

Tokenization of assets in the contemporary financial system. Determinants and potential implications

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Abstract: Tokenization is the digital representation of an existing physical or financial asset on a distributed ledger. It refers to the process of recording traditional assets, such as financial instruments, collateral portfolios, or real-world property using Distributed Ledger Technology (DLT). Asset tokenization specifically involves linking or embedding the economic value and legal rights of tangible or intangible assets into digital tokens created on a blockchain. The concept of Tokenomics describes the ability of organizations to design business models and projects based on the creation, distribution, and trading of digital tokens. These tokens can represent both real objects and intangible assets, including cash, patents, copyrights, and other forms of intellectual property. By enabling assets to be converted into divisible digital units, tokenization facilitates fractional ownership and improves liquidity. This procedure is increasingly being applied to a wide range of asset classes, such as real estate, commodities, equity shares, intellectual property, and personal valuables. Blockchain technology plays a critical role in ensuring the security, immutability, and transferability of these tokens. The aim of this research is to examine the key factors that determine the adoption of asset tokenization in the contemporary financial system. The study analyzes the benefits and costs associated with tokenization and explores current developments and anticipated future trends in this field.

Keywords: token, asset, digital asset, blockchain,

Introduction

The process of converting ownership rights to an asset into digital tokens on a blockchain is known as tokenization. This procedure improves liquidity, enables fractional ownership, and offers a more efficient and transparent mechanism for cross-border asset transfers. Tokenization is being applied to a growing range of assets, including real estate, commodities, equity shares, and intellectual property. Blockchain technology is essential for ensuring the security, immutability, and transferability of tokens.

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

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services” is what Mougayar (2016) defines as a token. Because tokens represent ownership rights or usage rights associated with intrinsic value, they can serve a variety of functions. In the ecosystems and marketplaces that have been established for them, they are traceable, unchangeable, traceable, recognizable, and responsible. Every kind of token has a unique programming code and regulatory framework. Tokens react to the parties’ agreed-upon coding and protocols. Sometimes they have a governance structure built into the code, which makes them automatic, scalable, predictable, and environment-adaptable. By utilizing transparent information sources based on blockchain technologies, tokens can produce high efficiency and enhance liquidity, trust, and traceability in comparison to centralized registries.

Tokenization is the process of creating digital tokens that represent digital or real-world assets on a blockchain. A wide range of assets, including tangible assets like real estate, financial assets like stocks and bonds, and even intangible assets like digital art or intellectual property, can be represented by these tokens. Additionally, tokenization provides the opportunity to convert all money in circulation into Central Bank Digital Currency (CBDC), enabling the development of an infrastructure that ensures digital token ownership. The earliest and most effective use of tokenized assets to date is fiat-backed stablecoins. Because they are digitally native, programmable, composable, and provide instant settlement, stablecoins are an improved version of the underlying fiat currency.

Another financial item being tokenized on-chain is debt instruments, such as government securities and business bonds. In 2023, Siemens, for instance, issued an on-chain digital bond. Smart contracts can be used by tokenized debt issuers to automate a number of debt lifecycle processes, including issuance, settlement, interest payments, and maturity. Blockchains provide the unchangeable documentation of ownership and transactions, while automation lowers operational complexity and expense.

Additionally, tokenized debt can be fractionalized, allowing investors to buy smaller amounts of debt securities than they normally might in conventional markets. A wider range of investors can now participate in markets that were previously solely open to authorized or institutional investors because of this fractionalization. Commodities are also subject to tokenization, which converts tangible items such as gold, silver, oil, or agricultural products into digital tokens that signify possession or a claim on the underlying asset. Tokenized commodities that are integrated with real-time data feeds guarantee transparency and traceability, which are essential for confirming the legitimacy and origin of these assets.

Traditionally, commodities have struggled with accessibility and divisibility. By allowing fractional ownership, tokenization solves these issues and makes it possible for a larger pool of investors to become exposed to the asset class without requiring physical handling or storage. Additionally, on-chain trading of tokenized commodities offers round-the-clock market access and lowers the hassle of purchasing, selling, and transferring ownership. Producers seeking more stable

pricing systems and access to international markets, as well as investors and asset managers aiming to diversify their portfolios, profit from this market efficiency.

One of the biggest markets in the world is the real estate sector. Real estate deals take weeks to complete and are extremely illiquid when compared to other assets. Real estate transactions will benefit from tokenization since it will streamline procedures, eliminate pointless middlemen, and reduce entry barriers. Increased liquidity, improved price discovery, and lower transaction costs might result from making assets easier to trade. By including this asset class in their client offerings, asset managers can expand their investor base with the aid of this accessibility unlock. Over the past ten years, the climate finance industry has expanded quickly, garnering significant interest from governments, banks, and corporations. However, illiquidity and inefficiency have historically hampered climate finance.

Lack of liquidity is the main issue with carbon markets; they are extremely fragmented, frequently with little trading activity dispersed among illiquid and inaccessible assets. Carbon markets may experience a major increase in liquidity and influence if these dispersed markets are brought together by a single carbon credit standard and international trade is made possible by on-chain environments (Chainlink, 2024).

There are two types of tokens: utility tokens and security tokens. Security tokens are regulated and signify ownership in a business or asset. Tokens that stand in for bonds, real estate, or firm shares are a few examples. However, utility tokens are not directly associated with asset ownership; rather, they grant access to a good or service.

Blockchain technology is used in tokenization to guarantee the safe production, administration, and exchange of digital tokens. Because of their smart contract capabilities, well-known blockchains like Ethereum, Binance Smart Chain, and Tezos are frequently utilized for token management and minting.

We now move on to the four tokenization techniques, building on our knowledge of the various asset kinds and how they are tokenized. The degree to which these approaches create a direct connection between the token and the underlying asset varies. From the strategy that offers the most direct link between the token and the asset to the strategy that offers the least direct link, we thoroughly examine each one.

- a) Direct title: This tokenization technique does not require custodial arrangements because the digital token acts as the title's record. Only digitally native assets can be used with this technique. The ledger for the digital tokens is a single ledger that may be dispersed. For example, when tokenizing stocks, the share registry itself might be tokenized, making the tokens the ownership records, instead of issuing tokens backed by the share registry. This method can make use of a distributed ledger, but it does not necessarily require the registry to become distributed. It also does not require custodianship or dual registries. However, many asset classes do not yet have full legal implementation for this

tokenization technique, and regulatory frameworks for this type of tokenization still need to be developed.

