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CHAPTER 8 TOKENIZED ASSETS AND SECURITIES

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ABSTRACT

Tokenization is a relatively new activity in digital finance. The standard features and characteristics of assets and securities can be enhanced by *tokenization*, a process that creates a blockchain representation of the underlying instrument. Asset and security tokenization produces many benefits. These benefits include reducing issuance and trading costs, lessening dependency on intermediaries, facilitating more liquidity in markets, and providing greater transparency around an asset's lifecycle for all parties involved. This chapter synthesizes the key characteristics, benefits, processes, tools, and techniques of tokenizing real-world assets. It also provides several examples of current asset-backed token applications to help understand the rapidly growing industry and analyzes future expectations of this new technology.

INTRODUCTION

Traditional asset classes include equities, fixed income, and cash. Alternative assets are other assets such as real estate, hedge funds, private equity, commodities, and infrastructure. As a result of blockchain technology, most traditional assets, both physical and digital, can be "tokenized." Therefore, a token can represent instruments such as stocks, bonds, real estate, consumer loans, and even art.

Tokenization is how public or private blockchain networks can digitally represent assets, services, or activities. The resulting tokens are identifiable, attributable, immutable, transferable, and traceable in their native blockchain

environment. Each token could have its programming code, internal rules, and be subject to different legal regimes. Occasionally, tokens have a governance system established in the code, making them predictable, scalable, automatic, and adaptable to changes in the environment. Using transparent information sources based on blockchain technologies, they can generate efficiencies and improve liquidity, trust, and traceability. Although a token is a digital representation in a blockchain network, it can connect and interface with non-blockchain information through "oracles*."* An *oracle* is an application designed to safely and reliably extract, process, and incorporate external information onto a blockchain. Consequently, it allows smart contracts and tokens to use non-blockchain information on their programming.

Tokenized assets and securities are independent and fundamentally different from cryptocurrencies, utility tokens, and security tokens. The latter represents various forms of value generated within a blockchain network and inseparable from their digital representation. By contrast, tokenized assets and securities are digital representations of assets and securities outside the blockchain infrastructure. Tokenized instruments are linked and completely dependent on their off-chain underlying assets. Therefore, they maintain core intrinsic characteristics and gain new elements and features from blockchain technology.

Among the benefits of tokenizing traditional assets, the most salient are increased efficiency and reduced cost, enhanced transparency and security, better compliance and traceability, improved liquidity, and facilitated innovation. Some benefits, such as transparency, security, and traceability, derive directly from the underlying blockchain infrastructure. Others such as efficiency, compliance, liquidity, and innovation arise from the possibility to create smart contracts and build ecosystems using blockchain infrastructure.

Several industries have already implemented asset and security tokenization projects. The chapter discusses applications in the financial sector (Santander

Bank/tokenized bonds), real estate (Reental/tokenized rental properties), and commodities (Agrotoken/grains).

Regarding the blockchain and distributed ledger technology (DLT) used for tokenizing assets, understanding the differences between blockchain-based tools and platforms is essential. Each blockchain platform, such as Ethereum, Solana, Binance Smart Chain, Polygon, Terra, and Stellar, has different characteristics in terms of cost, security, speed of transactions, traceability, and accessibility. A tokenized asset's best fit with a platform depends on its tokenization purpose and objectives.

The tokenization of assets introduces a new system of representation and property registration and transmission. Therefore, understanding its legal framework, level of development, and future regulatory reforms is critical. The pilot regulatory framework to be implemented in Europe in 2022 and the existing financial sandbox in the United Kingdom, Spain, and other countries are promising initiatives to absorb these innovative global changes.

This chapter has the following structure. First, it describes the concept of tokenized assets and securities and discusses the similarities and distinctions between security tokens. Next, the chapter explores the potential benefits of tokenizing traditional assets and securities. Third, it presents the tokenization process, briefly explores some tokenization platforms, and then presents examples of current tokenized assets and securities projects. Lastly, it discusses future trends in tokenization and concludes.

