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DIGITIZING UKRAINIAN REAL ESTATE: ECONOMIC POTENTIAL OF TOKENIZATION

Abstract. We examine how fractional ownership of real estate, facilitated by digital tokens, may broaden access to property investment in Ukraine and streamline financing for reconstruction. We evaluate international precedents where blockchain protocols divide large assets into smaller units, reducing traditional capital thresholds. This approach, we find, could spur broader participation and lessen financing bottlenecks in Ukraine's property market. Our analysis highlights that digital tokens, when linked to real estate through special-purpose vehicles, can create a more fluid environment for buying and selling fractional shares, with the potential to enhance transparency and reduce administrative overhead.

We observe that the current legal framework in Ukraine recognizes real estate rights primarily through a centralized register, rendering blockchain-based tokens an unacknowledged form of evidence of a title. Nonetheless, we propose that innovative structures, including foreign-registered entities holding Ukrainian property, might resolve such complications. We argue that such tokenized offerings could meet post-war demand for real estate finance and contribute to broader economic rejuvenation.

We also evaluate various growth scenarios for Ukraine's share of the European tokenized property market. Under a cautious trajectory, Ukraine might capture 2% of Europe's projected tokenized real estate volume by 2034; under more optimistic conditions, this share could reach 5%. Our estimates suggest this translates to USD 168–420 million in market value, representing around 0.06–0.15% of Ukraine's possible GDP in that timeframe. We identify fractional ownership as a key mechanism for lowering barriers, while the potential to trade tokens across global platforms could generate broader foreign investor interest.

We find that tokenized real estate, if governed by smart contracts, might lower transaction costs and facilitate automated compliance procedures. We further identify advantages related to faster price discovery, since daily digital trading can capture a wider spectrum of market signals. Despite these benefits, we note that high trading velocity poses a risk of volatility, which could deter conservative investors and undermine the longer-term goals of stable financing for redevelopment. Speculative pressures might also drive property values up too quickly, distorting local housing markets.

Finally, we conclude that successful adoption of tokenized real estate in Ukraine depends on regulations that clarify ownership rights, ensure investor safeguards, and resolve cross-border legal complexities. Through the alignment of legal and technical infrastructures, real estate tokenization may evolve into a viable funding channel, supporting both economic modernization and post-conflict recovery in Ukraine.

Keywords: *Investments, Construction, Real Estate, Tokenization, Economic Recovery.*

JEL Classification: E22; G23; R30; G32; O33.

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Introduction. The real estate sector in Ukraine has long served as both an economic cornerstone and a vehicle for accumulating capital. With ongoing reconstruction efforts, real estate assumes an even more critical role, as substantial investments are required to restore housing, commercial facilities, and infrastructure. Traditional financing mechanisms, however, often confront high entry costs, limited liquidity, and extensive administrative requirements. In this setting, real-world asset (RWA) tokenization has gained attention for its capacity to democratize access to property investment.

Despite its promise as a stable and profitable asset class, real estate poses persistent challenges, notably protracted transaction timelines, large upfront costs, and regulatory hurdles. Tokenization is viewed as a partial solution because it divides ownership into smaller digital units, thereby reducing barriers to entry and potentially improving liquidity. Scientifically, it prompts inquiry into whether fractional digital ownership alleviates real estate constraints.

Although global interest in real estate tokenization has significantly increased, several critical issues remain unresolved within the Ukrainian context. The existing national legislation does not provide formal recognition to blockchain-based tokens as valid legal instruments for recording property rights. Frequent digital transactions could induce speculative behavior incompatible with the traditionally illiquid nature of real estate assets. Empirical evidence concerning the effectiveness of tokenization in reducing overall financing costs remains limited. Finally, key regulatory dimensions have yet to be adequately addressed.

The purpose of this article is to analyze the economic potential of RWA tokenization for financing real estate in Ukraine. The study sets out four key tasks: examine international experiences with RWA tokenization in the real estate sector; evaluate the economic prospects of adopting similar instruments in Ukraine; review cases that demonstrate tokenization mechanisms and outcomes; identify the risks, advantages, and challenges associated with the digitization of property rights.

The object of the research comprises the processes of raising investment for Ukraine's real estate market through RWA tokenization, with an emphasis on how this method may influence reconstruction efforts and overall economic development.

The subject of the research encompasses the economic and legal dimensions of real estate tokenization – specifically, liquidity implications, potential financial benefits, legislative frameworks, and alignment with existing Ukrainian regulations.

Literature Review. Several recent works have explored the tokenization of real-world assets (RWA) with a focus on attracting investment, enhancing financial market infrastructure, and securing new financing channels for Ukraine's reconstruction. Riabokin and Kotukh (2024) describe RWA tokenization as an innovative approach that may expand Ukraine's post-war capital inflows. They argue that blockchain-based tokens can lower the capital-entry barrier and provide a transparent mechanism for channeling funds into infrastructure and economic development. Their conclusions emphasize the practicality of tokenization in revitalizing Ukraine's financial system.

Obushnyi et al. (2024) underscore the potential for real estate tokenization to stimulate broad-based participation and liquidity. Their analysis provides a technical view, situating property-backed tokens in the context of decentralized finance (DeFi).

Turning to financial asset tokenization more broadly, Belinska, Onyshko, and Dyuk (2023) classify tokens by functionality, such as security tokens and NFTs. They map out the regulatory considerations for different token categories, delineating the respective roles of issuers, investors, and intermediaries. This stands in contrast to earlier works that do not always differentiate among token types. The study also points out the significance of investor education in mitigating speculative extremes, echoing prior warnings from Sarmah (2018) that widespread adoption of tokenized assets requires not only strong technical infrastructure but also well-informed stakeholders.

