# Tokenizing Real Assets

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By now, Bitcoin and blockchain have become household words. Although many people mistakenly assume that they are synonyms, Bitcoin is merely an example of one of the first applications of blockchain technology.

The tokenization of real assets is another one. It potentially expands the investible universe for asset managers. It also increases liquidity of real assets that are currently considered to be illiquid and out of reach for most retail investors.

Bitcoin, which can be used to make payments, was the first application to be administered on a blockchain infrastructure.

## Bitcoin Is Not the Same as Blockchain

Back in 2016, the whitepaper entitled: "Distributed Ledger Technology for the Financial Industry" was released (Robeco, 2016). Since then, blockchain technology has come a long way. What started as an anarchistic attempt to remove financial institutions from the payments ecosystem, is now one of the biggest opportunities for substantial efficiency gains and new products/services, reaching far beyond the financial services industry. To some, the difference between Bitcoin and blockchain is still unclear. By using the internet as an analogy below, we attempt to explain the differences.

### Bitcoin is to Blockchain what Outlook is to Internet

Blockchain is essentially a layer of infrastructure. It comprises many nodes, networks and interconnections that form the basis for administering, updating, and safeguarding the information that has been stored in what is essentially a big spreadsheet. The first application of the internet was email. The nodes and interconnections were used to send messages based on that infrastructure layer. The so-called payment coins were the first application of the blockchain infrastructure. These coins can be used to facilitate online payments, just as the name suggests.

An example of an email provider is Outlook, and an example of a payment coin is Bitcoin. Besides Outlook there are many other email providers. There are also many other payment coin providers (over 2000 to be exact) besides Bitcoin. So when we talk about Bitcoin, it is an example of an application of distributed ledger technology, as well as being the first. Besides sending emails, the internet is also used for e-commerce, social media and many other things. Blockchain infrastructure can also be used for many other things besides making payments. Real asset tokenization is one of those alternative uses that could potentially have a big impact on the asset management industry.

### The Impact of Electronic Trading Has been Big

When trading migrated from physical to electronic marketplaces, many things changed.[1] Trading costs came down substantially because much of the paperwork was replaced by electronic record keeping. Access to global markets improved because the physical location no longer mattered. Information asymmetry was reduced substantially because the flow of information was also electronic instead of physical. Liquidity increased because the facilitation of buy-and-sell orders had improved. And finally, an automated trading system – now known as algorithmic trading – was developed on that infrastructure. One outcome of this system is that it enables high-frequency trading.

### Electronic Trading was First Developed for the Most Standardized Forms of Contracts

Examples of such contracts are commodity trading futures. Further down the road, it migrated to company shares and bonds. So far, it has had less effect on heterogeneous/real assets. Trading in paintings, real estate, private companies and many other illiquid real assets is still physical and not electronic or fractional.

Buying a share is not the same as buying an entire company. Buying a commodity futures contract is not the same as buying that commodity. And yet, for many real assets the buying or selling is binary. Either you own the entire asset, or you don't. This is where tokenization of real assets comes in. Around 40 years ago, the term IPO (initial public offering) was used for the first time and now, it's a well-known principle. In 2013 the ICO (initial coin offering) was introduced and it may also become as commonplace as the IPO over the next decade.

### Tokenization as the Next Step in Electronic Trading

In a nutshell, tokenization involves converting the partial or full ownership rights to an asset into a digital representation in the form of a token that is stored and administered on the blockchain. For example, you could opt to tokenize a percentage ownership of 'The scream' by Edvard Munch, which was valued at USD 120 mln at Sotheby's in New York in 2012. The fractional ownership of this painting could be translated into one million tokens issued at USD 120, administered on a blockchain and traded on a token exchange. Given that the price of USD 120 mln dates back to 2012, it is likely that if the painting were sold today in an open market where it is possible to own a fractional share of it, a new market value would be established by agents going long or short on the token.

## Using Technology to Create Liquid Markets

Technological progress facilitated the migration of the physical trading of a few asset classes to an electronic ecosystem. The Nasdaq was the earliest example of this. Blockchain infrastructure can facilitate the next step of automated electronic trading for a wide variety of asset classes, potentially opening up USD256 trillion in real assets.

