

GBBC Open-Source Ideas Series

Total Value Locked:
From DeFi to TradFi



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**Provenance
Blockchain**

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What are real-world assets, or RWA?

Blockchain technology has introduced new possibilities for transforming traditional financial systems through new solutions in infrastructure and financial products. One key development in this domain is the tokenization of real-world financial assets (RWA). This article aims to provide an overview of how RWA, through tokenization, can transform many aspects of the financial landscape. We will explore the significance of tokenized RWA as distinct from cryptocurrencies, highlight the opportunities and challenges associated with tokenizing real-world assets, and examine current trends and projections for adoption as financial products.

RWA comprises a wide range of both tangible and intangible traditional assets that have throughout history existed off-chain. As RWA holds value in the physical world, such as real estate, commodities, and vehicles, or as intangible assets including patents, copyrights, and financial instruments (e.g., public stock, mutual funds, ETFs, loans, private equity, CDs, and money), the term “real-world” is used to distinguish these assets from cryptocurrencies and related crypto activities, which are purely digital in nature.

Real-world financial assets have traditionally operated within centralized financial systems and therefore have been subject to various intermediaries, lengthy settlement processes, and in some cases have had limited accessibility. However, with the advent of blockchain technology and the opportunities brought by tokenization, these assets can now be represented digitally as tokens on a blockchain.

Tokenization is fundamental to RWA

Tokenization refers to the process of converting the value or ownership rights of an asset into a digital token, in a way that allows efficient transfer, storage, and verification of both information and value on a blockchain. As digital representations of their underlying assets, these tokens can also be fractionalized, enabling investors to own and trade a portion of any asset, with the potential to enter and exit positions more quickly. Peer-to-peer transfers of tokenized assets on a blockchain eliminate intermediaries, reducing administrative expenses and transaction costs in middle and back offices. This can increase liquidity, enable liquidity for otherwise illiquid assets, and expand opportunities for market activity. Democratization opens access to assets that can be lucrative, traditionally reserved for wealthy individuals and institutional investors, to retail investors.

Tokenization is an important use case driving much of the interest and adoption of blockchain technology and digital assets in the financial sector. With common technical standards in place,¹ interoperable global marketplaces for tokenized assets can enable unprecedented trading and investment opportunities for a broader range of market participants, with transparent and immutable transaction records improving trust and security, while reducing fraud. Token standards are fundamental for this space to achieve scale, allowing the necessary level of interoperability and supporting best practices across the board.

Through tokenization, RWA can be traded peer-to-peer on blockchain-powered platforms, benefiting from the features described above. This can apply to financial products such as funds, loans, cash deposits, debt, insurance, credit notes, and physical assets such as real estate, commodities, and art, among several others. Enhanced liquidity, improved efficiency and transparency, alongside global market integration, can unlock significant value for otherwise illiquid assets. By virtue of their tokenized form, RWA can be traded on blockchain-based marketplaces that operate 24/7, with instant settlement. Through fractional ownership as stated above, the barrier to entry for tokenized RWA can be greatly reduced, and their increased accessibility as a diversification option for portfolios may further increase their utility. Tokenization is a major use case driving much of the interest and adoption of blockchain technology and digital assets in the financial sector. With common technical standards in place¹, interoperable global marketplaces for tokenized assets can enable unprecedented trading and investment opportunities for a broader range of market participants, with transparent and immutable transaction records improving trust and security, while reducing fraud. Token standards are fundamental for this space to achieve scale, allowing the necessary level of interoperability and supporting best practices across the board.

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Tokenized RWA can drive innovation in financial services

With tokenization come related innovations in decentralized finance which can improve access to markets and support competitiveness, such as digital real-time marketplaces for private market assets. Programmability and open data ledgers of transactions can enable composable financial solutions to meet specific needs and use cases (e.g., student loans, immigrant credit building, streamlined payments embedded into customer experiences). Additional features can be programmed into digital asset trades (e.g., taxes and fees, dividend distribution, allocation of voting rights, tracking vesting schedules). This is particularly promising given the trends of embedded finance, where all industries are beginning to incorporate financial services, and the shared economy (e.g., business models like Uber, Airbnb, and shared marketplaces).

¹ The InterWork Alliance of the Global Blockchain Business Council has developed a [Token Taxonomy Framework](#) with a common language for the tokenization of any asset.