Makaliuk, Falko, and Zakharov (2023) approach tokenization from a capital-market perspective, underlining its capacity to attract foreign investment for Ukraine's post-war rebuilding initiatives. Their findings resonate with Cong and He's (2018) arguments that automated smart contracts expedite transactions while diminishing overhead costs. Authors see potential synergy between blockchain infrastructure and Ukraine's capital needs, yet they diverge in their emphasis on technical security, legal underpinnings, or strategic foreign capital inflows. Wang (2024) notes that the broader adoption of tokenization depends on stable blockchain protocols and consistent on-chain data verification. This aligns with the cautionary remarks across the cited works: while tokenization can accelerate investment and reduce transaction friction, absent a robust legal and regulatory framework,

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tokenized assets risk operating in a precarious zone of legal uncertainty.

Roland Berger (2023) forecasts highlight that incremental tokenization of large asset classes (like property and infrastructure) may bring sizable efficiency gains in Europe and beyond. At the same time, Ernst & Young LLP (2023) and Deloitte Center for Financial Services (2023) released white papers revealing that institutional appetite for tokenized instruments is growing. In summary, the latest scholarly output emphasizes RWA tokenization as an increasingly feasible route for modernizing markets and attracting cross-border investment.

Recent empirical work has begun to scrutinize tokenized real-estate markets from complementary angles. Kreppmeier, Laschinger, Steininger, and Dorfleitner (2023) dissect 173 U.S. security-token offerings and more than 238 000 on-chain transactions, showing that fractional tokens broaden ownership to hundreds of retail investors, while primary- and secondary-market flows hinge jointly on property fundamentals and crypto-market sentiment. Tanveer, Ishaq, and Hoang (2025) use a four-case, transaction-cost–theory framework (real estate, gold, gaming assets, carbon credits) to demonstrate that blockchain reduces intermediation costs and enhances liquidity. From a portfolio perspective, Steininger (2023) analyzes more than 40 000 daily price observations for RealT tokens between 2019 and 2022 and reports Sharpe and Sortino ratios that rival listed REITs, low correlations with traditional assets, and statistically significant downside-risk protection.

Using a quantile-VAR network, Aharon, Ali and Brahim (2024) show that spill-overs between real-estate stocks and property tokens are modest in the centre of the return distribution but surge in the upper and lower deciles, erasing most diversification gains during market stress. Abdullah, Adeabah, Abakah and Lee (2023) reach a congruent conclusion: extreme-value connectedness between tokens, REITs, oil and Bitcoin rises sharply when global uncertainty indices spike, yet tokens still perform as the least-cost hedge for crude-oil exposure.

Extending the cross-asset lens, Yousaf, Assaf and Demir (2024) employ a quantile connectedness approach covering eight major asset classes and document a strongly asymmetric dependence structure: real-estate tokens are weakly linked to conventional markets in normal conditions but exhibit pronounced co-movements in both extreme-loss and extreme-gain regimes.

A complementary evidence map is provided by Saari, Vimpari and Junnila (2022), who classify 262 peer-reviewed studies on blockchain for real-estate into four dominant themes – tokenisation, smart contracts, land registries and energy management.

Research Methodology.
Key Definitions

In this study, the concept of tokenization involves dividing real assets, including real estate, into digital tokens recorded on a blockchain. Each token corresponds to a fractional claim to the underlying property's value and potential revenue. Equity tokens provide holders with partial ownership rights. Equity tokens give holders partial ownership rights, while debt tokens function as securitized loans, offering investors payments rather than an equity share in the property.

Tokenization relies on distributed verification, where a network of independent nodes authenticates each transaction and synchronizes the blockchain ledger in real-time (Sarmah, 2018). This structure prevents unauthorized alterations and ensures that each exchange of tokens is permanently documented in a tamper-resistant record. On top of this decentralized framework are smart contracts – lines of code that activate when specific criteria are met (Lauslahti et al., 2017). In the context of tokenized real estate, these automated instructions can manage tasks such as paying out rental proceeds and adjusting fractional ownership whenever tokens change ownership. Each transaction is publicly verifiable.

A legal structure supporting tokenization is the Special Purpose Vehicle (SPV), which formally holds the property title. Investors acquire digital tokens tied to that SPV, thereby obtaining a fractional interest in the real estate without bearing the responsibilities of conventional ownership. Smart contracts then automate core processes, such as income distribution and compliance checks.

Methods and Data Sources

Quantitative evaluations and forecasts provided by Boston Consulting Group, Roland Berger, Custom Market Insights, and Security Token Market, among others, inform estimates of global and regional real-estate tokenization volumes, predicted growth rates, and potential market segments. Their data serve as the foundation for comparing projected tokenization levels worldwide – ranging from USD 10 trillion to USD 16 trillion in broader real-world assets by 2030 – and the specific trajectories for real estate within Europe and Ukraine.