- b) Tokens that are fully backed by assets: In this approach, an asset is held by a custodian, who then issues a token that signifies a right or claim to the underlying asset. The underlying asset (redemption) or the asset's monetary equivalent may be exchanged for this token. For instance, a commercial bank may issue fiat stablecoin tokens backed by a 1:1 ratio of commercial bank funds in a specific bank account, or a financial institution may issue bond tokens against bonds it owns in a trust account.
- c) Collateralized tokens: Using this approach, an asset token backed by assets other than the intended depicted asset or related rights is issued. To compensate for possible swings in the asset backing's value in relation to the token's intended asset value, the token is usually over-collateralized. For instance, the stablecoin Tether is supported by a variety of assets, such as fixed-income securities, in addition to cash. Likewise, an equity token backed by an over-collateralized portfolio of linked stocks or a government bond token backed by commercial bank bonds might be developed.
- d) Under-collateralized tokens: This approach entails creating a token that is not entirely collateralized but is meant to track the value of an asset. Active management of the fractional reserve asset portfolio and open market activities are necessary to preserve the token value, much like in fractional reserve banking. This asset token type is riskier and has a history of failures. For instance, the defunct Terra/Luna stablecoin depended on algorithmic stabilization via supply management algorithms rather than independent asset backing. Additionally, less severe fractionally backed tokens have been released (Baltais et al. 2024).

1. Advantages and disadvantages of tokenization

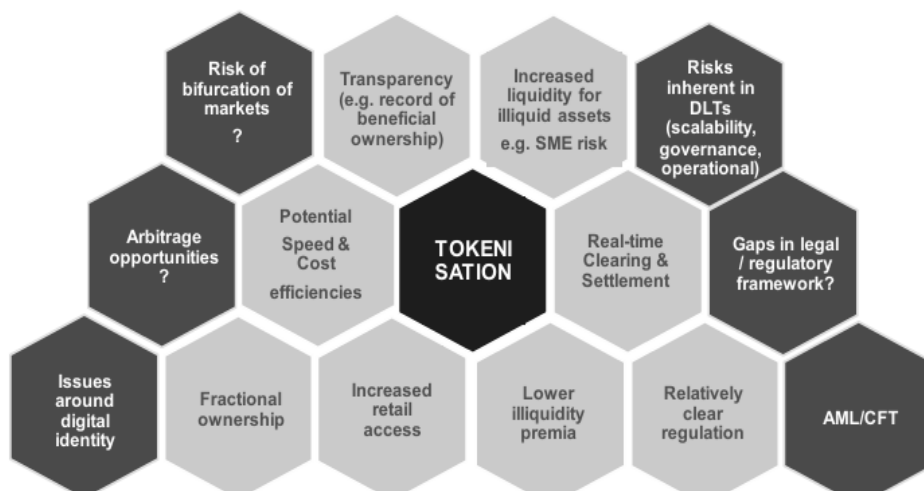
The most popular asset classes being investigated for tokenization include stocks, commodities, real estate, and artwork. Fractional ownership of properties is made possible via real estate tokenization, which enables investors to purchase shares in real estate developments without having to invest substantial sums of money. Tokenized real estate opportunities are being offered by a number of platforms, such as RealT and Tokeny, making it simple to trade and invest in this historically illiquid industry. Tokenization opens up international markets for real estate investment and lowers entrance barriers.

Tokenization is being used for commodities like gold, oil, and agricultural items to make trading and investing simpler. Tokenized gold, for instance, is a portion of real gold that is kept in reserve; tokens can be exchanged without the actual commodity being transferred.

Security tokens, in which company shares are tokenized and sold on blockchain-based exchanges, have emerged in traditional equity markets. This lowers the time and expense of settling transactions and improves accessibility to international markets.

Fractional ownership of valuable works of art is made possible by tokenizing art. Investors and art collectors can buy and sell shares in well-known works of art without having to acquire the complete piece. This type of trading is made possible by platforms such as Maecenas.

Figure 1. Benefits and risks of asset tokenisation



Source: OECD (2020).

There are several advantages to tokenizing assets for investors, companies, and individuals:

- a) **Increased liquidity:** Tokenization makes fractionalization easier by transforming illiquid or physical assets into digital tokens, which enables the purchase and sale of smaller amounts of pricey assets. This improves liquidity and democratizes access to investment possibilities.
- b) **Accessibility and inclusivity:** Wider access to markets that were previously inaccessible to smaller investors because of high capital requirements is made possible by tokenization. With fractionalized ownership, people can use as little money as possible to invest in valuable assets like fine art or real estate.
- c) **Transparency and security:** Blockchain technology guarantees the safe storage of each token's ownership and transaction history in an unchangeable, visible ledger. As a result, there is less need for middlemen and more confidence in the validity and provenance of the item.

- d) **Cost reduction:** Paperwork and middlemen like clearinghouses, banks, and brokers are less necessary with tokenization. Transactions are handled more quickly and cheaply than with conventional techniques.

Tokenization has many advantages, but there are also hazards and difficulties that must be considered:

- a) **Regulatory uncertainty:** The regulatory environment surrounding tokenized assets is still developing, and different jurisdictions have quite different approaches. While some nations are more aggressive in developing tokenization frameworks, others can be skeptical of it or have unclear regulations. Cross-border transactions become more complicated as a result. A number of legal and regulatory issues are brought up by the tokenization of assets, particularly in countries with strict, traditional financial transaction regimes. The question of whether the supplied tokens qualify as securities is a major one in the tokenization field.
- b) **Tax treatment.** The tax treatment of tokenized assets may present further difficulties. Because tokenized ownership is fractional, new methods for handling capital gains, income tax, and other transaction-related tax implications would be needed.
- c) **Technology risks:** Even while blockchain technology is frequently hailed as secure, problems with private key management, smart contract errors, and hacking are still worries. There could be large financial losses in the event that a smart contract malfunctions or a blockchain network is compromised.
- d) **Market volatility:** Because many tokenized assets are traded in emerging countries or lack enough historical data to inform investors, the market for these assets can be extremely volatile. Additionally, certain tokenized assets may have insufficient market liquidity, making it difficult to buy or sell tokens at competitive prices.