In addition to customized financial services, and a new element of community-driven financial solutions, purpose-built functionalities can also enable new forms of delivery to underserved and unbanked communities. Representations of real-world assets tokenized on a blockchain can be used as forms of collateral. Digital money flows can facilitate remittances, relief funding, and alternative financial services for cases of emergencies (e.g., natural disasters, refugee migrations, or where the mainstream financial system has failed).

Transactions of tokenized assets on a blockchain can also be automated through smart contracts and Markers.² which improve reliability if deployed under adequate parameters. Markers go one step further in automation by resolving the unnecessary counterparty risk, cyber security risk, and reducing additional expenses introduced by smart contracts. Transparency and immutability can improve security and trust, supported by additional features such as advanced identity capabilities, appchains (eg. Zones, Subnets), privacy tooling (e.g., zero-knowledge proofs), anti-fraud tools, and tracking and tracing tools to detect suspicious activities.

Tokenization of RWA is already here

Tokenization of RWA is occurring at an accelerating pace across a wide range of assets, with a number of active use cases. Here is a sampling of the live use cases:

Digital Money/Currency

Fiat-backed stablecoins are tokenized representations of fiat currencies, with each token representing one dollar, for instance, that a stablecoin issuer holds in reserve. Stablecoins are a major tool behind the increasing overall cryptocurrency adoption at a global level, dominated by emerging markets, for use cases such as sending remittances, preserving savings in cases of high inflation or volatility of local fiat currency, and alternative financial services to meet specific needs of local economies.³ Certain designs of central bank digital currencies (CBDCs) may also be launched as tokenized versions of fiat currencies issued directly by central banks. Ultimately, financial services offered over blockchain platforms would generally involve tokenized currencies - hence transactions in markets for tokenized RWA would involve these currencies as a means of exchange.

- In the UK, [Millicent](#) is an example of digital finance infrastructure, funded by the UK government, developing the rails needed for mainstream issuance and acceptance of privately issued stablecoins and hybrid public-private CBDCs in the UK.
- In the U.S., to support common standards necessary for scale, initiatives like the USDF Consortium focus on standards for digital money.

Bank Deposits and Loans

As banks are considering blockchain platforms to offer their services, tokenized deposits and loans have emerged as a significant opportunity to add value.

- For instance, the Onyx initiative at JP Morgan has launched deposit tokens in a permissioned system that serves as a deposit account ledger. This is the first bank-led blockchain platform to exchange digital assets, value, and information, enabling efficient and transparent payment data sharing across institutions.

² Provenance Blockchain has developed [Markers](#), smart contract capabilities at the protocol level and facilitate deployments in financial services.

³ [Data](#) from a Chainalysis survey shows that most countries with high crypto adoption are in emerging economies.

Alternative Lending

Non-bank lenders such as Figure, which began offering home equity lines of credit (HELOCs) leveraging blockchain technology on Provenance Blockchain in 2018, bring speed, efficiency, and savings to consumers.

- Applicants for Figure HELOCs are eligible for open-end loans as revolving lines of credit, using their homes as collateral. They can receive funding, which amounts to the entire loan amount less origination fee, fewer than 5 days after completing their application, whereas the typical HELOC can take 25-45 days. Figure's solution removes friction and reduces the cost of issuing a HELOC by 150 bps, a material savings for lenders. Figure has white-labeled this service to major U.S. lenders including Guaranteed Rate, Movement Mortgage, Homepoint Mortgage, and recently announced [four new lenders](#). During the first half of 2023, Figure also completed its first two securitizations, as the first rated securitizations to include blockchain assets (HELOC loans), and the [first of these securitizations](#) was led by Jefferies, Goldman Sachs, and J.P. Morgan.

Asset Management

Asset management has made headlines over the past 18 months, with large global firms such as Apollo Global Management, Franklin Templeton, Hamilton Lane, KKR, and WisdomTree becoming associated with tokenized funds. ADDX, Figure Digital Fund Services and Marketplace, and Securitize Markets contributed to the tokenization of these funds, on infrastructure including Avalanche, Polygon, and Provenance Blockchain.

Tokenized Debt

Tokenized bonds, which carry out bond issuance over blockchain technology, have been successfully launched while still being in early days. For instance, availability of custody services that can deal with digital assets, and liquidity to support secondary markets, are still issues to resolve. The market for debt around the world is estimated to be at almost \$120 trillion, with the US representing \$46 trillion (according to SIFMA). Tokenized bonds improve collateral mobility for investors and provide safer, cheaper, and programmable access to debt markets while lowering barriers to entry for small issuers.