A scenario analysis method underpins the estimation of Ukraine's prospective share

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in Europe's tokenized real-estate market. Low, medium, and high scenarios were constructed by assigning different percentages to Ukraine

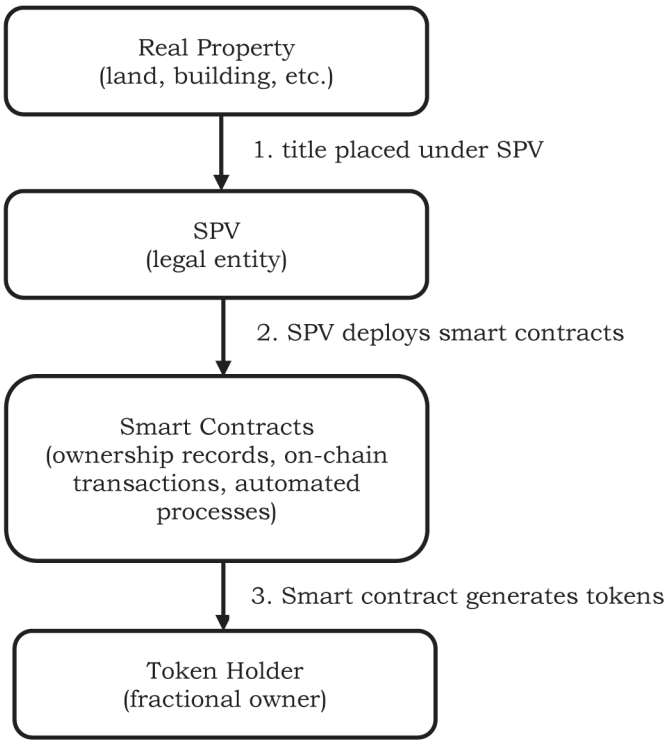

Fig. 1. Real estate tokenization visualized

(e.g., 2–5% market share by 2034). The article integrates assumptions on nominal GDP trends, reflecting data from the European Bank for Reconstruction and Development.

Structure and Limitations

The data used for projections and comparisons covers the period from 2023 to 2025, extrapolations extend to around 2034 for scenario-building purposes. The study relies on secondary data and market forecasts from international consultancies. The methodology lies in the ability to synthesize detailed market intelligence to gauge the scale and trajectory of real-estate tokenization. Applying scenario analysis clarifies how differing regulatory and economic conditions can influence Ukraine's market position.

The approach faces constraints. Estimates of tokenized market volumes and GDP rely on external institutions whose forecasts may change under shifting economic circumstances. Uncertainties regarding Ukraine's legal environment complicate assessments. The article's reliance on aggregated data does not capture field-level factors that could affect the outcome of tokenization initiatives. Despite these limitations, the analysis provides a structured framework for understanding the potential role of tokenization in financing Ukraine's real estate sector.

Main Results.

Global Real Estate Tokenization

Global illiquid-asset tokenization may reach USD 16 trillion by 2030 (10% of global GDP), with a high-end scenario of USD 68 trillion[1]. The on-chain tokenization market surpassed USD 2.3 billion in 2021 and could exceed USD 5.6 billion by 2026 at a 19% CAGR, while daily digital-asset trading volumes rose from EUR 30 billion in 2020 to EUR 150 billion in 2022 (BCG, 2023).

A separate forecast sees tokenized real-world assets surpassing USD 10 trillion by 2030, primarily in real estate, digital bonds, and investment funds[2]. Data from Custom Market Insights places the global RWA real estate tokenization value at roughly $3.5 billion in 2024, with projections pushing it to nearly $19.4 billion by 2033—a notable 21% compound annual growth rate (CAGR)[3]. Another source places the global real-estate market above USD 500 trillion in total value, of which tokenized real estate remains a fraction (Boggio, 2024).

Real estate tokenization was estimated at USD 232 million globally in February 2024, expanding at 6% monthly[4]. Another report aggregates real estate with other illiquid segments, predicting growth from USD 0.3 trillion in 2022 to USD 16 trillion by 2030[5]. Study by McKinsey & Company

1 Boston Consulting Group (BCG). On-chain asset tokenization. URL: https://web-assets.bcg.com/1e/a2/5b5f2b7e42dfad2cb3113a291222/on-chain-asset-tokenization.pdf (дата звернення: 07.04.2025).

2 Roland Berger. Tokenization of real-world assets unlocking a new era of ownership trading. 2023. URL: https://www.rolandberger.com/en/Insights/Publications/Tokenization-of-real-world-assets-unlocking-a-new-era-of-ownership-trading.html (дата звернення: 07.04.2025).

3 Custom Market Insights (CMI). Real Estate Tokenization Market. 2024. URL: https://www.custommarketinsights.com/report/real-estate-tokenization-market/ (дата звернення: 07.04.2025).

Security Token Market. STM Monthly Report – February 2024. 2024. URL: https://medium.com/security-token-group/stm-monthly-report-february-2024-bf0b07f3c411 (дата звернення: 07.04.2025).

4 Security Token Market. STM Monthly Report – February 2024. 2024. URL: https://medium.com/security-token-group/stm-monthly-report-february-2024-bf0b07f3c411 (дата звернення: 07.04.2025).

5 Impact of Distributed Ledger Technology on Global Capital Markets. Global Financial Markets Association. 2023.

(August 2023) places tokenized digital securities at USD 4–5 trillion by 2030, with fractional offerings as low as USD 1[1]. An analysis from Wang (2024) cites USD 16.1 trillion in tokenized illiquid assets (Wang, 2024). A 2024 survey by Oyebanji (2024)[2] values the total tokenized-asset market at USD 186 billion, though stablecoins dominate. The same survey projects USD 26 billion for tokenized real estate by 2034, driven by institutional interest.

Institutional investors aim to raise tokenized allocations from 4.3% to 7.2% by 2027, with real estate climbing from 3.3% to 6.0% (Ernst & Young LLP, 2023)[3]. High-net-worth (HNW) individuals project a jump from 7.3% to 9.3% over the same period, again led by real estate. A 2024 survey of commercial real-estate stakeholders found that 58% have at least piloted tokenization[4].

A 2023 analysis assigns real estate a total value of USD 379.7 trillion (36.5% of all real-world assets) and annual transactions near USD 8.3 trillion in residential and USD 1.14 trillion in commercial property (Baltais & Sondore, 2024). Full-scale tokenization could yield USD 62.3 billion in yearly efficiencies, though partial tokenization scenarios project smaller but still significant savings.