Table 1. Comparison of conventional financing instruments with asset tokenization

Host's View/Features	Commercial loan	Listed equity funds	Unlisted direct equity investment and co-investment platforms	Asset Tokens
Pros	Reliable funding source Most applied	Direct access to the capital market	Direct ownership and management Higher return	Expanded investor pool Improved efficiency Reduced counterparty risks
Cons	Highly Fragmented Multiple intermediaries High costs	High upfront and fixed fees High risks and volatilities	Limited liquidity Expertise required High upfront investment	Regulation uncertainty Technical Difficulties
Liquidity	*	***	*	***

Transaction efficiency	**	*	*	***
Transparency	***	**	*	***
Private participation	***	***	**	***

Note: ***indicates high applicability; ** indicates medium applicability; * indicates low applicability.

Sources: Tian et al. (2020)

2. Literature review

Economists have been looking into asset tokenization from a number of angles, investigating its possible effects on the economy, difficulties it may provide, and ramifications for financial systems and markets. An overview of the main economic conclusions and opinions expressed by economists about tokenization may be found below. Because tokenization facilitates fractional ownership and makes it simpler to reach a wider spectrum of investors, economists have acknowledged that it can increase market liquidity. More efficient markets may result from the democratization of access to historically illiquid goods like commodities, fine art, and real estate.

Tokenization, according to UC Berkeley economist Eichengreen (2021), could improve liquidity by allowing smaller transactions in markets that were previously closed to small investors. For instance, tokenizing real estate enables several small investors to hold fractional shares, increasing market accessibility and liquidity. Szandrishvili (2020), Nassr (2021), and Carapella et al. (2023) have argued that fractional ownership opportunities, lower minimum investment requirements, lower entrance hurdles, and easier asset trading would all help to further improve liquidity. According to Faccini et al. (2023), tokenization has the potential to increase liquidity in previously illiquid industries like real estate and private equity, where it has historically been challenging for smaller investors to participate, by lowering transaction costs and facilitating international trade.

Economists have also pointed out that tokenization can increase financial inclusion by giving people and companies who might not have had the funds or resources to take advantage of conventional investment opportunities access to international markets. According to economist and digital currency specialist Birch (2020), tokenization may help close the wealth divide by allowing individuals to make fractional investments in big assets like real estate or artwork. Birch contends that by expanding the amount of capital accessible for asset-backed investments, this expanded access may help both individual investors and the whole economy. In his book “The Future of Money”, Prasad (2021), a professor of trade policy at Cornell University, makes the case that tokenization may open up new avenues for financial inclusion, particularly in developing nations. Even with little wealth, people in

developing nations can access global financial markets by investing in tokenized versions of stocks, commodities, or real estate.

Economists believe that tokenization is a method that has the potential to drastically lower transaction costs across a range of asset types. By doing away with middlemen and streamlining procedures, blockchain technology and smart contracts can cut down on administrative work and delays. According to financial economist Hull (2021), who is well-known for his research on risk management and derivatives, tokenization is based on blockchain technology, which enables quicker settlement times and cheaper transaction costs than conventional financial systems. For example, tokenizing securities may lower settlement, clearing, and custody costs, improving the efficiency of financial markets. Treat et al. (2017) investigate how tokenization affects the infrastructure expenses of banks. They assign the size of the efficiency improvements from tokenization to each of the more than 50 operational cost parameters that they map. They discover that increased financial transaction openness and auditability might save between 30% and 50% of overall compliance expenses. According to Hart and Zingales (2022), blockchain technology can provide more effective contracts, eliminating the need for middlemen like brokers or custodians in asset transfers. They point out that tokenization can drastically reduce trading costs and streamline ownership and rights tracking, which lowers administrative overhead, particularly in the securities and real estate industries.

The macroeconomic effects of tokenization have also been studied by economists, with a focus on how it might promote economic expansion by enabling more effective capital allocation. Prominent economist Roubini (2021) has voiced doubts about tokenization's ability to spur long-term economic expansion. He contends that although tokenization could increase market efficiency in certain situations, it does not always generate actual economic value and can result in speculative bubbles, particularly when it comes to tokenized assets like cryptocurrencies and NFTs. According to Goetzmann et al. (2022), tokenization has the potential to increase economic growth and market efficiency by facilitating access to capital markets. Tokenization, for example, would make it possible to fractionalize valuable assets like real estate and artwork, increasing the pool of possible purchasers and promoting demand and economic expansion in those industries.

The regulatory framework surrounding tokenized assets and its potential impact on their further adoption have drawn the attention of economists. Concerns including tax laws, securities rules, and legal frameworks are frequently cited as major obstacles to asset tokenization. According to U.S. Securities and Exchange Commission (SEC) Commissioner Peirce (2020), regulatory clarity is essential to the broad acceptance of tokenized securities. In order to enable the development of more transparent legal frameworks for security tokens and other tokenized assets, she recommends that the SEC take a more adaptable and progressive stance toward digital assets and tokenization. Harvard University economics professor Rogoff (2021) talks about the

dangers of regulatory arbitrage in the tokenization market. He issues a warning that the absence of uniform international laws governing tokenized assets may cause market fragmentation, with certain countries providing better terms for tokenized assets than others. This might lead to regulatory ambiguity and possible misuse.

Economists have also talked about the dangers and difficulties of tokenizing assets, especially with regard to security issues, legal complexities, and market volatility. Another Nobel laureate, Stiglitz (2021), has pointed out that tokenized assets' high volatility and speculative nature may be dangerous for both individual investors and the larger financial markets. He contends that economic instability may be made worse by the volatility observed in markets for tokenized assets such as cryptocurrencies and NFTs. The hazards of tokenized assets are especially significant when there is no clear regulatory monitoring, according to Schulze (2020), a former member of the European Central Bank. Tokenization may result in fraud, market manipulation, and other types of economic disruption if it is not properly regulated. Economists Diamond and Rajan (2001), who have studied banking and financial markets extensively, have pointed out that if tokenization is not controlled, it may result in new types of financial instability. They recommend that the legal framework governing tokenized assets be strong enough to handle certain hazards, especially when it comes to custody, liquidity, and transparency.