TOKENIZED SECURITIES

According to Mougayar (2016, p. 24), a *token* is a "unit of value that an organization [or private entity] creates to govern its business model and give more power to its users to interact with its products or services." Tokens can have multiple purposes because they represent product usage rights or ownership rights tied to intrinsic value. They are identifiable, attributable, immutable, transferable, and traceable in the

environments/ecosystem and markets created for them. Each type of token has its programming code and applicable legal regime. Tokens respond to coding and consensus protocols between the parties. Occasionally, they have a governance system established in the code, making them predictable, scalable, automatic, and adaptable to changes in the environment. In contrast to centralized registries, tokens can generate high efficiencies, improve liquidity, trust, and traceability using transparent information sources based on blockchain technologies.

Tokenization is a process or system for storing, registering, and mobilizing tokens representing ownership rights over digital or physical assets or rights over the provision of activities. This process works through DLT systems, permissioned (private DLT) or not (public DLT or blockchain), which function as systems to transmit transparent and valuable information through tokens (Chen 2018; Cong and He 2019). Therefore, tokenization is the process of digitally representing assets, services, or activities in public or private blockchain networks. In other words, owning a token from a tokenized asset is owning all or part of the underlying asset registered on a DLT infrastructure of blockchain.

The owner or investor keeps the representation of the tokenized asset (token) in a private address (wallet). The investor owns the token and usually is its custodian unless a third party provides this contracted service. Investors can transact the token on a peer-to-peer (P2P) basis or through centralized or decentralized marketplaces if rules and regulations on the underlying asset allow.

Tokenization can occur with any asset.

- Traditional financial assets (Yermack 2017; Howell, Niessner, and Yermack 2020; Tian, Lu, Adriaens, Minchin, Caithness, and Woo 2020a; Gan, Tsoukalas, and Netessine 2021; Khan, Kchouri, Yatoo, Kräussl, Patel, and State 2022),
- Real estate (Smith, Manasi, Benedetti, Yoshida and Vogel 2019; Sazandrishvili 2020; Baum 2021),

- Renewable energy, carbon emissions credits, and “green finance” through tokens such as “Climatecoin” (Neves and Prata 2018; Dorfleitner and Braun 2019; Uzsoki 2019; Schletz, Nassiry and Lee 2020), and
- Space resources (Lucas-Rhimbassen 2021).

Some use cases require blockchains to connect, receive, and send information to non-blockchain applications and systems. An oracle is a bridge connecting blockchains to other information environments, whether blockchain-based or not. An *oracle* is an application that monitors, manages, and verifies real-world information on events, people, and identities. This information constitutes off-chain data to which smart contracts initially lack access. Therefore, oracles act as an intermediary that provides the necessary link between real-world data and blockchain ecosystems, providing a trusted data feed to smart contracts. The data feed supplied by oracles to smart contracts enables them to monitor any information affecting the adjacent assets or change of the tokenized asset. This situation allows the automatic and decentralized execution of the programmed code on smart contracts.

Oracles can make smart contracts robust, enabling their application to many different and complex scenarios. Examples of oracles and smart contract interaction include releasing flight insurance payments upon flight cancellation, permitting margin calls on tokenized asset loans upon price changes in traditional asset markets such as the New Yor Stock Exchange, and making payments on smart, automated betting contracts based on the result of sporting events.

For financial transactions, identity oracles can block transactions to and from non-accredited investors from those not subscribed in a *whitelist* (a list of previously vetted and approved investors) or belonging to a blacklist (a list of previously vetted and rejected investors). They can also block certain age groups, such as those younger than 18 and residents from specific countries. Oracles can even restrict transactions to ID-verified users meeting compliance requirements such as know your

customer (KYC), General Data Protection Regulation (GDPR), and anti-money laundering (AML).