DeFi platforms like Maple Finance and Goldfinch have ventured into real-world receivables and short-term credit (Ciminelli, Mazzoni, & Morisani, 2024)[5]. One U.S.-based study of 58 tokenized residential properties (collectively USD 6.5 million) showed broad ownership fragmentation and turnover of 5–15% monthly, higher on decentralized exchanges (Swinkels, 2023). A 2024 report notes USD 54.6 billion in tokenized RWA overall, including real estate, and a USD 15.1 billion global virtual office market (Koç, 2024). Another investigation of 408 U.S. properties recorded 1,173,247 blockchain transactions, with an average of 572 distinct token holders each (Smith & Baur, 2024).

Addressing the legal design directly, Avci and Erzurumlu (2023) outline a security-token offering structure that combines a special-purpose vehicle with sukuk-like certificates, thereby satisfying both EU securities regulation and Sharia compliance requirements. From a strategic viewpoint, Baum (2021) argues that singleasset tokenisation will stay niche until secondarymarket depth and uniform disclosure standards are established; nearterm breakthroughs are more likely in tokenised fund or debt structures.

European Focus

Europe's real-estate tokenization market, at USD 1.23 billion in 2024, may climb to USD 8.4 billion by 2034, implying a 2.60% CAGR[6]. EY Luxembourg report (2025) notes a possible USD 280 trillion total global real-estate value and USD 3.7 trillion under management[7]. That study foresees 7–9% of portfolios potentially shifting to tokenized assets by 2027, with real estate rising from 1.3% to 6.0%.

CeFi and DeFi Platforms

Property tokens may be pledged as collateral on DeFi platforms (Gogol et al., 2024), enabling owners to secure credit without relinquishing ownership. As of December 2023, 35 of 81 centralized providers (43%) offered real estate–focused solutions, making it the top tokenized asset among CeFi providers[8]. In DeFi, 9 of 48 surveyed platforms supported real-estate tokenization.

URL: https://www.gfma.org/wp-content/uploads/2023/05/impact-of-dlt-on-global-capital-markets-full-report.pdf (дата звернення: 07.04.2025).

1 Banerjee A., De Bode I., de Vergnes M., Higginson M., Sevillano J. Tokenization: A digital-asset déjà vu. McKinsey & Company. 2023, August 15. URL: https://www.mckinsey.com/industries/financial-services/our-insights/tokenization-a-digital-asset-deja-vu (дата звернення: 07.04.2025).

2 Oyebanji O. RWA tokenization: Catching up with the numbers, the institutional players, and the market predictions. HackerNoon. 2024, November 8. URL: https://hackernoon.com/rwa-tokenizationcatching-up-with-the-numbers-the-institutional-players-and-the-market-predictions (дата звернення: 07.04.2025).

3 Driving meaningful opportunity: Tokenization in asset management. EY-Parthenon. Ernst & Young LLP. 2023. URL: https://www.ey.com/content/dam/ey-unified-site/ey-com/en-us/insights/financial-services/documents/ey-driving-meaningful-opportunity-tokenization-in-asset-management.pdf (дата звернення: 07.04.2025).

4 2024 commercial real estate outlook: Finding terra firma. Deloitte Insights. Deloitte Center for Financial Services. 2023. URL: https://www2.deloitte.com/content/dam/insights/articles/us176319_cfs_fsi-outlook-commercial-real-estate/DI_2024-commercial-real-estate-outlook.pdf (дата звернення: 07.04.2025).

5 Ciminelli V., Mazzoni N., Morisani G. Asset tokenization: Potential applications. Iason Research Paper Series. 2024. No. 63. URL: https://iason-onigiri-prod.s3.eu-south-1.amazonaws.com/asset_tokenization_potential_applications_ab05fe4b7d.pdf (дата звернення: 07.04.2025).

6 Europe Real Estate Tokenization Market. Prophecy Market Insights. 2024. URL: https://www.prophecymarketinsights.com/market_insight/europe-real-estate-tokenization-market-5463 (дата звернення: 07.04.2025).

7 Le Gal L., Nagayach M., Swertvaeger R. Real estate tokenization: A new era for property investment and Luxembourg's strategic role. EY. 2025, February 24. URL: https://www.ey.com/en_lu/insights/real-estate-hospitality-construction/real-estate-tokenization-a-new-era-for-property-investment-and-luxembourg-s-strategic-role (дата звернення: 07.04.2025).

8 Real-world assets (RWAs) Tokenization Report. Digital Asset Research. 2023. URL: https://www.digitalassetresearch.com/real-world-assets-rwas-tokenization-report-december-2023-recap/ (дата звернення: 07.04.2025).

According to another research, tokenization in financial services could unlock "trillions of dollars in new value," with examples including tokenized bonds, intraday repo transactions, and over USD 1 billion in gold-backed tokens[1].

Fig. 2. Real estate tokenization in Ukraine visualized

Ukraine-Specific Legal Mechanism

Under Ukrainian law, legal title to real estate is conferred exclusively through a centralized government register[2], and any token transferred on a blockchain is not, by itself, recognized as evidence of an official property right. A non-fungible token (NFT) or other token purporting to grant fractional ownership of a Ukrainian real property can serve, at best, as an information tool or a surrogate indicator. Each formal transfer of real estate requires registration in the state-managed register, accompanied by the usual array of paperwork.

A similar complication arises with equity tokens. If a developer sets up a local special purpose vehicle (SPV) in hopes of distributing its shares digitally, each movement of equity would still need to be recognized in the official centralized records[3]. This means that even if a blockchain captures each transfer in real time, the law will continue to regard the SPV's equity holder register.

