic function, they are also often used for reserve accumulation.) Some sources refer to these tokens as “virtual assets for payment” (Veres, 2023). Their payment value is not based on any obligation, but on the value judgment of the user community according to the rules of market supply and demand. Payment tokens are not equivalent to electronic money. The most typical examples are Bitcoin, Ether, Ripple, Litecoin, and Monero.
- b. *Investment/security tokens*, as their name suggests, are similar to conventional securities in that they grant the holder the right to a future share in the issuer's profits, a fixed payment, and/or voting rights. An investment token presumes an issuer who issues the token in exchange for a claim against it. Such a right or claim may be against the issuer or a third party, e.g. a credit relationship, or a share in capital, profits, or income, voting rights, or rights of disposal over assets.
- c. *Utility tokens* provide immediate or future access to a service or product (or a claim for a product or service), and their value is essentially dependent on the value of this access right. They typically lack a general exchange function, do not confer ownership rights, but are transferable and can be used as a means of payment, thus most closely resembling a coupon or voucher. Utility tokens do not generally function as a means of payment, but rather only in the relationship between the issuer and the user, and therefore cannot be considered money.
- d. *Hybrid tokens* are crypto-assets that incorporate multiple features of utility, payment, and security tokens (Sajnovits & Wilhelm, 2024).
- e. *Non-fungible tokens* (NFTs), which are unique and cannot be substituted by other crypto-assets, include digital artworks and collectables, as well as non-fungible crypto-assets representing unique services or tangible assets, such as product warranties or real estate (Breszkovics, 2025).

The aforementioned list demonstrates that the world of crypto-assets displays an extremely diverse picture. While payment and utility tokens are clearly not analogous to securities, security tokens – and, in certain cases, hybrid tokens – exhibit many similarities. The question is therefore whether there can be a crypto-asset that qualifies as a security in the legal sense, and, if so, which regulatory regime should be applied.

In addressing this question, the US Securities and Exchange Commission (SEC) focuses on whether a digital asset based on distributed ledger technology qualifies as a security under US federal securities law². The SEC and the courts use the test developed in the *Howey* case (*SEC v. W.J. Howey Co.*, 1946) to determine whether an asset is a security.

The test evaluates not only the legal form and contractual terms of the instrument, but also its substantive characteristics. If an instrument qualifies as a security, it must be registered with the SEC, and various information relating to the security and its issuer must be submitted to the SEC. The elements of the *Howey* test are as follows:

- a. Is money being invested?
- b. Is the investment made in a common enterprise in which investors share a common risk?
- c. Is the investment made with a reasonable expectation of profit?
- d. Does the profit depend on the efforts of others?

In the European Union's legislative framework, a comparison of the MiCA Regulation on crypto-assets and their markets and the MiFID Regulation on financial instruments and their markets clearly demonstrates that, apart from technological differences, the structure and content of these regulations are similar in many respects, and there are also significant overlaps in certain basic regulatory elements. It is therefore necessary to clarify when the instruments in question fall within the scope of the respective regulations and, depending on this, whether the MiCA or MiFID regulatory framework applies to them.

The starting point for this distinction is the basic EU crypto regulation, the MiCA Regulation, which covers asset-referenced tokens, e-money tokens, and other tokens (collectively referred to as crypto-assets), but does not apply to crypto-assets that qualify as financial instruments (in particular transferable securities) under MiFID (MiCA Regulation, Article 2(4)(a)). At the same time, in capital market regulation, the MiFID Directive has recognized distributed ledger-based financial instruments since 2023.

Consequently, the regulatory background applicable to different types of instruments can be defined as follows ([Wittinghofer & Lorenz, 2024](#)):

- a. traditional transferable securities issued as paper-form instruments or in dematerialized form are clearly subject to MiFID and related securities law regulations, as has been the case to date;

² In particular: Section 2(a)(1) of the Securities Act of 1933, Section 3(a)(10) of the Securities Exchange Act of 1934, Section 2(a)(36) of the Investment Company Act of 1940, and Section 202(a)(18) of the Investment Advisers Act of 1940.