### The Tokenization via Blockchain Adds Efficiency

The tokenization process via a blockchain is more efficient than the current trading methods and it adds a global dimension to asset tradability. Auction houses charge fees of between 12% and 25%, while art gallery fees typically range between 6% and 10%. The fees charged by the first tokenized art broker – Maecenas – range from 2% to 6%. The arrival of new participants and a more transparent market are likely to push those fees down to just a fraction of these percentages. In some jurisdictions, there is already a legal framework for investor protection in place. There are insurance companies that insure tokenized paintings, art experts who validate the legitimacy of the artwork by issuing certificates and law firms that manage the token ownership process. All the administration is documented on a blockchain and executed through smart contracts. The benefits that we have seen in the rolling out of electronic trading in equities and fixed income products, may soon apply to real assets, too.

### Tokenizing the Income-Generating Real Estate

Creating liquid markets by tokenizing assets without an income stream (like paintings) is arguably harder than tokenizing income-generating assets like rent-generating real estate. In such cases, the token would come down to owning a share in the rent-income pool in addition to the underlying asset. In 2018, a USD 30 million luxury condo development project in Manhattan was tokenized on the Ethereum blockchain. Investors could buy the digital tokens, thereby financing the project and receiving a right to the underlying revenue-pool of the property. In this transaction, multiple participants came together to determine the price of the development project and the market price for the tokens that provide access to it. Ownership is administered on the Ethereum blockchain and smart contracts (a kind of automation software) handle the distribution of the rent income amongst token holders.

## Deciding if a Token Price is a Fair Representation of the Income Yield

Instead of deciding whether or not to buy an entire property, investors now have to determine if the price they would pay for a token is a fair representation of the income yield of the underlying property and the possibility of an increase in the asset's value. Some investors will hold large stakes in the building, while others only own small ones. Some investors will want to diversify by owning small stakes in properties in various cities across the world, while others will set their sights on a particular local market and seek exposure to it in the form of direct token stakes. When the token is sold, merely the ownership of the token is transferred, not the entire underlying asset, as is the case with stock trading.

## Tokenizing Intangible Assets

Apart from tangible assets, investing in intangible assets such as copyrights, film-production rights, royalties, actors, etc., will also be possible. The methodology would be the same as with other real assets. The value of the token would depend on that of the underlying asset. Financing a film production could, for example, be done by tokenizing the production rights. Depending on whether or not it's a success, the proceeds would be re-distributed amongst the token holders. Token analysts would have to estimate future income streams and discount those in a model in order to arrive at a fair value for the token. Depending on the heterogeneity of those estimates, trading occurs.

## Establishing Functioning Markets by Creating Arbitrage Opportunities

In order to establish a fair value through arbitrage possibilities that resemble structured finance solutions, the two-token waterfall framework by Lippiatt and Oved (September 2018) can be used. See Exhibit 1, in this setting, the real asset is transferred to two separate tokens. One is senior in priority of payment, and it replicates debt. The other – junior in priority – replicates equity. In order to prevent arbitrage opportunities, the token value of both tokens must translate into the same real asset value. This would create a liquid market where the digital tokens are traded frequently.

## Tokenizing Liquid Assets

We have discussed above the benefits of the tokenization of illiquid assets. It is important to note that the same technology can be applied to equities and bonds. Regulators around the world are starting to develop regulatory frameworks that treat equity and bond tokens in the same way as regular equities and bonds. This implies that there are regulations to protect investors and reporting requirements, just as there are for traditional listed companies. But this begs the question as to why people would invest in tokens and not in the mainstream equities. The key reason has to do with the infrastructure's efficiency, besides the advantage of direct cash settlement when the tokens are accompanied by digital currency. Fractional share ownership can also be beneficial for portfolio optimization reasons. Finally, the costs of creating active markets in the underlying company assets are likely to be much lower than those of traditional exchanges. We believe the added value of tokenizing liquid assets is currently