Debt instruments may still be issued as tokens. Though not strictly "real-world asset" tokens in the pure sense, debt arrangements can approximate some features of property financing without purporting to assign formal title.

One practical avenue places the bricks-and-mortar under local Ukrainian ownership and shifts the corporate shell abroad. Form a foreign SPV—for example, under a DAO LLC framework in the Marshall Islands[4] – and let that entity hold title to the legal entity in Ukraine that holds the title to the real estate under Ukrainian law. The property's deed remains firmly in the domestic register, with no direct nod to blockchain. However, the SPV's membership interest is digitized and recognized elsewhere, so an investor can buy or sell tokenized stakes in the offshore corporation itself.

Therefore, by trading tokens at the SPV level, participants enjoy a simplified ownership transfer mechanism, while the underlying real estate remains subject to the formalities and record-keeping of the Ukrainian system.

Economic Projection for RWA Tokenization for Ukraine

Key Data and Assumptions

As was mentioned above, global real-world asset (RWA) tokenization is projected to reach

1 Tokenization: Realizing the vision of a future financial ecosystem. Deloitte Blockchain & Digital Assets. Deloitte. 2024, April. URL: https://www2.deloitte.com/content/dam/Deloitte/us/Documents/financial-services/us-bda-steering-tokenized-assets-pov.pdf (дата звернення: 07.04.2025).

2 On State Registration of Property Rights to Immovable Property and Their Encumbrances : Law No. 1952-15. Verkhovna Rada of Ukraine. 2004. URL: https://zakon.rada.gov.ua/laws/show/1952-15#Text (дата звернення: 07.04.2025).

3 On Joint Stock Companies : Law No. 755-15. Verkhovna Rada of Ukraine. 2008. URL: https://zakon.rada.gov.ua/laws/show/755-15#Text (дата звернення: 07.04.2025).

4 Decentralized Autonomous Organizations Act. Nitijela of the Marshall Islands. 2022. URL: https://rmiparliament.org/cms/images/LEGISLATION/PRINCIPAL/2022/2022-0050/2022-0050_2.pdf (дата звернення: 07.04.2025).

between USD 10 trillion and USD 16 trillion by 2030, with real estate noted as the principal component (BCG, Roland Berger). Europe's real-estate tokenization market is estimated at USD 1.23 billion in 2024, potentially expanding to USD 8.4 billion by 2034[1]. This progression implies a factor of approximately 6.8 over ten years or roughly 21% annual growth.

The ongoing conflict continues to exert substantial influence on Ukraine's macroeconomic environment. Nominal GDP for 2025 is presently estimated at about USD 200 billion, which corresponds with European Bank for Reconstruction and Development data (2025). Their findings suggest that a budget deficit of 19.4 percent – equal to USD 38.4 billion in external inflows – translates into a nominal GDP of approximately USD 198 billion. Real GDP is forecast to rise by 3.5 percent in 2025 and 5.0 percent in 2026, conditional upon continued external financing inflows and reduced disruptions to critical infrastructure[2]. To reflect Ukraine's reconstruction-specific context, we adopt a construction multiplier of about 1.5–2.0. This choice aligns with IMF findings[3] showed that well-targeted capital outlays in emerging Europe could yield medium-term multipliers above 1.5.

Scenario Analysis

The model adopts the projection that Europe's tokenized real estate market will grow from USD 1.23 billion in 2024 to USD 8.4 billion in 2034, which implies an increase by a factor of about 6.83 over ten years (equivalent to an annual growth rate of 21–22%).

Initially, Ukraine's share of Europe's tokenized property market is assumed to be 0.5–1% in 2025. By 2034, this share is posited to rise to the 2–5% range, reflecting improved regulatory frameworks, reduced political risk, and reconstruction-driven demand. If Ukraine adopts frameworks consistent with those in the European Union according to Regulation (EU) 2023/1114 of the European Parliament and of the Council of 31 May 2023 on markets in crypto-assets[4], it could attract a larger cross-section of investors who prefer well-defined rights.

In the low scenario, Ukraine's share is 1% in 2024 (i.e., 1% of USD 1.23 billion = USD 12.3 million), climbing to 2% by 2034 (2% of USD 8.40 billion = USD 168 million). In the medium scenario, Ukraine's share reaches 3% by 2034 (3% of USD 8.40 billion = USD 252 million). In the high scenario, Ukraine's share rises to 5% by 2034 (5% of USD 8.40 billion = USD 420 million). If Ukraine's nominal GDP by that date stands in the USD 280–350 billion range (consistent with EBRD's medium-term outlook), then the fraction represented by tokenized property is on the order of: 0.06% of GDP at the low end (e.g., 168 million / 280 billion), and up to 0.14–0.15% at the high end (e.g., 420 million / ~300 billion).

Benefits of RWA Tokenization for Ukraine

Fractional Ownership

A defining challenge in real estate has long been its hefty capital requirements, which exclude most smaller investors from entering this potentially profitable market. By dividing a property into multiple digital tokens, tokenization shrinks the cost of entry to a level that individual savers can manage. As an illustrative scenario, consider a building valued at $10 million, which could be subdivided into 100,000 tokens, each priced at $100. An investor with $1,000 in available funds would thus be able to acquire ten tokens, effectively attaining a 1% stake in the property. This stake would confer proportional rights to any rental income as well as any appreciation in the property's market value.

Increased Liquidity and Price Discovery

Real estate investments are commonly characterized by illiquidity: it can take several months or even years to complete a property sale, thereby restricting owners' capacity to promptly convert assets into cash. The tokenization of these assets offers a potential remedy for the prolonged transactional inertia.

