

Blockchain to the Rescue—Tokenization of Residential Real Estate in the Emerging Token Economy



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1 Token Economics and Decentralized Finance

The coexistence of the Internet and social media with machine learning and artificial intelligence have led to substantial societal changes, represented by revolutionary and self-reinforcing platformization of the economy (Kasprzak, 2021). These new energy regimes (Ryfkin, 2011) have facilitated new economic activities and enhanced commercial exchange, thus unwinding new social relationships, which require redefined communication to organise and manage the new dynamics. This process is reflected in a new automated approach to collect and use of data and is changing the way market participants gather and exchange information (both internally and externally) including that on ownership. In the new reality, platformization has become more important than business processes alone. Finding a new, better solution for enhanced user experience is today's necessary way to success, which means further integration of businesses and a constant need for innovation. This paper is based not only on traditional sources: academic papers, technical reports, white papers, etc., but also extends the open discussion on internet platforms.

Development of cryptographic keys and shared ledgers incentivized users to redefine their interactions based on digital trust. The monopoly of financial institutions (serving as sole trusted third parties to process electronic payments in internet commerce) ended and a new element—blockchain entered the picture (Nakamoto, 2009). The blockchain, operated by independent servers (nodes), safely stores given transaction records on a widely distributed peer-to-peer computer network. It has enabled executing complex smart contracts, requiring multiple parties to approve

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transactions by introducing a multiple signature protocol and has given ground to another world-changing functionality-tokenization.

Tokenization can be defined as a process of digital storing and transferring cryptographed and digitally signed rights to any asset (or rights to access to any data or utility) on a distributed ledger where the ownership of these rights can be transferred via its protocol. In other words, it is a process of representing a given asset as a transferable unit on the blockchain infrastructure (Ross et al., 2019). It requires consensus algorithms to ensure replication of the information across nodes, but without central administration. Consequently, programmable smart contracts are collectively managed by an unlimited network of computers running a designated software.

Almost any asset can be tokenized (Stefanoski et al., 2020). Tokens can have broad functionalities: from those inherent in money (medium of exchange, means of account and of storing value) to the representation of access to real assets, or digital and legal permissions to services and utilities.

Within the theoretical framework of the diffusion of innovations (Rogers, 2003) i.e. diffusion of technology, is justified to assume, that diffusion of blockchain—allowing tokenization of various types of assets is imminent as successive groups of its adopters are growing.

Tokenization may be strengthening expectations of the enhanced customer experience, intensified by platformization of social relations. The new energy of social media is contributing to the notion of personal liberation. It is leading to the emancipation of low-income opinion makers, which adds to the invention's spread in a vicious circle. The Bitcoin's popularity and its price boost, are the best examples. It is the next step in the history of the web-wise world, where "online" is not just an addition to computer functionality. Blockchain and tokenization have enabled the appearance of mass-mind blowing concepts, products and ideas, like thousands of different cryptocurrencies (CoinMarketCap, 2020) or the blockchain banking. They allowed users to hold digitalized financial assets in their digital wallets, not only on their computers but also on their mobile phones. Unlimited opportunities have appeared for new business models, ecosystems, legal frames and other fields of interest subject to issues of trust and value.

This process is supported by unlimited and freely available opportunities to analysis and scientific discourse, leading to an emergence of the token economy and the token economics. One can define it as *a combination of the modern definition of economics—the interdisciplinary social science concerned with description and analysis of individual human and social actions of production, distribution, exchange and consumption of goods and services* (Collins, 2005), *with tokenization, as the essential invention allowing digital representation of real assets on distributed ledgers* (OECD, 2020), *thus exchange and execution of contracts related practically to all of their physical and legal aspects.*

Blockchain technology and cryptocurrency offerings added new ways for people to create and exchange values within society. Fundamental definitions and rules governing societies and economic systems have been redefined by uncounted technological startups. Dynamic advances in technology opened a new field in the financial system—Decentralized Finance (DeFi).

Unlike within the conventional financial system, DeFi users can engage via decentralized software applications, where an internet connection is the only condition. It is an entirely digital alternative to banks, insurance companies, stock exchanges, etc., which exists without traditionally associated structure (offices, bankers, etc.) and is accessible to anyone with just a mobile device.