According to Mottaghi et al. (2024), real estate tokenization has a bright future thanks to blockchain technology and smart contracts, which will improve accessibility and liquidity through fractional ownership. Transactions are automated and secured via smart contracts, and market expansion is supported by developing standards and regulatory frameworks in North America, Europe, and Asia. The feasibility of tokenization has been demonstrated by a number of successful projects since its first application with the St. Regis Aspen Resort STO. There are still issues, though, such as the need for clear regulations, industry and consumer education, employment and market participant displacement, and environmental effects. Including cutting-edge technology like AI and IoT can further simplify investment choices and property management.

In order to solve the issue of regulatory disparities and achieve a unified approach to asset tokenization, the European Union enacted the Markets in Crypto-Assets (MiCA) law in 2023. MiCA, which defines digital representations of value or rights that can be electronically transmitted and kept using distributed ledger technology or a comparable technology, is one of the most sophisticated pieces of legislation pertaining to crypto-assets in the world. The European Blockchain Regulatory Sandbox, a project started by the European Commission with the goal of encouraging innovation in the blockchain technology industry throughout Europe, has also been a significant development. This sandbox, which will run from 2023 to 2026, is to give businesses a safe space to test their blockchain-based goods and services while interacting with the appropriate authorities. It makes it possible for

entrepreneurs and regulators to better comprehend cutting-edge blockchain technologies (ESMA, 2023).

3. Econometric model of tokenization

An attempt to measure and examine the connection between the tokenization process and different economic variables or outcomes (such as liquidity, market participation, asset prices, etc.) is known as an econometric model of tokenization. By using blockchain or comparable technology to create digital representations of traditional or physical assets, tokenization can affect a number of asset market economic factors, such as price efficiency, ownership structures, and liquidity. Key variables that both influence and are influenced by the tokenization process are taken into consideration while creating an econometric model of tokenization. The framework of an econometric tokenization model is summarized below:

- Dependent variables (Tokenization results)
- Liquidity of Asset Markets (L): Tokenization can enhance this important aspect. Trade volume, transaction speed, and bid-ask spreads are all indicators of liquidity. Proxy: The difference between the ask and bid prices or the volume of transactions using tokenized assets.
- Market Participation (P): More people can take part in formerly illiquid markets thanks to tokenization, which permits fractional ownership. Proxy: The total number of distinct wallet addresses involved in transactions involving tokenized assets.
- Price Discovery Efficiency (E): By increasing transparency, tokenization can result in more precise price discovery. Proxy: The fluctuations or fluctuations in asset values over time following tokenization.
- Fractional Ownership (FO): The ability to democratize access to high-value assets through tokenization is essential. Proxy: The proportion of assets held or exchanged in smaller denominations.
- Independent variables (Factors Driving Tokenization)
- Transaction Costs (TC): Tokenization can lower the costs associated with purchasing, disposing of, and retaining an asset (broker fees, legal fees, transfer fees, etc.). Proxy: The average cost of ownership (including taxes) or fee per transaction.
- Regulatory Environment (R): The legal and regulatory structure pertaining to tokenized assets is known as the regulatory environment. Proxy: Dummy variables that stand in for various regulatory levels, such as liberal, moderate, or restrictive.
- Transaction Costs (TC): Tokenization can lower the costs associated with purchasing, disposing of, and retaining an asset (broker fees, legal fees, transfer fees, etc.). Proxy: The average cost of ownership (including taxes) or fee per transaction.

- Regulatory Environment (R): The framework of laws and regulations pertaining to tokenized assets. Proxy: Dummy variables that stand in for various regulatory levels, such as liberal, moderate, or restrictive.
- Market Adoption (A): The application of blockchain technology and tokenization platforms by organizations, developers, and investors. Proxy: The number of assets tokenized over a given period of time or the rate at which tokenization platforms are being adopted.
- Technology Infrastructure (T): The level of technological development that enables tokenization (e.g., blockchain scalability, smart contract functionality). Proxy: The number of active blockchain nodes or the typical transaction speed in tokenization networks.

A standard econometric model for tokenization may use panel data or cross-sectional data, that is, data gathered over time and across entities to examine the impact of tokenization on asset markets. The following is a straightforward expression for this econometric model:

$$Y_{it} = \alpha + \beta_1 TC_{it} + \beta_2 R_{it} + \beta_3 A_{it} + \beta_4 T_{it} + \epsilon_{it} \quad (1)$$

where:

Y_{it} - dependent variable for the asset i at time t (e.g., liquidity, market participation, or price discovery efficiency).

TC_{it} , R_{it} , A_{it} , T_{it} - independent variables for transaction costs, regulation, market adoption, and technology infrastructure at time t .

α - constant.

ϵ_{it} - random error.

If the data is cross-sectional and the variables are continuous, the model is first estimated using Ordinary Least Squares (OLS). Fixed or random effects are applied to panel data in order to account for the time-invariant properties of the observed entities. Estimation may be used if certain independent variables are endogenous, meaning they are connected with the error term. For example, although they are not immediately apparent in the dependent variable, regulatory changes may have an impact on both market participation and the adoption of tokenization.

Model Interpretation:

- Transaction Costs (TC): It is anticipated that tokenization and transaction costs would be negatively correlated. Transaction costs should decrease if tokenization eliminates middlemen (such as brokers and attorneys). Hypothesis: $\beta_1 < 0$.
- Regulatory Environment (R): Depending on how clear and supportive the regulatory framework is, regulation may have a beneficial or negative effect on tokenization. Hypothesis: β_2 could be positive in regions with supportive

regulations (e.g., clear legal frameworks), but negative in highly restrictive jurisdictions.