Improved liquidity is often associated with more precise price discovery. As tokens trade without barriers, market forces continually update valuations to reflect both localized dynamics, such as infrastructural enhancements within a specific neighborhood, and broader global perspectives,

1 Europe Real Estate Tokenization Market. Prophecy Market Insights. 2024. URL: https://www.prophecymarketinsights.com/market_insight/europe-real-estate-tokenization-market-5463 (дата звернення: 07.04.2025).

2 Regional Economic Prospects in the EBRD Regions: Weaker Momentum amid Fragmenting Trade and Investment. European Bank for Reconstruction and Development. 2025, February. URL: https://www.ebrd.com/rep-february-2025.pdf (дата звернення: 07.04.2025).

3 World Economic Outlook: Legacies, Clouds, Uncertainties. Washington, DC: International Monetary Fund. 2014, October. URL: https://www.imf.org/en/Publications/WEO/Issues/2016/12/31/Legacies-Clouds-Uncertainties (дата звернення: 07.04.2025).

4 *Regulation (EU) 2023/1114 on markets in crypto-assets*. Official Journal of the European Union, L 150, 40–205. European Parliament and Council of the European Union. 2023, May 3). URL: https://eur-lex.europa.eu/eli/reg/2023/1114/oj/eng (дата звернення: 07.04.2025).

including sentiment surrounding Ukraine's macroeconomic conditions.

In conventional real estate investment, illiquidity typically results in a "liquidity premium," in which buyers pay less (and sellers receive less) due to anticipated challenges in reselling. The advent of tokenization reduces this discount by creating a fluid, continuous market for fractional shares. As the volume of trading grows, there is a corresponding potential reduction in the cost of capital, which could lead to improved financing arrangements for developers and heightened interest from the broader investor community.

Global Reach and Capital Inflows

For many prospective international investors, Ukraine's real estate sector can appear enmeshed in legal specifics, with each step demanding specific documentation. Tokenization offers a detour around these complications.

In a conventional financing structure, a developer often relies on a single loan characterized by a high interest rate, reflecting both elevated risk assessments and limited lending alternatives. By contrast, tokenization allows sponsors to divide the project into fractional shares, broadening the pool of investors and enabling participation at a range of funding levels. For instance, consider a $10 million development: if financed by a single domestic bank, the annual interest rate might be 12–13% (National Bank of Ukraine, 2024)[1]. However, a diversified group of global retail and institutional investors could potentially lower this rate to an estimated 8–10% (Swinkels, 2023). Through heightened competition and wider participation, tokenization therefore has the potential to reduce the overall cost of capital.

Greater international involvement in tokenized real estate projects in Ukraine may also encourage more robust foreign currency inflows, thereby stimulating local economic growth. As tokenized investments gain momentum, they could ultimately form a highly liquid segment of the market, allowing global investors to diversify their portfolios more comprehensively.

Operational Efficiency

Smart contracts rest on top of this structure, capable of shouldering tasks that would otherwise take considerable staff time. For instance, ownership records update the moment tokens change hands. Fewer staff are needed to handle routine filings and disbursements, and there is a lower risk of administrative error because the blockchain ledger updates in real-time. A blockchain-based issuance of property tokens can embed Know Your Customer (KYC) and Anti-Money Laundering (AML) checks into the initial onboarding sequence (Chen, Jiang, & Luo, 2024).

Currency Flows and Interest Rates

Large-scale foreign currency inflows to purchase Ukrainian real estate tokens could strengthen the hryvnia, potentially helping to keep inflation in check. A stronger currency might also ease the cost of importing construction materials, potentially impacting export competitiveness.

DAO Governance and the Democratization of Commercial Terms

A feature of a tokenization lies in the potential for Decentralized Autonomous Organization (DAO) governance – an arrangement in which key commercial decisions become the collective responsibility of all token holders (Liu, Zhou, Huang, & Zheng, 2021). In Ukraine's context, this mechanism proves doubly relevant. On the one hand, it widens investor access. On the other hand, it imposes a level of accountability that traditional models often lack: no single developer or corporate officer can unilaterally dictate terms without consulting the DAO's token-based vote.

Potential Drawbacks and Challenges

Legal and Operational Complexities

In present-day Ukraine, the urge to digitize land and buildings through tokenization is running headlong into a legal framework that is still silent on whether such tokens amount to legitimate proof of ownership. Legislators have yet to issue rules that grant clear standing to digital assets under property statutes. Converting tokens to fiat currency, meanwhile, becomes a journey through regulations and the volatility of the hryvnia.

Meanwhile, the cost of forging and auditing smart contracts – as well as ensuring tax compliance under Ukrainian and international frameworks can increase quickly, mainly because foreign investors might demand transparent protocols at every step.

Market Volatility and Speculative Pressures

Markets that allow 24-hour digital transactions are prone to rapid, sentiment-driven swings. Traditional property investment, by contrast, benefits from a natural braking mechanism – physical inspections, legal due diligence, and the inertia of tangible assets. Once tokens enter the realm of immediate

1 *Financial Markets* [Data file]. National Bank of Ukraine. 2024. URL: https://bank.gov.ua/files/4-Financial_markets.xlsx (дата звернення: 07.04.2025).

liquidity, they can attract speculators. If digital tokens fluctuate more on rumor than on fundamentals, local and foreign participants alike may grow wary of what should be a cornerstone in long-term rebuilding efforts.

The ease of entry can lead to bidding wars for sought-after areas. That added demand might push property values above sustainable levels, reminiscent of asset bubbles in other high-liquidity markets.