- b. the regulatory framework for crypto-assets is provided by the MiCA Regulation;
- c. transferable DLT securities, characterised by the fact that they are based on the same technological background as crypto-assets, but are securities and therefore excluded from the scope of the MiCA Regulation (Article 1(4)) and subject to securities law regulations;
- d. securities tokens, although they appear to be crypto-assets, are also subject to securities law if they are classified as securities under the law of the place of issue ([Marjosola, 2021](#)), unless the token does not represent a property right but only other rights, such as voting rights ([Zickgraf, 2020](#));
- e. unique crypto-assets (e.g. NFTs) are outside the scope of the MiCA Regulation, and the applicability of securities law must be assessed on a case-by-case basis.

Based on these considerations, it can be concluded under both the European Union and US regulatory systems that instruments that fully possess the characteristics of a transferable security, even if issued in tokenized form, should be considered securities rather than security tokens (crypto-assets). This regulatory constraint severely limits the spread of security tokens to those countries whose legal systems allow the issuance of security-like tokens in parallel with, or in place of, securities that otherwise have the characteristics of securities.

3. The Value Added of DLT Securities

The issuance and use of DLT securities would considerably simplify the complex financial processes associated with the holding and trading of securities. Among their many advantages, it is worth highlighting the easy traceability of the ownership position of individual securities and of trading transactions related to securities, not only by service providers but also by investors and customers.

Easy traceability helps to reduce insider trading and prevents many other types of malpractice (e.g. backdating transactions).

The use of distributed ledger technology enables faster – almost instant – and cheaper settlement of securities transactions. Faster settlement also reduces the risk associated with transaction execution by reducing the counterparty's solvency risk, which in turn may lead to a reduction in the need for transaction collateral and its ongoing maintenance.

DLT securities also enable transactions to be executed within the framework of so-called smart contracts, which can result in the automatic execution of

transactions, the automation of interest, dividend, and other yield payments, and the automatic payment of collateral in the event of insolvency.

From a supervisory perspective, the possibility of automated data reporting and collection could be a particularly advantageous development (Seretakis, 2019).

4. Regulatory Challenges for DLT Securities

The EU regulations adopted so far do not regulate financial instruments issued via distributed ledgers or other trusted technologies (but regulate only the related services, activities, and market infrastructure, and even these only on a pilot basis). The regulation of such instruments remains within the competence of the Member States, so it is appropriate to review the relevant national regulations and identify regulatory similarities and disparities.

A general requirement for regulation is to adapt to the opportunities offered by modern technologies and to enable the widest possible use of them. Given that the technological landscape is evolving continuously and at an unprecedented pace, the legislature must create a regulatory framework capable of keeping pace with technological innovations.

The development of a technology-neutral regulatory framework is a fundamental factor, in line with the relevant UNIDROIT Principles on Digital Assets and Private Law (UNIDROIT, 2023), which does not consider distributed ledger technology to be the only and exclusive option among financial innovation solutions. As technology evolves, a number of as-yet-undeveloped technological solutions may emerge that could serve as a secure backbone for the functioning of capital markets. The legal regulatory framework must define the requirements for both known and still unknown solutions in order to allow their application.

The foundation of the capital market's operation is the trust of investors. Since the trust of investors cannot be gained without adequate safeguards, it is essential that regulation ensures this level of protection

- by providing a regulatory environment that offers a secure legal framework on the one hand, and
- by establishing a supervisory system that ensures the integrity, transparency, and proper functioning of the securities market, on the other.

It is essential to establish an interoperable technological and regulatory environment for different developers and government regulations in order to ensure the functioning of the global capital market.

In the European Union, the CSD Regulation already mandates issuance in dematerialized form for transferable securities (which, in practice, is no longer a

novelty in most cases). Some Member States (e.g. Germany, Luxembourg, Spain, and France) have combined this mandatory regulatory transition with the creation of a regulatory environment for DLT securities.

5. Examples of Certain State Regulations

The regulatory examples presented are not exhaustive in the sense that, in addition to the examples detailed below, other countries also have similar regulatory solutions.

5.1. German Regulation

In Germany, the Electronic Securities Act (eWpG) was adopted by the Federal Parliament in 2021. Its scope originally covered only debt securities (bonds), but was extended to shares two years later by the *Zukunftsfinanzierungsgesetz*. The Act is a significant step forward in the development of German securities law, creating a new form of securities through the general regulation of electronic securities.

Under the Act, the issuance of securities as electronic securities is an option, a right, and not an obligation (eWpG, art. 2(1)).

The Act regulates and distinguishes between two basic types of electronic securities:

- centrally registered (dematerialized) securities, and
- crypto-securities.