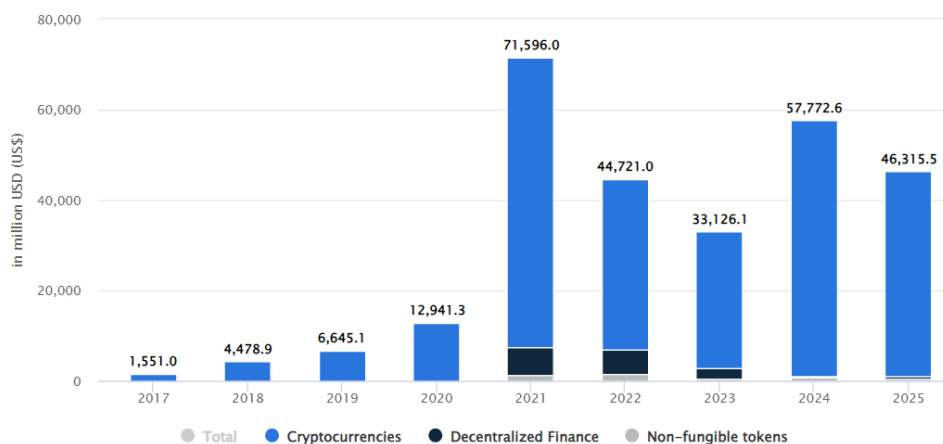
- Market Adoption (A): Improved liquidity and market participation ought to be correlated with increased market adoption. It is anticipated that this relationship would be favorable. Hypothesis: $\beta_3 > 0$.
- Technology Infrastructure (T): Stronger technological infrastructure (faster smart contracts, more effective blockchain protocols) should increase the tokenized asset market's efficiency and liquidity. Hypothesis: $\beta_4 > 0$.

It can be difficult to find trustworthy, high-frequency data on tokenized assets, particularly in early markets. A distinct model may be needed for each of the numerous asset categories that may be involved in the tokenization process, such as equities, commodities, and real estate. Significant volatility could be introduced by occurrences such as market crashes or significant technology advancements (such as modifications to blockchain protocols). Models such as logistic regression or generalized additive models (GAM) can be used if it is anticipated that the connection between the independent and dependent variables will not be linear. Time series models such as ARIMA (AutoRegressive Integrated Moving Average) could also be used to forecast future trends in tokenized asset markets if the focus is on the evolution of tokenization over time.

An econometric tokenization model can offer important insights into how tokenizing assets affects pricing efficiency, market participation, and liquidity. Such a model can aid in understanding the dynamics influencing the tokenized asset market by taking into account important elements such as transaction costs, regulatory settings, market adoption, and technological infrastructure. However, creating precise models for practical uses will be difficult due to data accessibility and regulatory complexity.

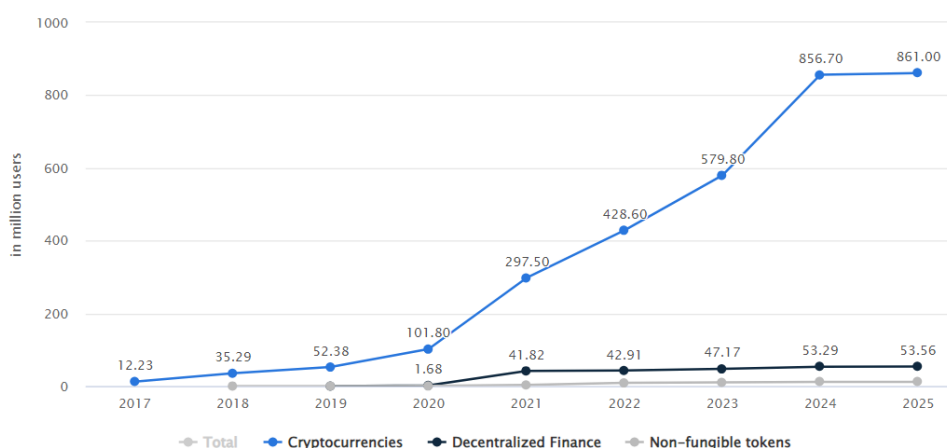
4. Trends in asset tokenization

Any kind of virtual or digital asset with value is referred to as tokenized (digital) assets; this includes non-fungible tokens (NFT's), digital tokens, and cryptocurrencies. These assets can be purchased, sold, or exchanged like conventional assets and are produced, stored, and traded on a digital network like a blockchain. By 2024, the global market for digital assets is expected to bring in US\$57,770.0 million. The market is expected to expand at a compound annual growth rate (CAGR) of -19.82% from 2024 to 2025, with a total estimated revenue of US\$46,320.0m by that year. It is anticipated that the Digital Assets industry will generate an average of US\$67.4 per user by 2024. With an estimated revenue of US\$9,981.0 million in 2024, the US dominates the market when compared to other countries.

Figure 2. Market size and growth of tokenized assets

Source: Statista (2024).

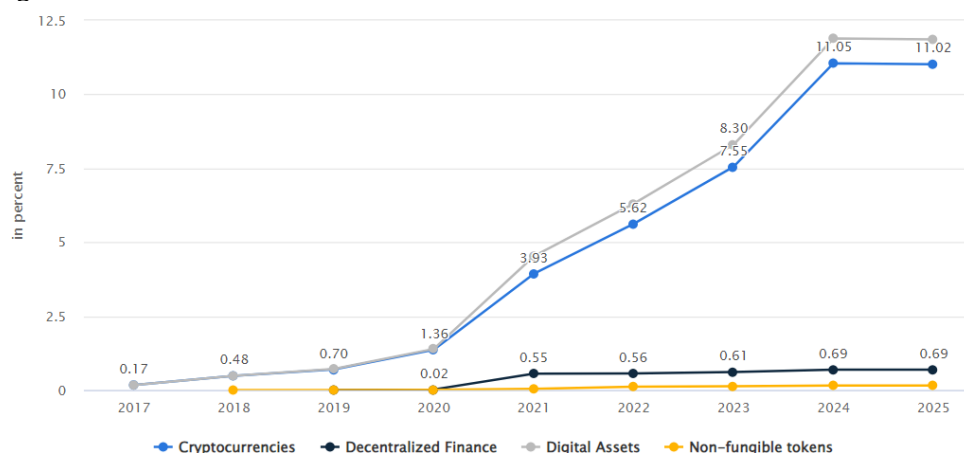
The largest number of users of digital assets is in the case of cryptocurrencies. Forecasts of the development of the digital assets market indicate that this will also be the largest group of users in 2025. The number of users of decentralized finance is several times smaller than in the case of cryptocurrencies, while the number of non-fungible tokens is the smallest. According to the forecast, this situation will be similar in 2025. The number of users in the digital assets market is forecasted to reach 861.00 million users by 2025.