Overbuilding is also possible if developers rush to meet what appears to be high token-based demand. Without tempering signals—like construction lead times and measured appraisal—these new units could flood the market, depressing future prices and leaving investors holding tokens tied to vacant or underutilized properties.

Ali, YechiamAharon and Brahim (2024) add that the increasing digitalisation of realestate trading improves pricediscovery speed but simultaneously compresses the window for supervisory intervention during dislocations, underscoring the need for realtime monitoring tools.

Societal and Political Sensitivities

Property is more than an economic instrument; it resonates with cultural identity and community ties. Fractionalizing real estate can invite scrutiny from local inhabitants who question the motives of external investors. They may worry that distant purchasers – perhaps never setting foot in the community – are gaining partial claims on real property essential for local revival.

Collateralization in DeFi

If tokenized property starts to serve as collateral for loans, particularly within decentralized finance (DeFi) platforms (Schueffel, 2021), the channels of leverage will multiply. Should borrowers place tokenized real estate in a digital lending pool, a drop in token valuations might trigger forced liquidations at inopportune times. Such a mechanism, largely automated by algorithmic protocols, could spill over into the broader property market. In a worst-case scenario, widespread token defaults might propagate across DeFi ecosystems and undermine the trust of both domestic and international participants.

Case Studies

Blockchain Estate Registry in Ukraine[1]

Spearheaded by the NGO Virtual Assets of Ukraine and supported by lawmakers in the Verkhovna Rada, the Blockchain Estate Registry (BER) showcases a prototype of how blockchain-based registries could address issues in property transfers, such as incomplete recordkeeping, persistent cybersecurity threats, and the overreliance on paper-based documentation.

The BER aims to replace an aging, centralized registry with a system that records legal titles on a public blockchain. It utilizes smart contracts to manage ownership, transfers, and specific legal interventions. Supporters argue that this shift could mitigate many pain points in Ukraine's current registry framework.

A key operational choice has been to adopt a "permissioned dApp" on a public blockchain rather than deploying a self-contained or "permissioned" ledger. The NGO's logic is that blockchains achieve absolute immutability and data security only when supported by a broad network of independent nodes – an attribute typically absent in private or centralized distributed ledgers. Yet the BER still preserves governmental oversight: authorities can intervene to correct errors, enforce judicial rulings, or address exceptional cases (e.g., inheritance or lost keys).

The project integrates two fundamental technologies: Polygon Smart Contracts (the primary registry actions – creating "title tokens" and transferring them – are executed in Solidity-based contracts on Polygon, an Ethereum-compatible network); and Internet Computer for Data Storage: non-sensitive metadata and transaction details are stored using a decentralized infrastructure provided by the Internet Computer.

The roadmap envisions an entire legislative process that formally recognizes on-chain tokens as valid title records. Concurrently, it anticipates a future where blockchain services run in parallel with Ukraine's existing registries. This dual structure would, in theory, allow property owners to "port" their recorded rights from the conventional system to the blockchain (and back again, if desired), with cross-checks to prevent double-spending or conflicting ownership claims.

An additional ambition is the proposed multi-chain architecture, in which the BER could operate across multiple public blockchains. Implementing cross-chain protocols would allow users to select their preferred network—be it Ethereum mainnet, Polygon, or another chain (Thibault, Sarry, & Senhaji Hafid, 2022). Proponents claim such flexibility not only circumvents throughput constraints but also fosters healthy competition among providers of blockchain infrastructure.

1 Blockchain Estate Registry (BER). Virtual Assets of Ukraine. 2024. URL: https://virtual-assets.org/ (дата звернення: 07.04.2025).

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MANTRA and DAMAC Group's $1 Billion Tokenization Accord[1]

In the opening days of 2025, Dubai's DAMAC Group – renowned for its extensive presence in real estate, hospitality, and data center operations – entered into a $1 billion partnership with MANTRA, a blockchain platform focused on real-world asset (RWA) tokenization. Under this arrangement, a substantial portfolio of Middle Eastern properties and infrastructure is to be fragmented into smaller, tradable tokens, all hosted on the exclusive MANTRA Chain.

From a market vantage point, this collaboration tackles two classic impediments in property investment: high upfront capital thresholds and the cumbersome processes that often dampen liquidity. The DAMAC–MANTRA alliance opens the door for a wider swath of investors, potentially global in scope. It also promises a more fluid mechanism for buying and selling stakes.

Brickken's Global Real Estate Tokenization Momentum[2]

By January 2025, the startup Brickken announced it had tokenized over $250 million worth of property spanning 14 countries—a reach that encompasses everything from residential buildings to commercial hubs and land holdings in various stages of development.

In its latest financing round, Brickken secured $2.5 million, propelling the firm's valuation to approximately $22.5 million. Central to Brickken's approach is a commitment to fractional ownership: by carving sizable properties into blockchain-based tokens, the company allows a broad swath of individuals and institutions to invest in projects once available only to large-scale capital.

Lofty's Approach to Rental Yields and Returns[3]

Lofty offers investors a breakdown of potential earnings. Each property's "Projected Annual Return" merges two components: the "Projected Rental Yield," representing the anticipated yearly net income from tenants, and a separate appreciation forecast estimating how much the underlying asset might climb in value over the course of a year. These figures adjust in real time in accordance with the current token price and broader market dynamics. In practice, yields on Lofty's marketplace can stretch from 5% to 15% a year.

Conclusion.

Main Findings

Tokenizing real estate into fractional, tradable digital assets can help to mitigate the traditionally high capital requirements and reduce the protracted timelines associated with property transactions. According to the findings of this study, issuing smaller digital units of real estate ownership expands the pool of prospective investors, thereby increasing accessibility and liquidity. In the context of Ukraine, this approach could channel new domestic and international capital inflows, potentially lowering the cost of financing for rebuilding efforts.