Although oracles can safely and reliably analyze real-world events, some threats exist. If the data source outside of the blockchain is manipulated, altered, deleted, or flawed, the smart contract process would be incorrect, due to using incorrect data. not to a coding problem in the smart contract. This issue refers to *oracle risk*. Its resolution requires a transparent methodology and sources, an auditable data trail, and smart contracts relying on consensus-based oracles instead of a single oracle. A consensus-based oracle consists of many distributed and connected oracles. Therefore, it compares many data sources to identify and eliminate outliers and reduce oracle risk.

Although many use the concept of tokenized securities and security tokens interchangeably, important differences exist between them. Tokenized securities and security tokens are digital assets. Both offer benefits over traditional securities, but the difference relies on the underlying asset. Tokenized assets or securities are a digital blockchain-embedded representation of real-world assets or securities. By contrast, security tokens do not represent a pre-existing adjacent asset or security but constitute a newly-created security.

Security tokens are blockchain-native tokens that do not exist outside of the blockchain (Smith, Manasi, Benedetti, Yoshida, and Vogel 2019). Security tokens, also called dative digital securities (NDS) (Lambert, Liebau, and Roosenboom 2021), are uniquely programmable. Each security token can work differently from others, depending on its programmed functions. For example, each can have unique characteristics and ownership rights. Given that security tokens are financial securities, they must initially satisfy stricter levels of regulatory compliance and approvals. Therefore, each security token must be issued, transacted, and processed by the relevant federal securities laws in the jurisdictions where they are issued and marketed. Table 8.1 compares security tokens and tokenized securities.

(Insert Table 8.1 about here)

POTENTIAL BENEFITS OF TOKENIZING TRADITIONAL ASSETS AND SECURITIES

Blockchain technology and tokenization offer great advantages (Chen 2018; Roth, Schär and Schöpfer 2019); Tian et al. 2020a; Garcia-Teruel and Simón-Moreno 2021). Their key benefits include:

- *Increased efficiency.* A benefit of using blockchain technology is reducing the need for intermediaries due to the automatization of certain smart contracts processes. The absence of intermediaries also reduces the time required for settlement and issuance, auditing, transitioning, trading, purchases, and sales. It can also lead to a better product management control among other processes. These benefits are also due to the native tools that blockchain technology offers for speeding up business processes.
- *Reduced cost*. Automation, transparent record-keeping, and reliance on the public internet allow significant cost reductions. Statistics show that blockchain technology can reduce bond issuance costs by up to 90 percent and fundraising costs by up to 40 percent compared to traditional private placement (Cashlink 2020).
- *Increased transparency and security.* Tokenization and blockchain systems offer high transparency. Recording all transactions in a public ledger, stored in a distributed manner worldwide, increases reliability and reduces potential information disputes. Furthermore, the transparent intrinsic nature of blockchain systems permit quick and complete auditing. Tokenization enables absolute traceability of each tokenized asset.
- *Better compliance*. Programming allows including complex compliance requirements into each token created. Smart contracts can automatically verify KYC, AML, age, or specific local requirements compliance on any transaction.

- *Improved liquidity*. Tokenization helps investors efficiently offer their previously illiquid or non-fractionable assets to investors worldwide. Markets allowing higher divisibility and lower prices per unit tend to be more liquid than markets of assets that trade only in large batches (Muscarella and Vetsuypens, 1996). Since tokens can represent a fraction of the tokenized asset, entry barriers for small investors with low investment power diminish (Chang 2020).
- *Facilitated innovation.* Smart contracts are programmable and accommodate the specific requirements of different industries. For example, smart contracts used in tokenized assets can create a fractionalized real estate, liquid revenue share agreements, dynamic exchange-traded funds (ETFs), and other previously unmanageable offerings in the finance industry. Also, blockchain innovation has already proved the enormous potential of this technology in creating new financing methods such as initial coin offerings (ICOs), initial exchange offerings (IEOs), and decentralized finance (DeFi).