An electronic security is classified as a security in the same way as a security issued in traditional certificate form; it possesses all the elements of the traditional concept of a security, but instead of a physical (certificate) form, it appears as an entry in an electronic registry.

Based on the two types of electronic securities, the eWpG differentiates between two different securities registration systems. Centrally registered securities are recorded in a central registry (at a custodian institution or central securities depository), while crypto-securities are recorded in a crypto-securities registry. These two systems are not hierarchically linked to each other; neither can be considered legally stronger or weaker than the other, and both have equal probative value, with the common goal of ensuring the publicity and transparency of securities. Electronic securities cannot exist outside these registries. Both types of registries are private and non-public registries (Szilágyi, 2023).

The crypto-securities registry operates as a decentralised registry system – not managed by any central institution – that is tamper-proof, forgery-proof, and

deletion-proof. This system must ensure that the recorded data cannot be modified or deleted retroactively. The crypto-securities register may be kept either by the issuer itself or by a service provider commissioned by the issuer. The crypto-securities register qualifies as an investment service under the German Banking Act (*Kreditwesengesetz*, KWG), and for this reason, a supervisory licence (from BaFin) is required for the provision of this service. It is crucial to note that the crypto-securities register is considered an investment service only under German law; it is not included among the activities subject to mutual recognition as defined in the CRD Directive.³

To ensure the public disclosure and transparency of crypto-securities, the issuer is required to publish a statement on the issuance of crypto-securities – containing the information specified by law – in the *Bundesanzeiger* and to notify BaFin, which publishes a public list of these securities on its website (eWpG, art. 20).⁴

A key difference between the central securities register and the crypto-securities register, from the perspective of securities trading, lies in the fact that only securities held in the central securities register may be entered into the securities settlement system (eWpG, art. 12(3)), which implies that only centrally registered securities may be traded on the stock exchange. Crypto-securities are also negotiable securities, but as securities outside the settlement system, they may only be traded on over-the-counter trading platforms (e.g. MTFs).

The eWpG does not introduce a new type of securities instrument, unlike, for example, the Swiss approach, but retains the traditional conceptual framework of securities law and designates and treats electronic securities (both types) as securities alongside securities appearing in traditional paper certificate form. The German legislature also refrained from adopting the Liechtenstein-style general and comprehensive regulation of tokens (Casper, 2021).

An electronic security has the same legal effects in terms of property and obligations as a traditional certificate-based security and, by virtue of a legal fiction, it is considered a security – and, pursuant to Article 90 of the German Civil Code (BGB), a thing – despite having no physical form and despite the fact that its substantive basis consists of an entry in a registry. In other words, an electronic security is considered a normative thing (Szilágyi, 2023).

The German legislature's goal was to create technology-neutral regulations (Lieder, 2024); thus, terms such as “blockchain” do not appear in the regulatory framework.

³ Annex I – List of Activities Subject to Mutual Recognition

⁴ The *Bundesanzeiger* (Federal Gazette) is the official publication medium for legal and statutory announcements in Germany, issued by the Federal Ministry of Justice.

5.2. Swiss Legislation

In Switzerland, according to Art. 965 of the Swiss Code of Obligations (*Obligationenrecht*, OR), a security is the physical instrument to which a right attaches in such a manner that it may not be exercised or transferred to another without the instrument. The transfer of ownership of a security always requires the transfer of possession of the instrument, meaning that the right embodied in the security can be transferred as a tangible thing (OR, art. 967). The novelty of dematerialized securities lies in their lack of physical incarnation, and their comprehensive regulation took effect in 2008 through the *Bucheffektengesetz* (BEG).

The central umbrella term in Swiss securities law is the “Effekt”, which encompasses both securities in certificate form (*Wertpapiere*) and property rights that do not qualify as securities (*Wertrechte*). Under applicable law, the Financial Services Act (FIDLEG) defines the scope of the term “Effekt”, which includes:

- standardised certificated securities (*Wertpapiere*);
- uncertificated securities (*Wertrechte*), in particular uncertificated securities in accordance with Article 973c of the OR and ledger-based securities (DLT securities) in accordance with Article 973d of the OR;
- derivatives; and
- intermediated securities (*Bucheffekte*),

which are suitable for mass trading.