Figure 3. Present and potential users of digital assets in the period 2017-2025

Source: Statista (2024)

Additionally, it is anticipated that user penetration would reach 11.86% by 2025 from 11.89% in 2024. As nations like China and the United States set the standard for incorporating blockchain technology into their financial systems, the acceptance of digital assets is growing quickly on a global scale.

Figure 4. Penetration rate on the market of tokenized market



Source: Statista (2024)

Currently, the highest adoption rate is in North America and is around 60%. Second place in this respect is occupied by the Asia-Pacific region, third place is occupied by Europe with an adoption rate of 40%. The lowest adoption rate is in Africa and it is less than 20%.

Table 2. Tokenization adoption by geography in 2023

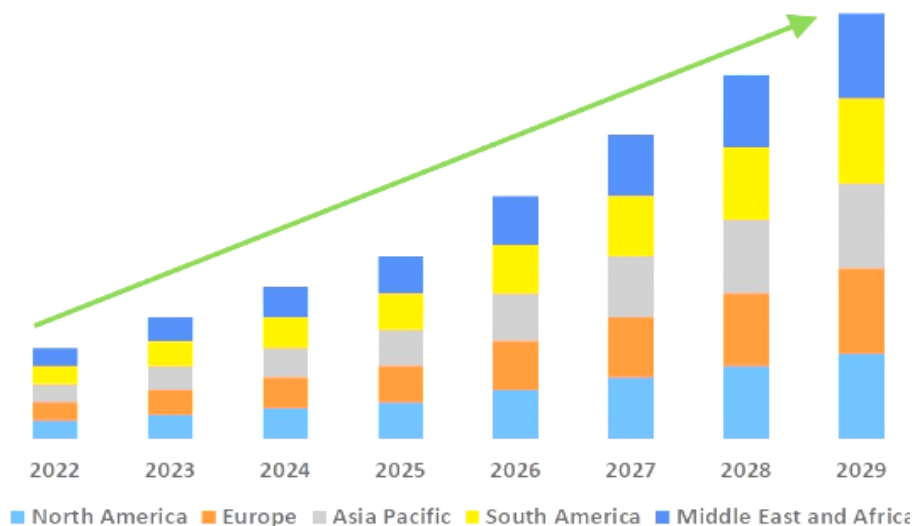
Region	Adoption rate	Key drivers	Examples
Europe	40%	Regulatory support, fintech innovation	EU's MiCA regulation, tokenization of real estate in Germany
North America	60%	Institutional adoption, investor interest	RealIT, Polymath, Securize, tokenized equity platforms
Asia-Pacific	50%	Government support, adoption of blockchain	Singapore: tokenized bonds, Japan: real estate tokenization
Africa	20%	Early stages, exploring blockchain benefits	Kenya and Nigeria exploring tokenized land ownership

Source: Statista (2024)

Forecasts for the development of the tokenization market until 2029 indicate that North America will continue to have the largest market share, although Europe

will become increasingly important, and in 2029 it will most likely overtake the Middle East and Africa region and North America in terms of global market share.

Figure 5. Global development of tokenization market by 2029



Source: databridgemarketresearch (2024).

Services in the area of asset and securities tokenization are offered by a number of platforms. The most crucial ones are:

- tZero*. One of the first businesses to tokenize assets was tZero, which was founded in New York in 2014. It offers a market for investors to purchase and sell tokens backed by private assets. The blockchains used by tZero are Ethereum, Tezos, and Algorand.
- ConsenSys Codefi*. ConsenSys Codefi was founded in 2017 in New York and provides a wide range of blockchain applications for companies. Codefi Assets, its tokenization program, runs a secondary market. Ethereum is used in the tokenization procedures.
- Securitize*. The company was founded in San Francisco in 2017 and provides a comprehensive range of services, including market trading, post-trading, and primary asset issuance to secondary exchanges. Investors can purchase and sell new asset-backed tokens on its secondary market, Securitize Markets. More than 300,000 accredited investors and more than 200 issuers of asset-backed and crypto-asset tokens are part of Securitize. Additionally, it operates as a licensed broker-dealer and is registered as an alternative trading system (ATS) by the Financial Industry Regulatory Authority (FINRA) and Securities and Exchange Commission (SECO). Securitize's tokenization procedures make use of Ethereum, Algorand, and Avalanche.

- d) *Polymath*. Polymath is an asset tokenization and issuance platform that was established in Toronto in 2017 and focuses on developing, issuing, and overseeing asset-backed tokens. More than 200 assets totalling more than \$2.4 billion had been tokenized on its platform as of February 2022. A permissioned blockchain designed for security tokens is being developed by the company.

The largest forecasted turnover of digital assets by 2030 will take place on the Polymath, tZERO and Tokeny platforms.