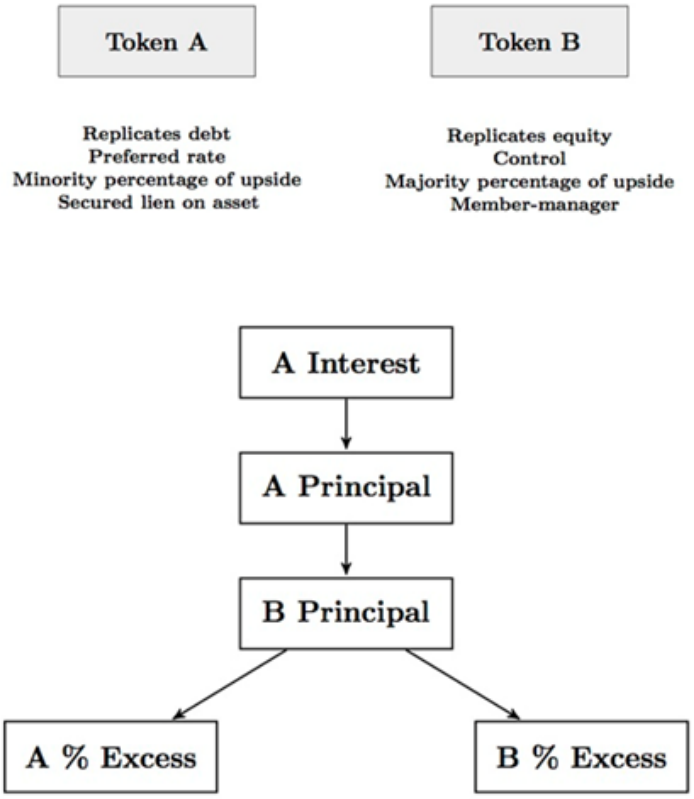


**Exhibit 1: The Two-Token Waterfall**
*Source: Lipiatt, Oved, 2018*

rather limited, simply because the existing infrastructure is relatively efficient compared to market dynamics of real assets. We think that once the benefits of tokenization become clear and observable in the case of real assets, there could be a transition to a similar infrastructure for liquid assets. However, we expect that process to be gradual.

## Tokenization is not the Same as Securitization

When researching the benefits of tokenization, some people will see parallels with securitization, which also aims to bring liquidity to illiquid assets. Unfortunately, we have seen what the consequences of securitization can be when parts of a packaged product start to deteriorate without knowing the exact impact on the overall portfolio. The securitization of mortgage-backed securities brought liquidity, but the underlying exposure in the repackaged products could not be traced. Tokenization solves this, as there is always a link with the underlying asset. Still, the repackaging of products to create more liquidity remains possible, but in this case the underlying exposure is clear to everyone and it can be diversified at one's own convenience, without having to rely on the services of third parties.

## Effects of Tokenization on Asset Management

Although tokenization is not yet widely available and has not become common practice, it is likely that over the coming decade more will be done to make this happen. Financial institutions will need to redefine their activities. This will open up new business opportunities in the area of custody, the safekeeping of real assets, token advising and token investing. The impact on the asset management industry is likely to be considerable. To start, portfolio construction would look different. One's investible

universe would expand from being based solely on equities or bonds. The difference between listed and unlisted equities or bonds would cease to exist, thus increasing the opportunity set for portfolio construction.

## Opportunity to Add Real Assets to Pension Fund Portfolios

There may no longer be a need to construct pension portfolios based on just a mix of equities and bonds, because diversification into real assets will become important as well. Irrespective of the possibilities to accomplish such portfolio construction for pensions today, this is not yet within reach for individuals. The shift from defined benefit to defined contribution pensions increases the need for diversification on a retail investor level. For some larger financial institutions, like pension funds, the prospect of removing illiquidity might not be appealing, since these institutions benefit from the illiquidity premium. However, tokenization democratizes access to real assets and thereby caters to a different group of investors than it has done historically.

We think that in this new era, asset managers will still serve an important function. It is hard for non-professional investors to have a good overview of all investible opportunities. Algorithms can help a lot, but fundamental research and views are becoming more important than ever. Determining what price to pay versus the value the investor gets is the core task of active management, and the importance of that task will increase. However, this also implies that asset managers would need to invest in new capabilities. Direct real estate experts, art experts, patent experts and many more would be needed in order to determine the value of the underlying asset, compare it to the market price and ultimately make an informed investment decision.

## Increasing the Investible Opportunity Set

The impact on theoretical asset pricing would also be profound, as the Capital Asset Pricing Model (CAPM) – which includes all assets rather than just the smaller universe of liquid assets – will be expanded by a new investible opportunity set. This would have an impact on the relative risk of equity and bonds versus the opportunity set, and would therefore affect valuations, as well, by means of the discount rate adjustment. At the moment, the efficient frontier takes into account equities, bonds, REITS and in some cases, commodities. Real assets like paintings, direct real estate or movie rights are not yet included. The reason for this is simple: there is no up-to-date pricing data and so it is impossible to include these real assets. Once they are tokenized, an active market emerges. It is transparent and can be integrated in the opportunity set, thereby shifting the efficient frontier leftwards (see Exhibit 2).