Decentralized platforms already allow not only trading digital tokens or currencies, but also lending, borrowing and swapping them, trading margins or yield farming. Automatization of market making by smart contracts permits matching of lenders and borrowers without intermediaries. DeFi creates unseen before innovative decentralized financial instruments, like synthetic assets (Synthetix) or prediction markets (Augur). It promotes on-chain exposure to practically any asset class, e.g. enabling protection against devaluation in the third-world countries (Airtm). It is giving a strong impulse to the emergence of the digital barter economy of the future.

On June 18, 2019, Facebook announced preparations of its stablecoin infrastructure. It aims at “modernizing payment infrastructure and creating a core transport layer for value, that is low-cost, interoperable, and compliant” (the Libra token). A group of stakeholders (from technology, venture capital, regulatory, telecommunication, online marketplace, payment and compliance) already works on the project.

This groundbreaking venture is taking place in our eyes. Interestingly, Facebook scaled the project down recently and renamed the coin to Diem. Reasons for the retreat remain unclear, but the giant’s surrender to objections of the mainstream financial system seems highly plausible. Nevertheless, after the launch of Diem (predicted for 2021) and its potential reach to billions of Facebook users with a computer or a mobile phone, the world will not be the same. After reaching a critical size, such stablecoins could constrain monetary policy (Assenmacher, 2020). Free access to private money, of citizens from countries remaining outside monetary unions, might influence their government’s control over the money supply and put pressure on their undercapitalized local currencies. Undoubtedly, the situation is serious, and the time pressure is high.

A tension between Facebook and regulators could cause unwanted administrative behaviours. It would be a poor prognostics for Bitcoin and the whole cryptocurrency concept. On the other hand, it might contribute to works around less concentrated stablecoins, as a widely accepted alternative.

Satoshi Nakamoto started the genesis block of Bitcoin (the first block forming the chain of connected data) on a small server located in Helsinki, Finland on Saturday, January 3, 2009, at precisely 1:15 p.m. Eastern Standard time. Most probably, to timestamp the birth of Bitcoin he has encrypted a message in the block, quoting this day’s headline from The Times: “Chancellor on brink of the second bailout of banks”.

This message to posterity is widely interpreted as Satoshi’s warning of fractional-reserve banking instability and a mission statement for Bitcoin itself-being on the brink of the financial paradigm shift worldwide, and the end of the centralized banking (Fig. 1).

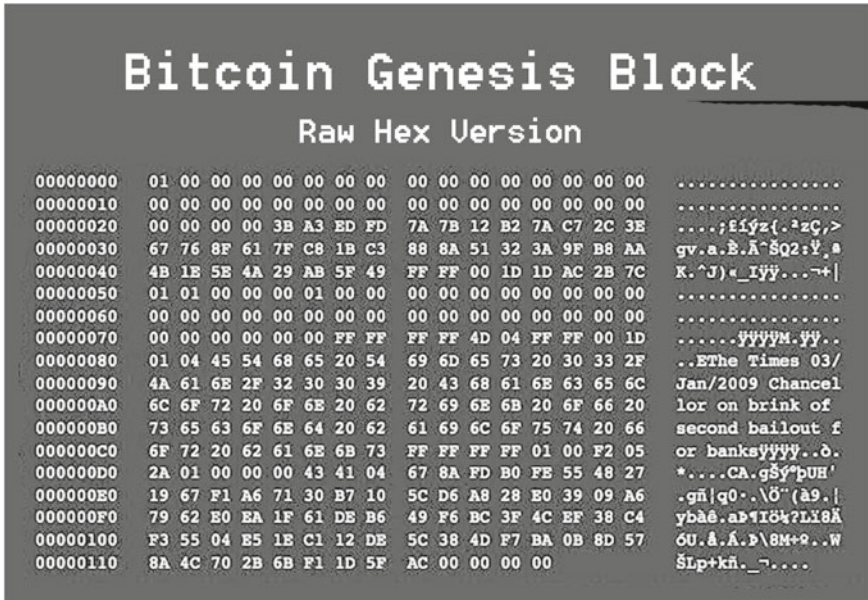


Fig. 1 Satoshi’s hidden message. Source <https://commons.wikimedia.org/wiki/File:Bitcoin-Genesis-block.jpg>

Before the foreseen by its believers, Bitcoin’s recognition as the world reserve currency, for the sake of this article’s argument, one can read the message differently and form a thesis that: “Bitcoin” and the blockchain can bailout the incumbent banking system, rather than replace it.