Tokenization can transform the market, democratize and globalize investment options, and facilitate innovation opportunities (Yermack 2017; Blémus and Guegan 2020; OECD 2020; Tian et al. 2020a; Tian, Adriaens, Minchin, Chang, Lu, and Qi 2020b). Entrepreneurs and innovators realize they can now tokenize almost any scarce asset (Chen 2018). They can now benefit from these innovations through tokens representing preorders in crowdfunding campaigns and ownership stakes in profit-sharing crowdfunding campaigns (Belleflamme, Lambert, and Schwienbacher 2014; Mollick 2014; Vismara 2016; Rodriguez-Garnica, Gutierrez and Tribo 2022). The combination of traditional crowdfunding settings with blockchain technology has made ICOs emerge (Yermack 2017; Adhami, Giudici and Martinazzi 2018; Momtaz 2019, 2020, 2021; Momtaz, Rennertseder and Schröder 2019; Howell et al. 2020; Gan et al. 2021; Campino, Brochado and Rosa 2022).

Table 8.2 presents the benefits of tokenized assets and securities over traditional assets and securities in different activities and industries. These benefits

include increasing the potential investor base through global distribution of tokens, including retail investors due to the fractionalization of tokenized instruments, enhancing traceability of the underlying instrument, and securely incorporating and storing additional information of the instrument into the token.

(Insert Table 8.2 about here)

THE TOKENIZATION PROCESS

Although the tokenization process might look tedious and obscure, many tools and services facilitate issuers and businesses in the tokenization process. Examples include Polymath, Tokeny, Templum, Securitize, Swarm, Nivaura, Horizon, tZero, Paxos, LiquidShare, Setl.io, Zodia, and Custody. Therefore, the tokenization process becomes simpler and more intuitive due to new tools in this changing environment.

Tokenization processes differ based on the tools used and the tokenization goal or underlying asset (Sazandrishvili 2020; Tian et al. 2020b). The following tokenization steps are common to most assets that a business may want to tokenize.

Ecosystem Assembly

The first step in the tokenization process is analyzing and planning the use or creation of a strong ecosystem of industry specialists for a specific token. Therefore, businesses interested in tokenizing assets should consider the digital asset lifecycle and ensure the proper fit of each piece of the ecosystem. Developers should plan the technical, legal, marketing, business, and financial aspects to satisfy participant needs and ensure the ecosystem is strong enough to cover unpredictable situations by following the smart contract coded rules.

Regarding the ecosystem assembly, two potential approaches depend on the services provided by the ecosystem participants. Some token issuance platforms might offer end-to-end service, an “all-in-one” solution approach. Others follow a “modular approach,” specializing in a few specific services. Issuers partnering with providers offering an “all-in-one” solution approach do not need to find other partners to cover

further ecosystem needs. Issuers with specific needs such as exponential scalability or high customization levels generally prefer a modular approach, assembling an ecosystem of providers.

Examples of participants that can integrate a complete ecosystem follow.

- KYC/AML providers help issuers comply with securities regulation requirements in an automated instead of a traditional manual one.
- Legal service providers assist in submitting regulatory filings and structuring the token offerings.
- Advisory service providers facilitate the relationship between market agents such as buyers and sellers. They can assist in developing a business plan and launching a token offering, token custody, distribution, and the token payment process.
- Marketing service providers develop promotion actions, list the token offering on different platforms, and provide press releases.
- Token sale platforms facilitate primary and secondary token sales.
- Capitalization table management platforms manage company equity and holdings, offer an updated list of token owners, and provide regulatory compliance.
- Custodians safely keep funds and tokens and manage ownership rights attributed to investors. However, many jurisdictions still need to provide clear legislation to deal with the insolvency risks of crypto custodians (Haentjens, Graaf, and Kokorin 2020).

Security Token Creation

The next step after ecosystem assembly is to configure the token to represent the asset. Coding and programming a token's characteristics and the related smart contracts are critical in a successful tokenization process. The token configuration should be simple, intuitive, and transparent regardless of the technology or adjacent

asset type. Therefore, tokenization should avoid introducing complexities but improve traditional processes using technology. Blockchain selection should consider technical capabilities and its provider and user network, especially an oracle's availability to integrate off-chain information and the existence of a user base compatible with the tokenized asset or security.