- The [European Investment Bank](#) has been among the first to offer tokenized bonds, with each of its two first euro fund issuances taking two years to structure. Thus far, the bank has issued three such bonds, with two additional bonds in the pipeline for 2023, aiming to reduce frictions for further bond issuances across different blockchain platforms.
- Attesting to financial inclusion, Colombia also issued the first [blockchain-based bond](#) in Latin America and the Caribbean. This COP\$110 million bond launched as a pilot project under the regulatory sandbox of the country's Financial Superintendence, in collaboration with IDB Group and Davivienda Bank.

Tokenized Equity

As U.S. companies remain private longer, and as more of the value creation occurs while companies are private, there's a growing demand from individual investors who are seeking to participate. Digital marketplaces have enabled alternative trading and an opportunity for retail investors to participate in Reg CF and Reg A+ offerings under the US JOBS Act, which respectively enable crowdfunding and allow fundraising for securities offerings from accredited and non-accredited investors up to a certain amount. Marketplaces built on blockchain technology include the likes of Republic, Securitize, and TZero, which provide either primary markets for tokenized equities, secondary markets (Alternative Trading Systems), or both.

- The first private company to provide tokenized equity to investors leveraging a Reg A+ was Exodus, a multichain Web3 digital wallet. In a period of two months, [Exodus raised \\$75 Million USD](#), the Reg A+ maximum, from 6,800 customers, fans, and investors, and then went on to offer secondary trading on TZero and Securitize Markets.
- As these marketplaces attract the attention of traditional institutional players, Standard Chartered has partnered with Settlemint to provide a [Digital Virtual Exchange](#) for institutional investors, where assets are issued and traded on distributed ledgers that support tokenized equity, bonds, and currencies, as well as fractional ownership. Benefits include trading efficiency, the potential for increased liquidity, instant settlement, transparent and immutable records, 24/7 markets, and reduced risk and costs.

Institutional Adoption

While 2022 has been widely considered as the first significant wave of institutional adoption of tokenized RWA, adoption by institutions started well before that. For instance, Provenance Blockchain today has over 70 financial institutions and fintechs actively participating on a decentralized chain, with more than \$8 Billion in RWA value locked on-chain (total value locked, or TVL) and over \$15 Billion in supported transactions. The adoption trend has been led by private market funds and equity investments, real estate, and lending activities. Material use cases include digitally native funds launched on-chain by asset managers Apollo Global Management and Hamilton Lane, where blockchain technology would disintermediate markets, provide more accessible data, and reduce costs for trading activities with digitized assets. Moreover, Neuberger Berman approved Bitcoin investments through its commodity fund, Ondo Finance enabled tokenized exposure to US money market funds, and WisdomTree enabled a tokenized form of its digital wallet offering, while Securitize tokenized feeder funds for KKR and Hamilton Lane.

Altogether, by the end of 2022, there was a total of [\\$0.3 Trillion USD](#) in tokenized financial assets locked as value on-chain, as TVL. A number of institutions have released studies projecting the total value to be tokenized by 2030, with BCG and ADDX estimating financial services to tokenize [\\$16 Trillion USD](#) of real-world financial assets. The financial industry has been increasingly leaning toward these innovations and is expected to continue doing so – both from a market infrastructure modernization angle and from an investor angle - as a major drivers of the increasing institutional adoption. Financial market infrastructure can benefit greatly from the transparency, efficiency, and lower costs of tokenized real world assets, while investors can find significant wealth creation opportunities funding value enhancing solutions.

DeFi and a Case for TVL

Decentralized Finance (DeFi) has emerged as a backbone of a truly global and digitally native financial ecosystem operating over blockchain platforms. This ecosystem is fueled by a global liquidity pool to enable a wide range of on-chain assets that can be used to provide financial solutions. Total Locked Value (TVL), a measure of the total value of digital assets deposited or staked ("locked") in DeFi protocols and decentralized applications (dApps), is a crucial metric that indicates potential for the generation of economic activities.