The banking sector came out from the last financial crisis intertwined with the real estate sector (acquiring large troubled-property portfolios). Despite the global bailout of banks, financial intermediation remains expensive and the regulatory approach is subject to significant political economy and coordination costs, and thus unlikely to deliver much structural change (Philippon, 2013).

These observations indicate potential reserves existing at the junction of both sectors. Considering opportunities granted by tokenization, one can assume that real estate tokenization can capitalize on these reserves and contribute to the banking sector’s development.

2 Stablecoins, Security Tokens and Oracles

The evolution of the crypto world generates new concepts of digital coins and tokens. In traditional finance, fiat currencies usually are not backed by any assets but are controlled by central banks. Typical cryptocurrencies neither have reserves backing

their values, nor central authorities powering their prices, which results in extreme instabilities, damaging their function as means of payment.

Stablecoin is a cryptocurrency pegged to a specified asset (Arner et al., 2020) to curb its volatility. The following types of stablecoins can be distinguished (based on characteristics of assets backing them):

1. fiat currency collateralized, where a coin is partly or fully backed by a real-world currency and can be exchanged to it (e.g. Tether, USDC, PAX),
2. cryptocurrency collateralized (e.g. DAI, Synthetix),
3. tangible asset collateralized (coins backed by commodities, precious metals or non-fungible asset i.e. real estate, art, etc.),
4. non-tangible asset collateralized (coins backed by intellectual-property-related assets or royalty payments),
5. subject to the multi-asset-collateral model, in which a mix of different types of assets is packed and used to decrease their volatility (e.g. \$RSV).

Stablecoins may also be backed by algorithmically programmed smart contracts to compensate for changes in their value, by influencing the coin's supply. Such algorithm stablecoins (e.g. AMPL) are not collateralized by any asset but adopt seigniorage-supply-control mechanism used by central banks.

The security token is a legal concept of a digital unit issued on the distributed ledger, which satisfies the applicable regulatory definition of a security or a financial instrument under local law (SIFMA, 2020) or digitally certifies an ownership interest in an underlying security or a financial instrument issued on a different platform (e.g. on a traditional register). In this context, it functions similarly to traditional securities, and the main difference between them is the distributed ledger listing. The security token can represent a share in traditional listed assets like equity or bonds and illiquid assets like close-end private placements, real estate, art, etc.

Security tokens are similar to equity shares backed by the blockchain and smart contracts, i.e. tokenized securities (Smith et al., 2019). Like traditional securities, they represent digital ownership, allow dividend or interest payments, etc. Unlike traditional securities, they are entirely programmable.

Security tokens represent the following key features of an underlying asset:

- the virtual description of the asset (or its tokenized attribute) and a fraction of ownership represented by the token,
- the identity chain of the token owners (allowing investors or third-parties to view the flow of funds and tokens on a public blockchain),
- rules of legal compliance concerning ownership and transactions (e.g. investor eligibility or risk profile).

The security token technology significantly improves drafting, issuance, trading and management of ownership. Security tokens can be programmed not only to fulfil regulatory requirements. Expanded and redefined fractionalization of ownership allows raising and trading capital through new and innovative financial products, combining different aspects of a given enterprise. Security Tokens can be divided and

defined in ways traditional securities cannot (e. g. dividend payment can be related to preferences of their owner).

Characteristics of different tokens can be joined and traded. They can match their issuer's current and future ideas and evolve with them. For example, liquidity benefits of digital rights expanded by artificial intelligence and machine learning protocols could allow fractional ownership of combinations of financial returns with environmental, societal or cultural impact factors.

Utility tokens, providing digital access to a good or a service (EC, 2020), may serve as tools to support a specific business solution, platform or application. They give their holders rights to use the service and to influence its platform by voting.

Any security token solution requires a connection to the real world, either to validate the collateral or to deliver the required information. Usually, it is realized by a third-party service within the ecosystem—the blockchain oracle connecting the outside world with the network, by providing smart contracts with off-chain external data (Beniiche, 2020). It plays the most significant role in the system, as the information quality and relevance are crucial to the contract execution.

Oracles connect to the blockchain by application programming interfaces (APIs), i.e. by programs allowing two applications to share information. Different oracle types are necessary to fulfil a given smart contract requirement. For example, the information provided by software oracles can be obtained from various databases and transmitted in real-time. Hardware oracles validate, translate and standardize physical information into digital data. They can be centralized or decentralized in so-called trustless solutions, which grant trust without a reliable third party.