## Consequences of Tokenization for Active Management in Equities

Currently, a choice must be made between building a long-only strategy or a long-short version of a listed equity. The efficient frontier would include various sets of a listed equity with their own expected return and volatility profiles. In the case of tokenized private company assets, the opportunity set would expand beyond listed equity into private companies, which by then will not be considered private companies anymore because

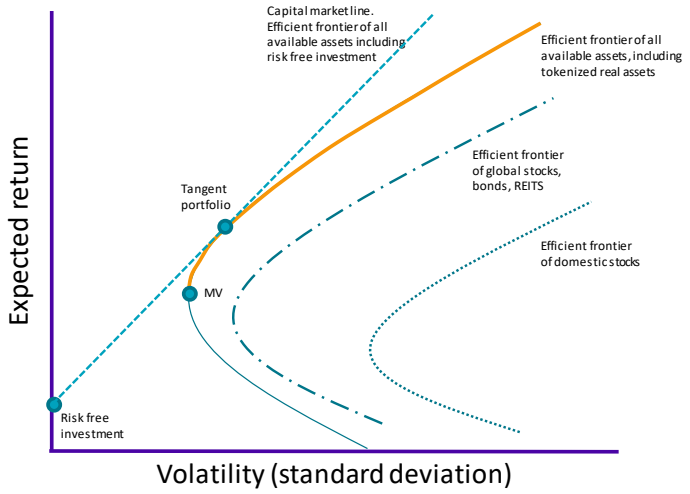


**Exhibit 2: Efficient Frontier Including Tokenized Real Assets**
*Source: Robeco Trends Investing*

of the fact that company representations in the form of tokens will have become public. However, the current dynamics in terms of the risk/return profile differ a great deal between these two worlds. That is why venture capital and private equity investment strategies differ from those of actively-managed listed equity managers. If those worlds were to converge, the skill set and investment process would have to change as well.

# Challenges to Overcome

Before tokenization can become the new normal in asset management, a couple of important hurdles need to be taken. Our expectation is that the roll-out will first take place in specific real asset class categories, like real-estate and arts. That experience can serve as a blueprint for other asset categories once proven beneficial.

## Issues to be Resolved

Although we have described some clear advantages of tokenization, there are also many obstacles that need to be overcome going forward. We attempt to categorize some of them by looking at the token itself, the underlying asset and the regulatory requirements. The list is by no means exhaustive, and it includes some practical considerations, in addition to the opportunities discussed above.

## Hurdles Related to the Token

Exhibit 3 lists some of the hurdles that may come to mind in relation to tokens. The most important consideration here is the issue of ownership and its link with the underlying asset. Do the tokens confer ownership rights and voting rights, for instance? What is the legal protection with regard to those rights in terms of regulatory enforcement? The link to the underlying asset is also critical. Once that link is broken, it undermines the value of the token. Responsibilities need to be defined, as well.

## Hurdles Related to the Asset

In Exhibit 4 we discuss some of the hurdles that are related to the underlying asset. In this case, too, the ownership rights are an important topic. If an investor owns 51% of the tokens, is he/she the legal owner of the asset? Can he/she decide to change,