Compliance Set-up

Automating compliance is crucial to consider during the tokenization process. Enforcing token investors to comply with the changing and complex regulatory environment processes is notoriously costly and time-consuming. Each investor must comply with different securities regulation requirements depending on the jurisdiction where a token is issued and where an investor is domiciled.

Services dealing with meeting ownership and transfer restrictions, fulfilling KYC/AML obligations, and enforcing requirements for future transfers involve continuous development. Automating these compliance requirements is possible because blockchain technology maintains a clear record of procedures and compliance activities for each investor/user in a secure, immutable manner. Blockchain technology also reduces the risk of errors and oversights.

Oracles are essential for restricting token ownership by age, residency, and accreditation (KYC/AML) status, among other identity-based restrictions. KYC and AML providers are not only oracles but also other agents attaching attestations to 'investors' identities. The blockchain includes off-chain information through oracles, becoming on-chain information. Therefore, smart contracts can automatically respond to this on-chain evidence checking and ensure that investors meet all requirements before transferring any token. Automating this process allows investors to automatically comply with all rules and requirements set in each jurisdiction. In summary, a smart contract should set systematic and automatic transfer and ownership restrictions by using previously selected trusted attestation providers.

Token Distribution

Token distribution is the process of transferring tokens to their intended recipients. This process is like a primary issuance and usually proceeds as follows. First, interested investors transfer funds to an entity in charge of the distribution process, usually a broker-dealer. Once the external broker-dealer receives the funds, it requests the custodian holding the tokens to transfer them to the investor's private wallet. Once the investor receives the token, the issuer instantly receives the payment of the retained funds by the broker-dealer. This process resembles the traditional distribution of securities but is cheaper and quicker. It is also more secure due to using a unique, immutable, and public transactions record through blockchain, which is the only source of truth against any agent's complaints. Therefore, the asset distribution process through blockchain technology provides automated, transparent, and reportable transactions during the initial and future token distribution processes.

The token distribution process offers issuers and stakeholders different pricing, minting, control, and custody opportunities. Token distribution allows issuers to set pricing tiers for their tokens depending on arrival orders and market demand. It also allows transferring tokens in exchange for funds in any currency − fiat and crypto − as determined by the issuer. In terms of minting the token, the issuer can pre-establish a list of requirements such as intended recipients or selling restrictions. Record transparency and visibility give substantial control to token issuers and other stakeholders. Finally, issuers and investors can establish a custody service to hold tokens during the token distribution process.

Corporate Actions Execution and Management

Corporate actions are events initiated by public companies that can provoke changes in the securities issued by the company and hence affect stakeholders. Events considered corporate actions include rights issues, voting in annual or extraordinary general meetings, stock splits, coupon payments, dividend distributions, spin-offs,

mergers, and acquisitions. These corporate actions are traditionally complex, costly, labor-intensive, and error-prone.

Using tokenization processes and blockchain technology can simplify these actions. They can also state clear and transparent information and rules on distributing dividends, transparency of token distributions among all stakeholders, and security, so no privileges or errors occur without stakeholders noticing. Therefore, establishing token distribution rules through coding is useful whether the business benefits are predictable (bond payments) or unpredictable (dividend payments. Blockchain technology also helps issuers publicly state announcements and notices on-chain to transmit information efficiently to any investor. It also provides faster report generation. Tokenized shares allow streamlining the execution of stock options contracts, share splits, share exchanges, and other share agreements. Finally, investors can vote on-chain efficiently and transparently during annual meetings and motions.

ASSET AND SECURITY TOKENIZATION PLATFORMS

Various tokenization platforms are available. Some platforms specialize in a particular service of the tokenization process, such as Polymath, offering highly customized services. Private businesses wanting to tokenize specific and heterogeneous asset types often use these companies and platforms. Other companies provide a full-service approach to the tokenization process, such as tZero, including token issuance to a secondary marketplace or exchange and post-trading services, such as custody, clearing, settlement, compliance, and reporting. These companies offer more standardized services, use permissioned technology, and focus on specific asset types. Some providers are a hybrid form, providing primary and secondary market services, such as Securitize. These companies tend to collaborate with partners providing post-trading services. Hence, financial institutions are the primary users of these services.