Accessible to virtually anyone around the world with an internet connection, open-source data and tooling enable composable financial products with plug and play architecture. Protocols set common rules for each function, and smart contracts and Markers enable automated transactions based on predetermined parameters, allowing automated financial services tailored to specific needs. For instance, Automated Market Makers (AMM) can provide liquidity management and asset pricing mechanisms at low cost. Flash loans enable borrowing and returning funds occurs in a single transaction. Proof-of stake-consensus mechanisms process transactions where token owners lock deposits for the ability to validate. Participants can contribute funds into liquidity pools - deposits of digital assets that enable trading - that can be programmed to meet a variety of functions.

TVL plays a pivotal role in assessing the combined value of these activities on a specific blockchain, since a higher TVL can denote gravitas and a more trustworthy platform with potentially greater network effects and participant engagement. The TVL metric has demonstrated notable fluctuations over time, reflecting the dynamic nature of cryptocurrencies and the broader DeFi ecosystem. According to DeFi Llama data, the amount of user funds deposited in DeFi protocols reached a peak of close to \$180 billion in January 2022. Subsequently, it declined to around \$50 billion in June 2022, where it stabilized. As of July 2023, the TVL stands at \$45 billion, representing a stable and substantial value locked within DeFi protocols.

Understanding TVL Beyond DeFi

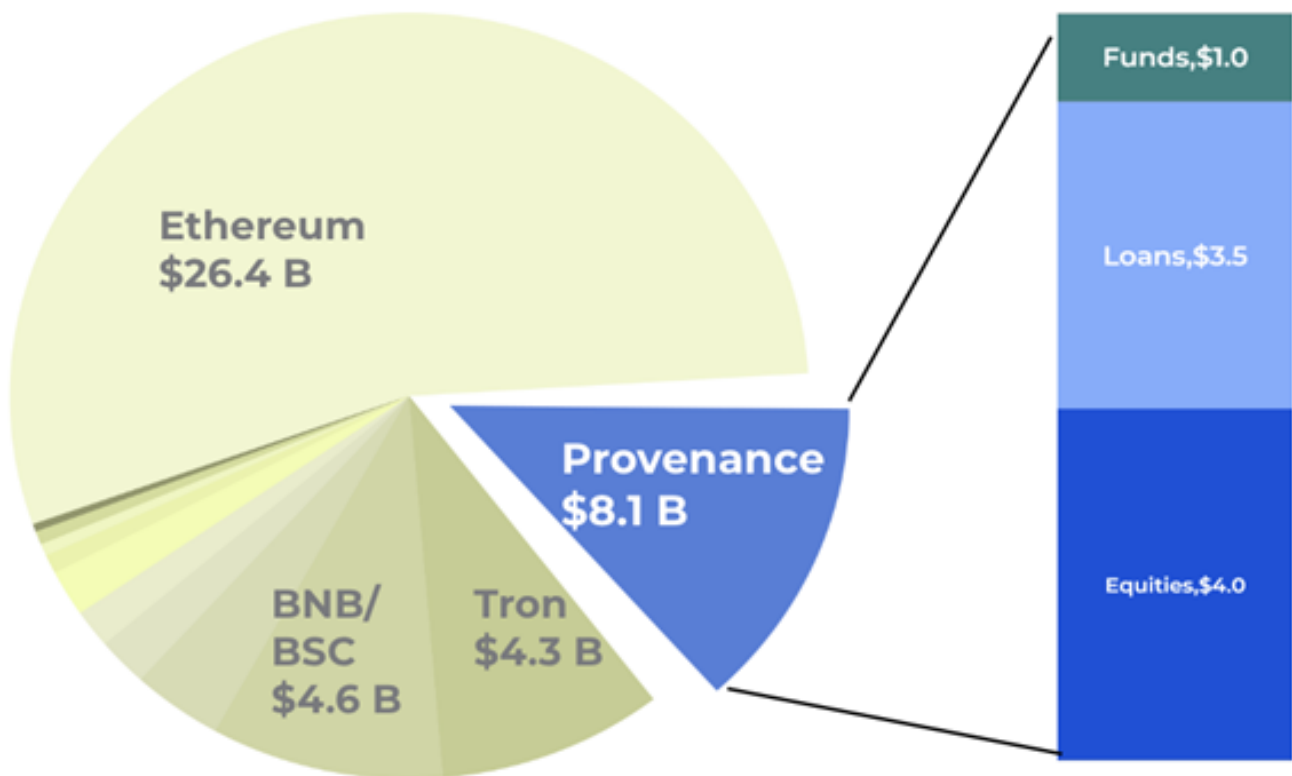
As decentralized finance (DeFi) continues to evolve and mature, the concept of Total Locked Value (TVL) has also gained significant attention. Originally focused on digital assets such as cryptocurrencies, TVL has now expanded to include tokenized RWA, providing a more comprehensive understanding of the assets represented on-chain. These tokenized assets are typically held in smart contracts on a blockchain network.