Unlike digital signatures, real-world data can be faked or manipulated. As trustless execution depends on oracles, secure and trustworthy mechanisms and their immutability are fundamental to such an ecosystem's systematic risk. But yet, they receive few literature contributions, leaving theoretical implications highly questionable, and a significant research effort is needed (Caldarelli, 2020).

3 Tokenized Real Estate

Globally, real estate (including residential, office, commercial, health, leisure and industrial properties) is the second-largest asset class after the global debt. In 2017, the world's real estate totalled USD228 trillion (Savills, 2016). Though professionally managed real estate investment market constitutes only a small fraction of this value, new DeFi solutions and tokenization of real estate assets could narrow the gap.

Real estate tokenization is a process of creating a digital asset (or an asset structure), which represents a property or a portfolio of properties, on a trading system within the distributed ledger. Principles of royalty finance and revenue-based investing (capitalizing on cash flows from lease contracts, resale of the property or revenues generated by it) base its business model.

This concept offers numerous benefits:

- possibility of high fractionalization of ownership, limiting entry barriers and allowing to target new types of investors and developers to reduce the cost of financing,
- liquidity management of a given property by partial tokenization,
- inclusion of low-income private investors into projects unavailable for them before, e.g. large commercial real estate projects around the world,
- globalization of offering and marketing, removing geographical barriers in fundraising,
- peer-to-peer contracts with instant settlements and the blockchain security, effecting in a lower cost of trading tokens and faster transactions,
- diversification of small investor portfolios in a manner reserved for institutional investors,
- improved transparency, traceability of transactions and identification of particular assets or investors,
- uncurbed programmability of smart contracts, allowing implementation of more complex dynamics of risk balancing.

Nevertheless, the potential of real estate tokenization remains still unrealized for a larger scale. It also rarely associates with residential properties, which may be caused by unique characteristics of this segment of the real estate market. It is:

1. Local and unique, as each property is different. Residential real estate is highly inhomogeneous, which makes it difficult to compare and to standardize data. Currency movements are important to valuations and comparisons. Single properties hold characteristics of non-fungibility, which limits their liquidity and makes the price definition process difficult.
2. Inelastic and imperfect. The elasticity of supply is limited (e.g. due to spatial constraints) and abrupt (for long investment cycle). The functioning of the law of supply and demand is limited (especially in imbalances of the market). The sector is exposed to the asymmetry of information. It is subject to common government interventions, various restrictions and monopolization of land supply and trade.
3. Informal, unorganized and non-transparent. Despite the existing formal requirements for concluding transactions of transferring ownership rights, their real value and official price can differ significantly. Access to information about transaction prices is difficult. Frequent price misrepresentations in concluded transactions may result from money laundering, lowering stamp duties, balance sheet manipulation, corruption, etc.
4. Expensive and difficult to trade. A real estate project is still a slow, mostly paper-based, expensive process of setting up its financing and management. It requires the physical presence of stakeholders, appraisers, signatures, notaries, etc. Entry barriers are high, as the unit price of real estate is high. Investors are locked exceptionally long. Direct and indirect investment options are limited, while banks usually finance residential projects. All of this translates into not

very sophisticated investment patterns of individual retail investors, who either buy residential or leisure single real estate or invest in REITs at best.

5. This market is driven by behavioural factors, where collective conservatism is dominating. Its participants tend to stick to established patterns, even if new possibilities arise. Pluralistic ignorance (Thaler & Sunstein, 2008) is significant and herding effects can be observed (Shiller, 2016). Owner-occupied residential real estate is misinterpreted as an investment. Moral hazard is inherent in indebted households, the banking sector and the political class (Kasprzak, 2018).

These features are essential to further discussion of real estate tokenization with the participation of traditional banks. Aside from the benefits of disintermediation in collaborative housing, free movement of persons and capital due to cross-border transactions, the blockchain technology will have a significant effect in making traditional business models obsolete (Nasarre-Aznar, 2018). This article is focused on the tokenization of single-asset residential property because it can offer the economic system-wide benefits unless realized outside the banking sector or against it.

4 The Oracle Bank Concept

Even though dedicated platforms already provide tokenization of single-property projects, large-scale approach towards tokenization of residential property is still a novelty. The presented concept reflects the synergies and comparative advantages of tokenization and traditional retail banking.