The following platforms provide services for asset and security tokenization.

- *tZero***.** Created in 2014 in New York, tZero is one of the first companies to tokenize assets. It provides a marketplace where investors can buy and sell private asset-backed tokens. tZero uses Ethereum, Tezos, and Algorand blockchains.
- *ConsenSys Codefi***.** Established in 2017 in New York, ConsenSys Codefi offers many blockchain applications for businesses. Its tokenization application called Codefi Assets operates a secondary marketplace. It uses Ethereum for the tokenization processes.
- *Securitize***.** Starting in 2017 in San Francisco, the company offers full-service covering primary asset issuance to secondary exchange, market trading, and post-trading. It has a secondary market called Securitize Markets, where investors can buy and sell new asset-backed tokens. Securitize has over 200 issuers of crypto-asset and asset-backed tokens and more than 300,000 accredited investors. Furthermore, it is registered as an alternative trading system (ATS) and performs as a licensed broker-dealer by the Securities and Exchange Commission (SECO) and Financial Industry Regulatory Authority (FINRA). Securitize uses Ethereum, Algorand, and Avalanche for the tokenization processes.
- *Polymath.* Founded in 2017 in Toronto, Polymath is an asset tokenization and issuance platform, specializing in creating, issuing, and managing asset-backed tokens. In February 2022, it had tokenized over 200 assets on its platform, worth more than $2.4 billion. The company is developing a permissioned blockchain built for security tokens.

Many evolving options are available in blockchain infrastructure, classified as permissioned and permissionless infrastructure. Some companies prefer using private, permissioned blockchain infrastructure to maintain complete control over the activity. Examples of permissioned blockchain infrastructure are Polymesh and Quorum. Other companies favor using public, permissionless infrastructure, which is usually open-

source and accessible to community developers. Therefore, companies can easily integrate innovations, enabling creating and implementing new applications. Corporations prefer this option because it offers higher innovative tools, services, and applications. Ethereum, Solana, Tezos, and Cardano are permissionless blockchain infrastructures.

CURRENT TOKENIZED ASSETS AND SECURITIES PROJECTS

The following are examples of current tokenized assets projects worldwide.

Reental – Real Estate

High entry barriers and low liquidity characterize real estate investments. Investors usually require large down payments and high credit scores to obtain mortgage financing. In real estate markets, direct ownership cannot be fractionalized among many investors since it requires special investment vehicles with high intermediary and legal costs.

Reental, a Spain-based firm, uses the tokenization process of a participating loan to acquire a real estate investment, with a minimum amount of €100 (Reental 2021). The company rents the property and distributes dividends to token holders every month. After two years, Reental sells the property, receiving capital gains and distributing them among token holders. Furthermore, Reental fractionalizes a real estate investment and increases its liquidity by combining multiple DeFi protocols. These protocols provide liquidity pools for the property-backed tokens so that investors can trade them at market value.

Santander Bank – Debt issuance

In September 2019, Santander Bank issued the first bond issued end-to-end on a public blockchain (Santander Bank 2019). The bond, valued at $20 million, offered 1.98 percent quarterly coupons, which Santander Bank also tokenized. Santander Securities Services acted as the tokenizing agent and custodian. According to the bank, this

process offers increased market transparency, shorter settlement time, increased security, and fewer intermediaries.

Agrotoken − Commodities

Agrotoken is a tokenization ecosystem providing commodities tokenization, trading, custody, wallet, and integration with oracles and third-party applications (Agrotoken 2020). The company currently issues tokens backed by tradable commodities, such as a metric ton of wheat, corn, and soy. Grain producers deposit their product with a custodian, who generates a certificate of deposit and informs Agrotoken. Agrotoken issues or “mints” new tokens equivalent to the deposited amount of grain and transfers them to producers’ wallets. Producers can trade the token in the internal market or P2P. Prices are set by the market and tracked by oracles that connect with commodities markets in the region. Token holders can claim the underlying grain from the custodian, which would lead to a token’s destruction (burning).