Under Swiss law, a traditional dematerialized security is therefore referred to as a “*Bucheffekt*”, which is a security-like instrument that represents rights in value (e.g. a claim, membership rights) through registration – by crediting a securities account – without the issuance of a physical certificate. Under Swiss regulations, therefore, the issue is not approached by regulating securities issued in physical and dematerialised forms, but rather by retaining the concept of a security for physical certificates and, in addition, creating another concept that grants the same rights to the holder without the issuance of a tangible document. The BEG does not mandate the dematerialization of securities; it merely creates the opportunity for it.

The further development of the system for non-certificated securities was implemented in 2020 through a comprehensive legislative measure, when the Swiss Parliament adopted the DLT Act (*DLT-Gesetz*), aimed at aligning regulatory elements with the development of distributed ledger technology, thereby enabling the issuance of ledger-based securities.

Contrary to German legislation, ledger-based securities (DLT securities) are, under the Swiss Code of Obligations (OR), instruments similar to securities:

electronically recorded, non-replicable and non-manipulable instruments registered on distributed ledger technology. Although they are not considered securities under private law, they are classified as securities under Article 2 of the Financial Market Infrastructure Act (*Finanzmarktinfrastukturgesetz*, FinfraG). Contrary to its German name, “*Registerwertrecht*” is not a right, but it fulfils the same functional role and may represent the same rights as a security in certificate form.

A DLT security is created upon entry in the registry (securities ledger / *Wertrechtregister*) and can be transferred only through this ledger. Any right capable of being issued as a security can also be issued as a ledger-based security (DLT security), which allows for the creation (issuance) of claims, membership rights, and property rights. The securities ledger or registry enables transfers of securities without the involvement of a separate intermediary.

The securities ledger or registry must meet the following requirements (OR, art. 973d(2)):

- it uses technological processes to give the creditors, but not the obligor, the power of disposal over their rights;
- its integrity is secured through adequate technical and organisational measures, such as joint management by several independent participants, in order to protect it from unauthorised modification;
- the content of the rights, the functioning of the ledger, and the registration agreement are recorded in the ledger or in linked accompanying data;
- creditors can view relevant information and ledger entries, and check the integrity of the ledger contents relating to themselves without intervention by a third party.

Similar to German legislation, Swiss regulatory provisions are technology-neutral; however, given the current state of technology, only ledgers based on distributed ledger technology are capable of meeting these requirements. The regulations do not, however, preclude the use of other technologies if they meet the above requirements.

Unlike the German eWpG regulations, Swiss regulatory requirements do not consider ledger-based securities (DLT securities) to be a tangible asset, but they do require that the ledger or registry grant rights of disposal over ledger-based securities to the entitled parties (OR, art. 973d(2)(1)). A further difference between the two systems is that, while German regulations require a supervisory licence for the keeping of the crypto-securities register, the Swiss system sets out only the basic requirements for registries and ledgers.

5.3. *Spanish Regulatory Framework*

In Spain, the Law on Securities and Investment Services adopted in 2023 (LMVSI) incorporated numerous new elements into securities law, thereby creating the possibility of issuing DLT securities. According to the preamble of the law (LMVSI, Section II), the definition of financial instruments is being amended to clarify, without legal ambiguity, the possibility of issuing financial instruments using distributed ledger technology. The law has incorporated DLT securities into the general framework of securities law, without creating a separate legal category or independent regulation for them. Spanish regulations also adopt a technology-neutral approach.

Article 6 of the LMVSI specifies that transferable securities may be issued as securities certificates, dematerialized securities, and DLT securities; however, only dematerialized and DLT securities may be admitted to trading on trading systems. The legal status of DLT securities is equivalent to that of securities issued in the form of certificates or as dematerialized securities recorded in a securities account. Furthermore, the law does not impose any restrictions regarding the types of securities that may be issued on a distributed ledger.

The Act requires that, in cases where the issuer uses systems based on distributed ledger technology to record negotiable securities, such systems must ensure the integrity and immutability of issuances executed through them, and they must directly and indirectly identify the holders of transferable securities, as well as the characteristics and number of such securities. Holders of securities registered in systems based on distributed ledger technology must be granted access to all information relating to the securities and to transactions involving the securities.

DLT securities become securities upon their initial registration in these systems and are transferred to the ownership of the issuer or the securities' registrars. The transfer of these securities takes place through the registry (LMVSI, art. 11).