According to the scenario analysis, assigning Ukraine a 2–5% share of the European tokenized real-estate market yields a range of USD 168–420 million by 2034 – equivalent to roughly 0.06–0.15% of an assumed USD 300 billion GDP. Although this proportion of output may appear modest, it represents a non-trivial influx of capital at more flexible terms and can help address chronic underinvestment challenges. Rapid trading of fractional property tokens could further streamline funding into redevelopment efforts and offer diaspora communities simpler channels for contributing to Ukraine's rebuilding process.

Although the potential advantages appear promising, uncertainties in the regulatory domain continue to present a major limitation. In the absence of explicit legal recognition for digital tokens and comprehensive oversight structures, tokenized real estate assets risk existing within a legal grey area. Consequently, the creation of legislation and standards becomes imperative, both to safeguard investors and ensure transparency in ownership records, while remaining aligned with overarching economic development objectives.

In summary, real-world asset tokenization aligns well with Ukraine's needs for reconstruction financing and inclusive growth. Provided that legislators, technology experts, and local communities collaborate to clarify legal frameworks and practical guidelines, tokenization could become a key instrument for mobilizing the capital necessary to revitalize the country's real estate market.

1 US $1 Billion Tokenization Partnership Announcement. MANTRA & DAMAC Group. 2025. URL: https://www.mantrachain.io/resources/announcements/mantra-and-damac-group-revolutionize-tokenized-real-world-assets-with-us-1-billion-deal (дата звернення: 07.04.2025).

2 Global Real Estate Tokenization Momentum. Brickken. 2025. URL: https://www.brickken.com/en/real-estate-tokenization (дата звернення: 07.04.2025).

3 Real Estate Marketplace. Lofty AI. 2025. URL: https://www.lofty.ai/marketplace (дата звернення: 07.04.2025).

Prospects for Further Research

Several areas call for deeper examination. First, additional work is needed to refine legal mechanisms that integrate tokenized property transfers with centralized registries, ensuring that fractional digital ownership can seamlessly align with recognized property rights. Second, future studies might explore detailed government policy interventions—such as tax incentives, regulatory sandboxes, or public-private partnerships – designed to spur secure and transparent adoption of tokenization across the real estate sector. Third, the broader impact of tokenization on other segments of the Ukrainian economy, including infrastructure and public-sector projects, remains an open question. Empirical research on whether tokenized asset models could be extended to energy, logistics, or manufacturing fields would be particularly valuable. Overall, systematic analysis of these dimensions will help establish a comprehensive framework for leveraging tokenization's full potential in Ukraine.

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ЦИФРОВІЗАЦІЯ УКРАЇНСЬКОЇ НЕРУХОМОСТІ: ЕКОНОМІЧНИЙ ПОТЕНЦІАЛ ТОКЕНІЗАЦІЇ

Досліджено, як часткова власність на нерухомість, реалізована за допомогою цифрових токенів, може розширити можливості інвестування в український ринок нерухомості та спростити фінансування відбудови. Розглянуто міжнародний досвід, де блокчейн-технології застосовуються для поділу титулу на великі активи на дрібніші частки, що суттєво знижує суми, необхідні для інвестування в нерухомість. Встановлено, що такий підхід здатен стимулювати участь ширшого кола інвесторів і знизити дефіцит фінансових ресурсів у секторі нерухомості України. За результатами аналізу встановлено, що цифрові токени, прив'язані до об'єктів через спеціальні структури, створюють гнучкіший механізм купівлі та продажу часток і водночас підвищують прозорість та знижують адміністративні витрати.

Відзначено, що чинна правова база в Україні визнає права на нерухомість виключно через централізований реєстр, через що блокчейн-токени не мають офіційного статусу посвідчення права власності. Проте припускається, що застосування інноваційних корпоративних структур не створює юридичні обмеження. Цифровізація токенів або боргових зобов'язань на міжнародному рівні допоможе українським девелоперам розширити коло потенційних інвесторів і зменшити вартість капіталу. Припускається, що такі токенізовані пропозиції можуть задовольнити післявоєнні потреби у фінансуванні нерухомості і сприяти економічному відновленню.

Оцінено декілька сценаріїв зростання частки України на європейському ринку токенізованої нерухомості. Згідно з обережними прогнозами, до 2034 року частка може сягнути 2% від загального обсягу сегмента; за оптимістичними оцінками — до 5%. Розраховано, що таке збільшення відповідає приблизно 168–420 млн доларів США, або 0,06–0,15% імовірного обсягу ВВП України. Незважаючи на порівняно незначну частку, вважається, що ці кошти можуть суттєво прискорити відбудову.

Наголошується, що застосування смартконтрактів для токенізованої нерухомості може знизити транзакційні витрати та автоматизувати процедури. Постійний цифровий обіг активів дає змогу оперативніше фіксувати ринкові сигнали і визначати вартість нерухомості. Водночас звертається увага на ризик надмірної волатильності, яка може відлякувати консервативних учасників ринку і ускладнювати довгострокове фінансування відбудови. Спекулятивне завищення цін може спричинити дисбаланс місцевих ринків житла.

Підсумовано, що впровадження токенізованої нерухомості в Україні потребує вдосконалення регуляторної бази, яка би захищала інвесторів і визнавала цифрові активи. Прогнозується, що за умови гармонізації правових і технічних інструментів токенізація нерухомості може перетворитися на важливий канал залучення капіталу, сприяючи модернізації економіки та післяконфліктному відродженню України.

Ключові слова: і*нвестиції, будівництво, нерухомість, токенізація, економічне відновлення.*

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