Besides broad access to financial markets, retail banks hold a privileged and trusted position in the society, assuring comparative advantages against newcomers to the retail client business (e.g. by reduced effects of frauds or regulatory fines). Their bloated branch networks, full of skilled workforce, offer the potential of knowledge of the local environment. Verification and implementation of the following assumptions of the Oracle Bank concept could redefine retail banking in the economy. It should unfold in the spirit of decentralization, but within the system providing the physical presence of experts and understanding of unique characteristics of the residential property market.

- Retail banks acting as the blockchain oracles in residential real estate tokenization can assure that real-world data is accurate and valuable.

In preparations for tokenization of a single property, it is essential to check its legal status, physically confirm its state and prepare a professional appraisal.

Blockchain only protects data within the chain, so the quality of information entering is essential to execute present and future smart contracts. It can only be accessed and modified by authorized parties. Although highly accurate statistical and machine learning single-property appraisal algorithms are already available, a real estate agent's expertise, local market analysis and a professional appraisal are still recommended. Banking professionals could fill up this gap, as they operate

locally and can give reliable estimates. This further integration of the housing finance business would require only a slight adjustment of their qualifications.

Such information should not be limited to visual confirmation and filing legal or financial reports, but it should embrace complex data on material, economic, political and social factors. Most importantly, in a feedback function of the system, it would include evaluations of their reception by market participants. Furthermore, such a service would have a repeatable and long-term character.

- The Oracle Bank can act as a trusted partner within the necessary SPV structure, audit and feedback solutions.

Proper structuring of a given real estate token solution should provide control over the subject property management and minority interest protection. A simple example: ownership of a single property is transferred to an entity—the special purpose vehicle (SPV), by an entry in the land and mortgage register, to allow indirect trading of its tokens. Another SPV manages the property, maintains its standard, collect rents, pays local duties, etc. Statutory solutions for both SPVs guarantee the Oracle Bank’s privileged position of a trusted partner for all stakeholders. Its experts appear not only as property validators but also auditors of property managers. They contribute to creating and verifying assessment data to be further digitalized (e.g. by adopting IoT technologies). Furthermore, basing the system on a distributed in-house network reduces the chances of data tampering or fraud with a motivational solution (based on utility tokens).

- The Oracle Bank can perform whitelisting of potential investors, set up the primary marketplace and the secondary trading.

A traditional banking group is already an ecosystem. It can offer licensed and experienced marketplace structure to property owners and investors.

Such a centralized exchange could adopt functionalities towards transparent accessibility, by adding mechanisms and solutions specific to decentralized autonomous organizations (DAOs) however drafted for an inner solution.

Security Token Offerings (STOs) organized by the Oracle Bank would combine a reach of Initial Coin Offerings (ICOs) with the regulatory transparency of Initial Public Offerings (IPOs), and banks know how to do them.

Single property tokenization promotes the participation of non-professional investors. Banks are already doing client risk classification, are involved in central programs, verification for electronic signatures and have enormous customer databases in the disposal.

The Oracle Bank could act as a market maker for its tokens and also provide custody services.

Furthermore, concluding from the dynamic development of cryptocurrency trading, the idealistically postulated disintermediation of financial services remains a myth. In reality, due to a high risk of losing privately-stored blockchain keys, large numbers of crypto assets are stored with crypto exchanges and custodians. There are hundreds of crypto trading platforms, but a bulk of trading happens in a few of

them (CoinGecko, 2020). This apparent disintermediation creates significant risks and trust issues, associated with the custody of tokens. They could be limited if recognisable financial institutions backed particular solutions.

Assuring high-end trusted assistance in the tokenization process does not only mean adding new functionalities to existing bank services. Given the mass adoption of different oracle-bank-certified tokens, highly-trusted barter exchange network would emerge, giving ground to a whole range of businesses related to the real estate tokenization. Assuming unlimited swapping opportunities for different tokens certified by oracle banks in their ecosystems (or on higher-level markets) the whole scheme could be radically more efficient.

5 Potential Hazards of Residential Property Tokenization

Apart from inadequate token backing, unreliable valuations and audit controversies, which can be easily overpassed by the Oracle Bank, other selected potential hazards of crypto solutions and residential property tokens can be specified. They refer to the technical side (structural, legal) and qualitative socio-political constraints, specific to the residential real estate market. The Oracle Bank concept portrayed in this essay addresses most of them by offering trust and a systematic, institutional approach.

- Technological flaws, DeFi hacks, scams, smart contract vulnerabilities, and forks.