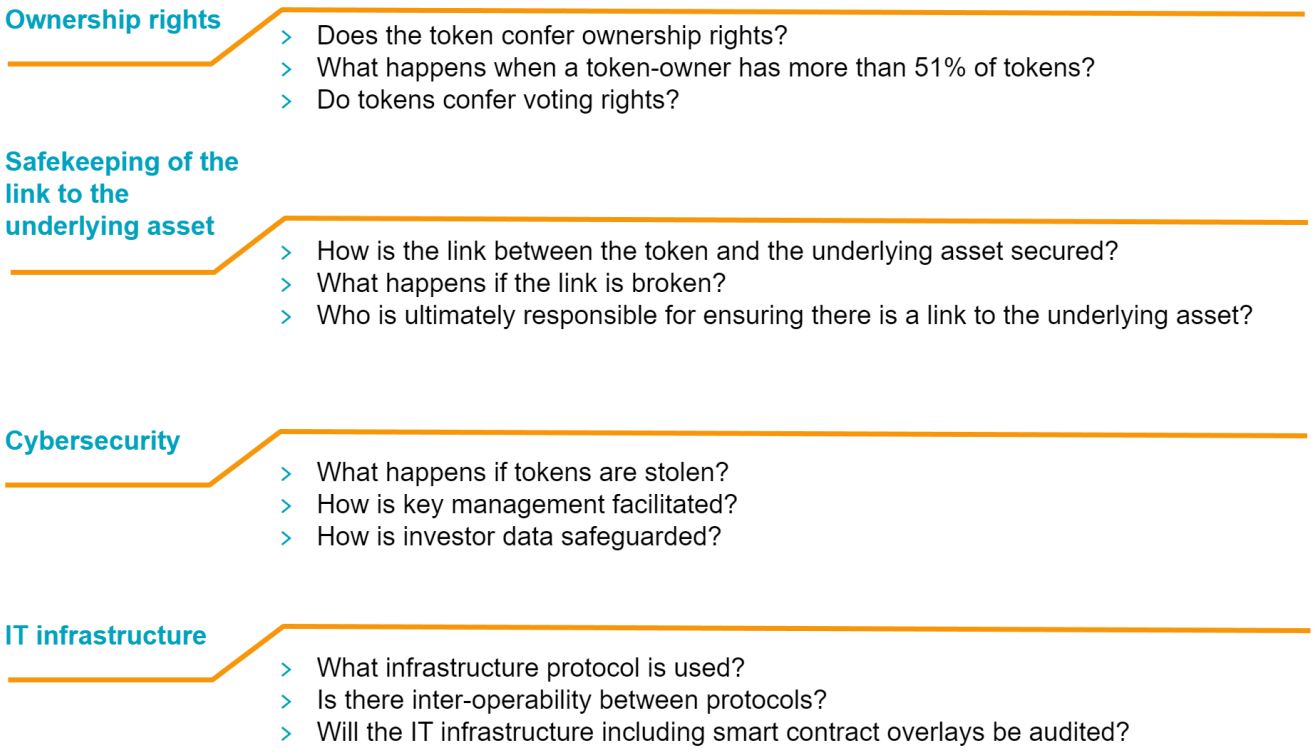


**Exhibit 3: Token Hurdles**
*Source: Robeco Trends Investing*

relocate, re-tokenize the asset? In most of the cases we have seen so far, only a minority stake of the underlying asset has been tokenized. But theoretically an art collector could double his collection by investing in tokenized assets and owning 51% of the tokens instead of having to own the entire asset. For shares, there are certain rules that apply in such cases. They also cover full ownership and the right to buy out minority stakes. These rules will need to be implemented in the token space, as well. Besides ownership rights, the underlying assets must be maintained. Paintings, real-estate and classic cars all require regular maintenance in order to protect both the asset and its value. One could charge a fee that is deducted from the token value, like the share class fee deducted from the NAV for funds. Those fees can then be used to pay for maintenance and storage costs, but that process needs to be formalized and unified across real asset tokens.

## Hurdles with Respect to Regulation

Exhibit 5 illustrates some of the regulatory hurdles. Even if token- and asset-related hurdles are resolved by service providers, it is still not clear how the regulators would react to the token offering. First, regional standards are disappearing, because tokens are global in nature. Therefore, global cooperation among regulators would be required, and this process would take years to complete. Global cooperation is possible – as we have seen in the case of accounting standards that have migrated over the last several years – but this is not easily achieved. What makes it particularly difficult is the fact that tokenization is a highly technical topic