Because RWA, such as mortgages, private equity investments, and illiquid funds, were not represented on-chain as stated before, TVL primarily focused on the value of digital assets deposited within DeFi protocols. However, as blockchain technology adoption progresses, the inclusion of RWA within the TVL framework becomes increasingly relevant and necessary. This is a natural progression in line with the continued development of the DeFi ecosystem, which is coming to embrace tokenized RWA as part of TVL. Moreover, as DeFi platforms attract institutions and large scale investors which are key for scaling, it becomes increasingly attractive to offer the ability to trade tokenized bonds, equity, debt, and other assets such as gold, real estate, and art.

While the integration of RWA into the TVL metric is still in its early stages with only 0.3 Trillion USD locked on-chain, the current state of the blockchain landscape shows the following figures representing TVL as of July 2023⁴:

1. Ethereum: \$26.4 Billion
2. Provenance Blockchain: \$8.1 Billion
3. BNB: \$4.6 Billion
4. Tron: \$4.3 Billion

Total Value Locked



Most blockchains' TVL is largely representative of digital assets, such as cryptocurrency and NFTs, although there are a select few notable blockchains whose TVLs are heavily weighted to RWA. A great example is Provenance Blockchain, which has an overall TVL of \$9.3 Billion, of which over \$8.1 Billion is from real-world financial assets, such as HELOC loans, private equity, and alternative asset funds. RWA are gradually making their way onto the blockchain, further expanding the TVL metric and its significance.

Importance of TVL to TradFi

The tokenization of real-world financial assets (RWA) represents a transformative shift for financial services, with numerous advantages as mentioned above, alongside the opportunity to enable innovative financial products and services. These solutions not only streamline traditional financial processes but also open doors to underserved and unbanked communities, as well as particular interest groups with specific financial needs (e.g., students).

The momentum of RWA tokenization is evident in the growing number of assets being tokenized across various blockchain platforms. Institutions are embracing this trend, and as the Total Value Locked (TVL) metric continues to include tokenized RWA in growing proportions relative to cryptocurrencies, it reflects the ongoing integration of these assets within the blockchain ecosystem.

As financial services, and also insurance services, lean into blockchain-based solutions through tokenized RWA, the TVL metric specific to RWA becomes an important indicator for what blockchain to tokenize assets on. There are multiple factors involved in selecting a blockchain to tokenize RWA on, such as which blockchain has the most robust tooling for easy onboarding and lifecycle management of financial assets, ability to achieve compliance and privacy standards, and ability to achieve security and scalability requirements. Though perhaps the leading indicators of the above are (a) where the majority of tokenized financial assets exist today, and (b) where the momentum of RWA tokenization is occurring.

By identifying a blockchain's current RWA TVL and TVL growth over time, an institution is able to assess these questions and ultimately select the most appropriate blockchain platform to support transactions in tokenized RWA. Blockchains with the greatest gravitas, as indicated by real-world financial asset TVL, are probabilistically also best positioned as a long-term sustainable solution.

TVL therefore becomes a crucial indicator for institutions seeking to tokenize RWAs, helping them identify the most suitable blockchain platforms based on real-world asset adoption and growth. As the financial industry continues to adopt these innovations, RWA TVL is expected to play an instrumental role in guiding decisions and driving institutional adoption.

Yet with any new data set, one challenge to date is that the RWA TVL data is not always readily available, and rarely segmented by asset class, meaning that it can be difficult to assess what portion of a given TVL value consists in cryptocurrency assets vs. real-world assets. As is the case with Provenance Blockchain, certain blockchains are aiming to self-publish their TVL data by asset class. Additionally, several analytics firms are also working to make this data more accessible, such as [RWA.xyz](#), which focuses on data for tokenized real-world assets. As a necessary data point for assessments for the tokenization of RWA, TVL specific to RWA is expected to become more widely used, and potentially a standard for financial services and insurance institutions making a decision as to which blockchain to leverage.



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