Table 3. Leading tokenized platforms and assets in 2023

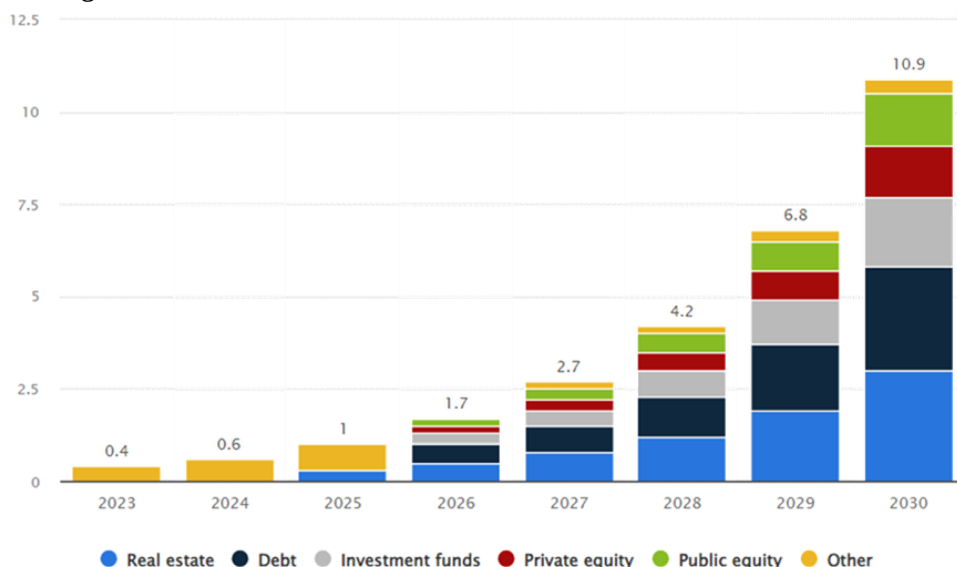
Platform	Tokenized asset types	Total value tokenized	Features/cases
Polymath	Equities, private equity	3.7 billion USD	Security token issuance, capital rising for startups
RealIT	Real estate	10 million USD	Fractional real estate ownership
Securitize	Equities, real estate	500 million USD	Tokenized securities, private market
Tokeny	Real estate, private equity	1 billion USD	Regulatory-compliant token issuance platform
tZERO	Equities, bonds, commodities	2.5 billion USD	Blockchain-based trading platform for tokenized assets

Source: Statista (2024)

According to the data presented in the figure below, the largest capitalization by 2030 will be in the case of digital real estates (share of about 3% in global GDP). The next place will be occupied by digital debt instruments (share of about 2.5% in global GDP), then toe-financed investment funds (share of about 2% in global GDP), then private equity (share of about 1.5% in global GDP); public equity will have the smallest capitalization (share of about 1% in global GDP).

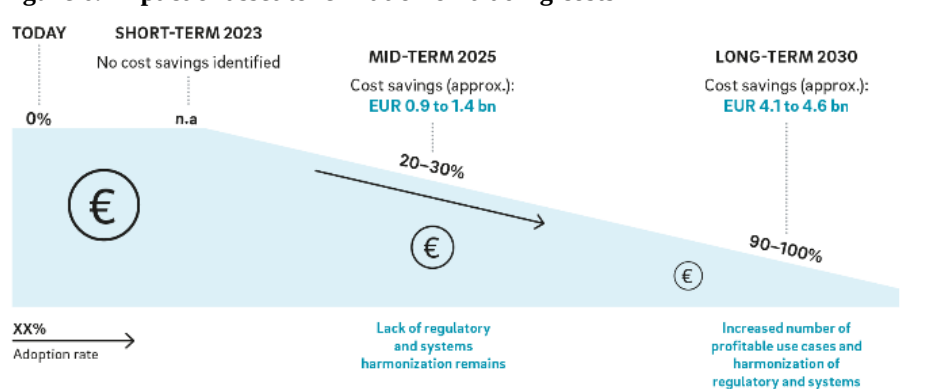
Economists have differing opinions regarding tokenization; some are excited about how it will improve market liquidity, efficiency, and financial inclusion, while others are sceptical due to its speculative nature and regulatory difficulties. Tokenization has the potential to lower transaction costs, increase equity in asset ownership, and enhance access to finance and markets. Tokenization must overcome major obstacles like market volatility, security issues, and unclear regulations before it can realize its full economic potential. Tokenization is probably going to become more significant in international banking as technology advances and legal frameworks change.

Figure 6. Forecasted market size of real-world asset tokenization from 2023 to 2030 as a % of global GDP



Source: Statista (2024)

Figure 6. Impact of asset tokenization on trading costs



Source: rolandberger.com (Van Gysegem, 2021).

By allowing token holders to utilize their assets in decentralized lending, borrowing, and trading contexts, the emergence of decentralized finance (DeFi) platforms may enhance tokenized assets. As a result, tokenized assets may become even more liquid and useful. Global platforms that enable tokenized asset trading will probably appear when more jurisdictions start to adopt tokenization, enabling cross-border asset transfers and investment.

Roland Berger & Keyrock's analysis shows that once tokenization implementation begins with harmonized regulations and systems, post-traded share tokenization could generate profits of around €4.6 billion by 2030.

The decrease in transaction fees is one of asset tokenization's most important cost-saving advantages. Conventional asset transfers entail several middlemen, each of whom adds costs, particularly in industries like finance and real estate. By automating and securing transactions using blockchain technology, tokenization eliminates the need for these middlemen and can result in significant transaction cost reductions. By doing away with middlemen and administrative expenses, tokenization may drastically lower transaction costs and be between 20% and 30% less expensive in the mid-term and between 90% and 100% in the long-term than traditional securitization. For high-value transactions, when even little percentage fees can add up to substantial sums, this decrease is quite advantageous.

Conclusions

Asset tokenization is likely to become increasingly significant in the global financial system as blockchain technology matures and regulatory frameworks become clearer. Economists emphasize its potential to enhance liquidity, reduce transaction costs, and expand market participation. However, challenges related to regulation, technology risks, and market volatility must be addressed to ensure stable and sustainable adoption and borrowing without the use of middlemen, are also gaining popularity.

The market for digital assets is expanding as a result of several causes. The growing use of blockchain technology, which offers a transparent and safe means of transaction verification, is among the most important. Demand for digital assets is also being driven by the growing interest in decentralized finance (DeFi), as people look for methods to engage in financial activities without depending on conventional financial institutions. Growing knowledge of the possible advantages of digital assets, such as reduced transaction costs, quicker transaction times, and greater liquidity, is another driver. But like any developing market, there are risks and difficulties as well, such as the possibility of market instability and regulatory ambiguity.