The law makes it explicit that the Spanish Securities Market Authority (*Comisión Nacional del Mercado de Valores*) also has supervisory authority over organizations responsible for managing the registration and record-keeping of securities that operate using systems based on distributed ledger technology (LMVSI, art. 232).

5.4. *Liechtenstein Approach to Tokenised Securities*

The regulatory framework in Liechtenstein differs in several aspects from the previously analysed legislative schemes. It is based on the Law on Tokens and Trusted Technology Providers (TVTG), adopted in 2020, whose regulations aim

to provide a comprehensive and technology-neutral framework for market participants regarding token-related services (not merely in a financial sense).

One of the fundamental terms of Liechtenstein's regulatory framework is the "security", as defined by the Act on Persons and Companies (PGR). Similar to Swiss rules, Liechtenstein's regulations (cf. Art. 267 of the PGR) are based on securities issued in certificate form; however, they also allow the issuance of securities without a certificate, though unlike Swiss regulations, they do not create a separate concept or category of securities law for this purpose (Layr, 2021).

An additional fundamental term in the legislation is the "token", which the TVTG defines as information stored on a reliable technological system and which:

- may represent a claim or membership rights against a person, rights related to property, or other absolute or relative rights; furthermore,
- is associated with one or more trusted technical identifiers (keys).

Any right may be tokenized, with the exception of rights linked to a person. Based on the definition of a token, Liechtenstein's regulations do not distinguish between crypto-assets and DLT securities as defined by EU law, but instead apply the broad concept of a token to both. The issuance and trading of any token, as well as related services, may take place in accordance with the TVTG. Within this framework, tokenized assets may therefore be either crypto-assets under the MiCA framework or financial instruments under the MiFID Directive, with the distinction that tokenized securities are subject not only to securities law regulations based on and fundamentally consistent with EU regulations but also to the provisions of the TVTG.

Under Liechtenstein's property law, similar to Swiss law and unlike German law, the concept of "tangible property" does not extend to tokens and tokenized securities (cf. Art. 20 and Art. 171 of the SR).

6. Conclusion

Regulating the issuance, registration, and trading of DLT securities offers several benefits to all participants in the financial markets. These benefits serve to protect the interests of both retail investors and non-retail clients.

For issuers, this constitutes a new, innovative fundraising tool; for investors, it is an efficient, fast, and secure form of investment. One of the most remarkable advantages for both sides is the fast, even instant, settlement of transactions. While the settlement period for traditional securities transactions is currently T+2 days under the CSD Regulation (T+1 day as of 2027), the use of distributed ledger technology enables instant, real-time settlement.

Although the distributed ledger-based registry also operates in a digital environment, the data in this registry cannot be multiplied or manipulated.

In the case of DLT-based securities, a further benefit is that the number of intermediary institutions (registrars/custodians) is reduced, as their functions are taken over by the ledger itself. For the same reason, there is no need for a central securities depository. As a result, transaction costs can also be reduced. Reducing the number of parties involved in transaction processing also reduces the potential for errors.

The use of reliable technological solutions – due to the transparency of the registry system and the immutability of the records created (e.g. blocks) – also reduces the risk of intentional fraud.

Whereas the concept of a security is not defined in EU law, it is possible to determine on a case-by-case basis, based on the substantive securities laws of the Member States, whether a particular asset is to be considered a crypto-asset or a security recorded on a distributed ledger. Until the concept of a security is defined at the EU level, distinguishing between specific cases will remain challenging. Considerable differences can be observed among Member States' securities laws even on fundamental issues, such as whether the legislation provides a definition of a security or whether a tokenized security qualifies as a tangible asset.

Except for a single sentence of the Investment Firms Act (Bszt., art. 6), the Hungarian legal system does not provide regulations for DLT securities. Although the Bszt. permits the provision of services and trading in Hungary related to such financial instruments issued in other countries, their issuance is not currently permitted under Hungarian law, and Hungarian law does not regulate the framework for keeping records of them either.

This regulatory gap represents not only a legal constraint but also a competitive disadvantage, as companies wishing to issue such securities or other financial instruments in order to take advantage of the benefits described above are forced to do so in another country where the legal framework exists. Legal barriers and regulatory gaps thus hinder the development of the domestic capital market, despite the fact that the issuance of DLT securities would entail numerous legal and economic benefits.

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