Even though there are significantly fewer flaws in the blockchain, the ability for anyone to duplicate open source codes (which dominate the ecosystem) remains a risk factor. Such an independent development of the source code, with its improved mathematical model or a smart contract, may generate a competitive solution to the original and steal its users, creating a so-called fork. It is a threat leading to fragmentation of cryptomarkets and liquidity dumping. Oracle banks trusted by regulators more than any other participant in the market could play an important role in standing to the issue.

- Lack of clear terminology and universal legal structure.

Tokenization still gives rise to concerns from various codes of law and national legal systems. Clear rules to deal with insolvency risks of crypto custodians are missing (Haentjens et al., 2020).

Particular solutions for residential property tokenization should be based on internationally agreed standards, with provisions on public offerings and trading of financial instruments and securities as a reference. The process requires the cooperation of national regulators, international standard-setting bodies and courts. As major banking groups operate across borders, oracle banks would intensify discussions on residential property tokenization influencing local and political monoliths.

- Unclear and non-universal local standards and concepts of the Internet which may cause unfair competition.

There is no common concept of world-wide-web. Essential differences exist between the decentralized and the authoritarian model of internet governance, hacking and misinformation, or protection for privacy from trolling and data manipulation (O'Hara & Hall, 2018). The United States and its private sector retain a disproportionate influence over internet technologies, and their commercial interests may be promoting technological advances motivated by rent-seeking behaviours. These discrepancies are visible not only between countries, but they also regard different groups of interest. They can have critical repercussions to tokenization, as it also can be subject to free riding, exploitation of regulatory loopholes or political pressure of such groups. The emergence of the Oracle Bank would add ferment to the existing mix of interests, groups and institutions.

- The asymmetry of information, embezzlement and moral hazard behaviours.

Residential property tokens remind shares of small-cap companies listed on OTC markets, making them particularly exposed to insider trading issues and asymmetry of information (e.g. about tenants' plans or local community initiatives). Untransparent assumptions of particular projects can intentionally be asymmetric. Although transparency lies in foundations of the very concept of asset tokenization, if unsupervised, bears huge risks of intentional fraud and manipulation or moral hazard behaviours. Mass tokenization of real estate seems little probable, without large-scale involvement of the banking sector with its internal regulations, control mechanisms and certifications. The Oracle Bank acting as a blockchain oracle, auditor, or the market maker, would guarantee enlarged transparency of information, certified by its utility tokens. It seems safe to assume that within this recognized financial group, fraudulent actions would be limited.

- Mass client participation in easily available investment activity may incur an increase in the systematic risk.

Investment patterns of retail investors can be risky, and susceptible to manipulation, trend creation and herd behaviours. Some researchers connect the last financial crash with the introduction of REITs and CMBS structures, and promote illiquidity, as a defensive force necessary to stabilize real estate prices (Baum, 2020).

One can hardly share this opinion. On the contrary, reasons for bubble-originated crises lie in progressing concentration, lack of competition and moral hazard behaviours throughout the system (Kasprzak, 2018). Numerous potential small-cap deals, being subject to standardized protocols and procedures, would lead to an explosion of automated brokerage solutions, where qualified retail investors could draft their risk/return preferences and yet unimaginable income scenarios. The Oracle Bank qualifying retail investors and educating them would lower the systematic risk. Additionally, hybrid solutions might allow pegging residential real estate tokens to qualitative features of a particular property owner, as a bank client. Such an

approach could redefine the very concept of retail financing and client relations with the banking system.

- Operation on a living organism can hurt the very concept.

To implement changes to the existing economic system it is necessary to limit variables, without losing the key idea behind the blockchain revolution. Undoubtedly, enhanced legitimacy of the tokenization is needed, and the current unconstrained decentralization will have to be channelled. But, as the direction is not clear, it can happen at the cost of innovation. Higher pressure is necessary from the private sector and within governments and various groups of interest. It requires universal awareness of necessity and inevitability of the ongoing change.

Fierce competition between the financial system and DeFi will only delay and complicate the transition and should evolve into competition within the financial system—e.g. between different oracle banks.

Difficult integration of authorities into the transition can provoke enforcement actions dangerous to the very process and pushing it sideways. Different dynamics of regulation adjustments in particular countries can cause regulatory arbitrage between regulated and unregulated DeFi projects. The Oracle Back concept could be an international bridge of communication, founded by stakeholders being aware of the necessity of revaluation and redefinition of the housing finance.