References

- Avci, G., & Erzurumlu, Y. O. (2023). Blockchain tokenization of real estate investment: A security token offering procedure and legal design proposal. *Journal of Property Research*, 40(2), 188-207. <https://doi.org/10.1080/09599916.2023.2167665>

- Bala, R. (2022). Tokenization of Assets. In D. C. Tran, M. T. Thai, & B. Krishnamachari (Eds.), *Handbook on blockchain* (pp. 577-602). Springer.
<https://doi.org/10.1007/978-3-031-07535-3>
- Baltais, M., Sondore, E., Putniņša, T. J., & Karlsen, J. R. (2024). *Economic impact potential of real-world asset tokenization* (Report No. 6). UTS Business School, University of Technology Sydney.
- Bamakan, S. M. H., Nezhadsistani, N., Bodaghi, O., & Qu, Q. (2022). Patents and intellectual property assets as non-fungible tokens; key technologies and challenges. *Scientific Reports*, 12(1), Article 2178. <https://doi.org/10.1038/s41598-022-05920-6>
- Birch, D. (2020). *The currency cold war: cash and cryptography, hash rates and hegemony*. London Publishing Partnership.
- Carapella, F., Chuan, G., Gerszten, J., Hunter, C., & Swem, N. (2023). *Tokenization: Overview and Financial Stability Implications* (Finance and Economics Discussion Series No. 2023-060). Board of Governors of the Federal Reserve System.
<https://doi.org/10.17016/FEDS.2023.060>
- Chainlink. (2024). *Beyond Token Issuance How Interoperability and Real-World Data Unlock the True Value of Tokenized Assets*. <https://blog.chain.link/definitive-guide-to-tokenized-assets/>
- Databridgemarketresearch. (2024). <https://www.databridgemarketresearch.com/>
- Diamond, D. W., & Rajan, R. G. (2001). Liquidity risk, liquidity creation, and financial fragility: A theory of banking. *Journal of political Economy*, 109(2).
<https://doi.org/10.1086/319552>
- Eichengreen, B. (2021, July 13). *The Stablecoin Illusion*. Project Syndicate.
<https://www.project-syndicate.org/>
- European Securities and Markets Authority. (2023). *Markets in Crypto-Assets Regulation (MiCA)*. <https://www.esma.europa.eu/esmas-activities/digital-finance-and-innovation/markets-crypto-assets-regulation-mica>
- Faccini, R., Matin, R., & Skiadopoulos, G. (2023). Dissecting Climate Risks: Are They Reflected in Stock Prices. *Journal of Banking & Finance*, 155, Article 106948.
<https://doi.org/10.1016/j.jbankfin.2023.106948>
- Goetzmann, N.W., Dasol, K., & Shiller, R. J. (2022). *Crash Narratives* (NBER Working Papers No. 30195). National Bureau of Economic Research.
<https://doi.org/10.3386/w30195>
- Hart, O., & Zingales, L. (2022). The New Corporate Governance. *The University of Chicago Business Law Review*, 1(1), 195-216.
- Hull, J. C. (2021). *Risk Management and Financial Institutions* (6th ed.). John Wiley & Sons.
- Mottaghi, S.F., Steininger, B.I., & Yanagawa, N. (2024). Real Estate Insights: The current state and the new future of tokenization in real estate. *Journal of Property Investment & Finance*, 42(6). <https://doi.org/10.1108/JPIF-07-2024-0087>

- Mougayar, W. (2016). *The Business Blockchain: Promise, Practice, and Application of the Next Internet Technology*. John Wiley & Sons.
- Nassr, I. (2021). *Understanding the tokenisation of assets in financial markets* (OECD Going Digital Toolkit Notes No.19). OECD Publishing, Paris.
<https://doi.org/10.1787/c033401a-en>
- OECD. (2020). *The Tokenisation of Assets and Potential Implications for Financial Markets*. OECD Publishing. <https://doi.org/10.1787/83493d34-en>
- Peirce, H. M. (2020, February 6). *Running on Empty: A Proposal to Fill the Gap Between Regulation and Decentralization* [Speech]. U.S. Securities and Exchange Commission. <https://www.sec.gov/newsroom/speeches-statements/peirce-remarks-blockress-2020-02-06>
- Pizzolato, L. (2021). *Cryptocurrencies and tokenization of assets: the managerial implications of a new financial reality* [Master's thesis, Universidade Autónoma de Lisboa]. Repositório Institucional UAL.
- Prasad, E. S. (2021). *The future of money: How the digital revolution is transforming currencies and finance*. Harvard University Press.
- Rogoff, K. (2021, July 23). *The Future of Crypto Regulation and Central Bank Digital Currencies*. <https://www.bloomberg.com/news/videos/2021-07-24/might-not-see-conventional-banks-in-30-40-years-roff-video>
- Ross, O., Jensen, J. R., & Asheim, T. (2019). *Assets under Tokenization* [Working paper]. SSRN. <http://dx.doi.org/10.2139/ssrn.3488344>
- Roubini, N. (2021). *The Looming Stagflationary Debt Crisis Project Syndicate*. Project Syndicate. <https://www.project-syndicate.org/commentary/stagflation-debt-crisis-2020s-by-nouriel-roubini-2021-06>
- Sazandrishvili, G. (2020). Asset tokenization in plain English. *Journal of Corporate Accounting & Finance*, 31(2), 68–73. <https://doi.org/10.1002/jcaf.22434>
- Schulze, E. (2020). Top ECB official will lead a global central bank effort focusing on digital currencies. *Consumer News and Business Channel*.
<https://www.cnn.com/2019/11/11/ecb-benoit-coeure-to-lead-central-bank-effort-on-digital-currencies.html>
- Statista. (2024). <https://www.statista.com>
- Stiglitz, J. E. (2021). *Economic Fluctuations and Pseudo-Wealth* (Working Paper No. 28415). National Bureau of Economic Research.
<http://www.nber.org/papers/w28415>
- Tian, Y., Adriaens, P., Minchin, R. E., Chang, C., Lu, Z., & Qi, C. (2020). *Asset Tokenization: A blockchain Solution to Financing Infrastructure in Emerging Markets and Developing Economies* (ADB-IGF Special Working Paper Series: Fintech to Enable Development, Investment, Financial Inclusion, and Sustainability). <http://dx.doi.org/10.2139/ssrn.3837703>
- Treat, D., Brodersen, C., Blain, C., & Kurbanov, R. (2017). *Banking on blockchain. A value analysis for investment banks*. Accenture Consulting.

https://www.blockchainconsultus.io/_acnmedia/accenture/conversion-assets/dotcom/documents/global/pdf/consulting/accenture-banking-on-blockchain.pdf

Van Gysegem, F. (2021). *Reshaping the financial system*. <https://www.rolandberger.com/en/Insights/Publications/Tokenization-The-future-of-financial-markets.html>