SUMMARY AND CONCLUSIONS

Tokenizing real-world assets is a promising phenomenon that can enhance traditional business models from different industries, reducing inefficiencies and expanding value creation potential. This chapter reviews tokenization applied to traditional assets and securities. It also differentiates tokenized securities from security tokens, explores tokenization’s potential benefits, describes steps in the tokenization process, discusses some involved stakeholders, and presents current business applications of tokenized assets and securities.

DISCUSSION QUESTIONS

1. Explain the difference between tokenized securities and security tokens.
2. Describe some tokenization benefits of traditional assets.
3. Explain the steps of the tokenization process.
4. Discuss the importance of oracles in the asset tokenization process.

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Table 8.1 Comparison of Security Tokens and Tokenized Securities

This table compares the key characteristics and features of security tokens and tokenized securities.

Security Token	Tokenized Security
Is a digital blockchain-native asset.	Digital and blockchain-embedded representation of real-world assets.
Represents a newly created security.	Represents a pre-existing underlying asset.
Can have unique characteristics and ownership rights distinct from traditional asset classes.	The underlying security maintains its traditional characteristics and receives additional blockchain-enabled features.
Must comply with all securities laws in the jurisdictions where the security token is issued and marketed.	If applicable, must comply with existing regulations that apply to the underlying asset and additional regulations targeting the tokenized security.

Source: Authors' elaboration based on Smith et al. (2019).

Table 8.2 How Tokenization Benefits Business, Stakeholders, and the Traditional System

This table summarizes the tokenization benefits of traditional assets across different use cases and industries.

	Traditional Assets	Tokenized Assets
Fundraising	● Entrepreneurs may raise funds from angel investors or venture capitalists. ● Entrepreneurs may raise funds from the public through crowdfunding.	● Entrepreneurs can raise funds directly from any investor type worldwide. ● Entrepreneurs can raise funds from the public through ICOs.
Investing	● Average investors have few opportunities to invest in promising early-stage ventures. ● Investors have limited liquidity with private company investments.	● Average investors can have almost equal opportunities to invest in early-stage ventures worldwide through blockchain tokens. ● Investors enjoy almost immediate liquidity with blockchain tokens. They can freely transfer tokens representing an asset.
Real estate	● Low liquidity occurs after making the initial investment. ● High entry barriers. Few investors have enough capital for the initial payment to acquire the property and then obtain a mortgage for the remaining capital.	● Investors experience higher liquidity of traditionally illiquid investments. ● Democratization occurs due to low entry barriers. A small initial investment is enough to acquire the whole or part of a token representing the real estate investment.
Agro-Commodities	● Traceability of products along their lifecycle is complex and prone to falsifications, scams, and errors. ● Production loans are difficult to obtain. ● Intermediaries are necessary to provide the commodity to the final user and prices are opaque. • Preselling commodities occurs for complex security assets like futures.	● Traceability of products is secure, unalterable, and efficient. For instance, livestock lifecycle events result in tracing and efficient pricing. ● Asset-backed tokens collateralize or back production loans. Asset-backed tokens are publicly available in secondary marketplaces to any user and have transparent prices. ● Investors can easily presell asset-backed tokens like a ton of wheat.
Law	● Any transaction or event registration requires a notary and registrar. ● System costs are higher.	● DLT is enough for registering an event to be certified and binding. ● An oracle is cheaper than a notary or registrar for connecting the real world to the asset and token events.
Community Building	● Platforms may appeal to users and third-party providers after achieving strong network effects.	● Platforms can reward early adopters with tokens, compensating for the lack of network effects.

Open Sourcing	● Open-source projects may fund their continued development through donations. ● Open-source projects usually do not share their success with core developers.	● Open-source projects can fund their continued development through token sales. ● Open-source projects can share their success with core developers through tokens

Source: Authors' elaboration of Chen (2018, p. 569).