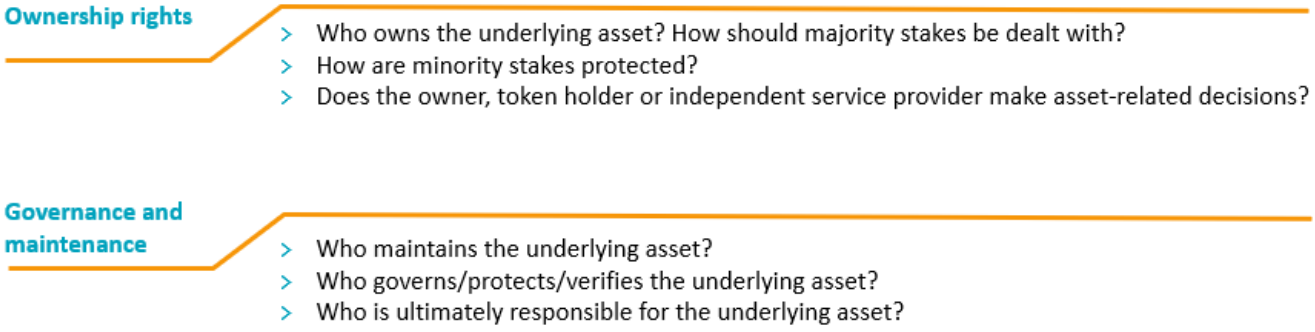


**Exhibit 4: Asset Hurdles**
*Source: Robeco Trends Investing*

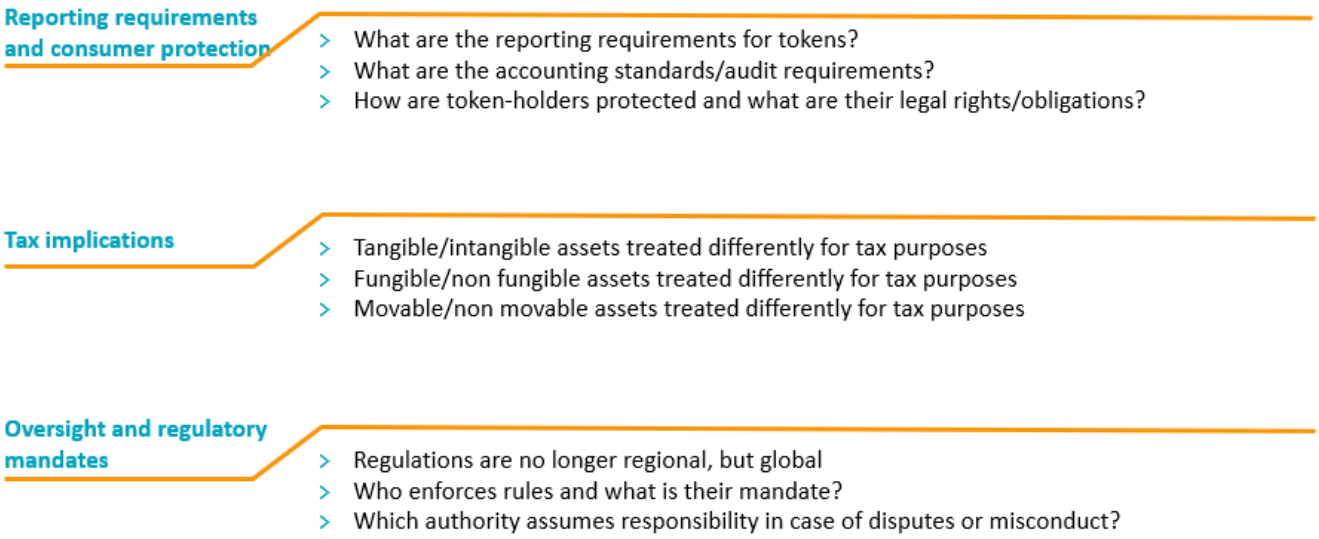


**Exhibit 5: Regulatory Hurdles**
*Source: Robeco Trends Investing*

that is often misunderstood by regulators given that they do not always have the required skill set to make a full assessment and to conduct oversight.

In addition, the tax authorities would have to find a way to enable uniform treatment of tokens. The 'Big 4' accounting firms already started making an assessment of the tax treatment of tokens. Given the virtual and global nature of tokens, it should not be hard to optimize regulatory and tax arbitrage for token holders. As we have seen in the case of cryptocurrencies, simply forbidding ownership would not work. Therefore, a more proactive approach would be required in order to create regulatory frameworks that are comparable to equities and bonds. They should be capable of providing consumer protection on the one hand, and freedom of capital on the other.

## Conclusion

Real asset tokenization is an interesting innovation that follows in the footsteps of the introduction of blockchain technology in 2009. There are many potential benefits of tokenizing real assets. It would improve liquidity, expand the investible universe and create fractional ownership that provides options for better portfolio optimization. These benefits are not offered by the existing infrastructure – due to the local characteristics of the alternatives currently on offer and the inefficiencies related to those technological solutions. However, there are many hurdles that need to be cleared in order for tokens to become mainstream investment vehicles like the ones we are familiar with today. We expect to see experimental use cases in the near future, with companies pushing the boundaries of the existing regulatory frameworks. This would enable the development of new rules, which, once successful, could be globalized and expanded into other asset categories.

Although it is still in its infancy, we think tokenization would be beneficial for exchanges. There are several exchanges today that are investing heavily in blockchain technology. They do it in order to facilitate trade in private companies and alternative assets. This might create challenges for brokers and investment intermediaries. The distribution model would change substantially, and the global character of token exchanges and token brokerage services would mean some of the current models would have to be adapted in order to remain relevant.

## Endnote

1. Maniam, Cross, *Electronic Trading and Financial Markets*, 2003.

## Author Bio

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