Different characteristics of tokens, their role and impact on society still need to be explored and defined. Undoubtedly, this is and will be a painful learning process, volatile and based on errors. Shock waves originated by realized hazards across the whole crypto industry can provoke “bank runs” and massive pullouts of wallets, hurting solutions unrelated to the troubling case. Nevertheless, their probability seems lower within the innovation-integrated financial system- promoting competition, but protecting the blockchain idea itself and its numerous stakeholders.

6 Concluding Remarks

Modern societies face a never-ending and hardly controlled process of imminent change, where dominant values obtain a new shape, and knowledge and technology are the major social powers and sources of their dynamism (Bell, 1973). The educated and technical class dominates such a society, and service industries contribute to the economy more than manufacturing. Technological innovation is there a function of time, and the very process is unstoppable. Tokenization of the economy is such a process, and one day, ownership rights of all digital and physical assets will be tokenized, recorded and exchanged via blockchain protocols. Traditional middlemen will be dismissed, ownership guaranteed, and markets will work smoothly and effectively. But as of today, two obstacles remain -dim trust in apparently disintermediated trading and the irreplaceable necessity for oracle competence.

The Oracle Bank can provide solutions to both issues. Existing hazards are an excellent starting point for drafting formulas needed by issuers and investors furthermore required and understood by regulators and institutions.

As the blockchain has already allowed mass inclusion of mobile phone owners to financial services, the real estate tokenization should encourage institutional inclusion in the revolution. The cost of the transition is not the issue. Massive reserves in profit margins within the present model of real estate financing and trading can convert into the long-term income of entire societies. The real challenge is convincing institutional stakeholders to shift from unsophisticated and costly but a fully-fledged system to the redefined-intermediary involvement. Their retail clients will follow.

Real estate tokens can potentially unlock trillions of dollars in investable asset value backed by individual property or debt, bringing secondary liquidity to traditionally illiquid markets, allowing automatic operations and setting new paths to alter the financial landscape. Residential property tokens certified by the Oracle Bank could drive the irreversible process of the financial paradigm shift but within more predictable and secure frames. Ability to issue and safely trade such tokens with fiat currencies, cryptocurrencies and stablecoins or barter with other tokens would open unlimited options for further innovation, allowing capitalization of hidden reserves, particular skills, different incentives, anticipated benefits and unthinkable yet opportunities. In such a scenario, the importance of the banking sector would not decrease but grow.

In the face of private giant internet platforms' efforts towards crypto innovation, the urgent action is necessary, with little time remaining, counted in years or even months.

The new legal framework is already in preparation. The European Commission has been working on a single regulation regime for the token ecosystem—Markets in Crypto-Assets, (MiCA) since 2018. It already is a highly advanced process (as on September 24, 2020, the EC published this proposition within Digital Finance Package) even though its implementation by member states is due in 2024. The single legal framework will not only protect consumers but assure the integrity of previously unregulated services and markets in crypto-assets. It will encourage both regulators and companies to apply it in practice and will enable further innovation. As long as the definitions used will still be relevant and newly emerging hazards addressed.

There can be institutional resistance, as such tokenization of individual residential assets meddles with a silent bargain within the economic system. With tokenization of residential assets, popular understanding of safe investing could shift from tangible-but-illiquid of the past to intangible-but-liquid of the future. It could contradict traditional bank bias and politically motivated monetary policy. Mass tokenization of real estate could create alternatives to world currencies and change savings and investment paradigms because it relates to the largest transitive component of savings for generations.

Yet unobvious sociological effects of disconnecting social tissue from the tangible property can also be significant, as the feedback wheel will keep on turning, further changing modern societies. Open-minded and creative discussion of the concept is

necessary. Postulates to focus on tokenization of indirect investments, i.e. funds or REITs (Baum, 2020) represent different logic and may only slow this process down.

Even though the blockchain revolution might seemingly be undermining the importance of central governance and funding, it could be an opportunity for smaller countries and their central institutions. It may positively contribute to their global competitiveness, by fast adoption to the unstoppable processes.

It will be captivating to see how governments and central banks align with the private sector to ensure a consistent and cohesive approach to the forthcoming paradigm shift.

Finally, as crypto ideas are strongly associated with the Internet community, innovating primus financial institutions will build their market position in the number-one segment of the future- belonging to young innovators, with oracle banks as their redefined, but wanted financial partners.

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