



Tokenisation of Alternative Investments



For professional investors only

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01 Executive Summary

Alternative investments are attracting ever more investors. According to the Chartered Alternative Investment Analyst (CAIA) Association, in the fifteen years between 2003 and 2018 the size of the global investment market doubled, while alternative investments almost tripled to USD 13.4 trillion. This would mean around 12% of all worldwide investments were allocated to alternative investments. CAIA Association members expect this allocation to rise to 18-24% of the global asset market by 2023.¹

Alternative investments include hedge funds, private equity, venture capital and private debt as well as real assets such as real estate, infrastructure, and natural resources. These asset classes are generally less liquid, less accessible and less transparent in terms of information than traditional investment assets, appearing to be a perfect target for tokenisation. In that regard, tokenisation via blockchain technology could have a significant beneficial impact for all investors in and managers of alternative assets.

Tokenisation could help to democratise alternative investments by providing accessibility to more investors, while enabling asset managers to innovate by creating alternative assets tokens, thereby furthering the expansion of their potential product mix. The tokenisation process is not a "one-click" affair; it involves multiple steps, from deal structuring, digitisation, primary distribution, post-token management, and certainly clear regulatory standards to enable secondary market trading. Investor education, as always, is a most important wrapper in making any innovation sustainable.

Tokenisation contributes to addressing some of the inherent challenges – for both investors and asset managers – of the alternative asset classes by:

- **Improving Liquidity**

The tokens can be traded on secondary markets

- **Enabling Faster, Cheaper Transactions**

Less complexity and better operational efficiency reduces transaction and lifetime costs

- **Offering Greater Transparency**

The token holder's rights, legal responsibilities and record of ownership can be embedded into tokens

- **Broadening Access**

Tokens provide access for more investors to a previously unaffordable or insufficiently divisible asset class

¹ CAIA Association: The Next Decade of Alternative Investments. <https://caia.org/next-decade>

However, technology is not the remedy for all the challenges of alternative investments. Creating a secondary market does not automatically result in liquidity, but we believe it is the first step. Some constraints remain, for example in the area of hedge funds, private equity and natural resources, where a sizeable universe is needed to be able to create a portfolio of tokens for diversification.

For venture capital and private equity, the tokenisation process cannot necessarily streamline the due diligence process as it can in the private debt and infrastructure markets. For real estate investment, many constraints have been identified as it is currently one of the most tokenised assets in the alternative field. The major constraint here is that real estate developers are looking into tokenisation asset by asset, so the issue of scalability needs to be addressed.

For private debt, covenants can be difficult to code into smart contracts, potentially creating a challenge in the life management of the tokens. Infrastructure assets are heavily regulated, which can make it more difficult to construct a smart contract.

In addition, the benefit of greater liquidity does not outweigh the fact that alternative investments are not a silver bullet for achieving target returns. Hedge funds often rely on financial market inefficiencies to generate alpha. These inefficiencies are sometimes fleeting and often captured in part via an illiquidity premium. Venture capital is a high risk and high return strategy. Investors are bound to lose money on some individual deals, but they count on the outstanding deals to deliver big wins such that the overall portfolio still meets the target return. Private equity has huge return dispersion. The returns from the best managers and the worst managers are materially different. Real estate and private debt are characterised by information asymmetry and lack of transparency. Infrastructure and natural resources require specialized skills and scale. End investors need to be capable of understanding and quantifying the risk they are adding to their portfolio.

The world still faces many challenges with a huge need for capital. It is estimated that some USD 15 trillion is needed by 2040 for global infrastructure to keep pace with global GDP growth.² Real estate accounts for one-third of global greenhouse emissions and consumes 40% of the world's energy,³ thus environmental upgrades can have a positive impact on our environment. The 'New Economy' such as space business and artificial intelligence holds great promise and requires capital from a combination of private investments, public-private collaboration and government incentives for breakthrough technology along with socio-institutional innovation.⁴

² World Economic Forum 2019. The world is facing a \$15 trillion infrastructure gap by 2040

³ World Economic Forum 2020. Here's why real estate finance needs to build in sustainability

⁴ World Economic Forum 2020. Markets of Tomorrow: Pathways to a new economy

Can traditional sources of capital still be sufficient to provide the required funding if global debt rises to USD 277 trillion by 2020, or 365% of world GDP because of a weaker global economy and costly pandemic relief measures?⁵ Could tokenisation provide a bridge to a wider pool of investors and create a new source of financing for private markets such as infrastructure, real estate, and private equity? Unlocking the growing pool of retail capital could create an essential source of future funding.

Like any major disruption, tokenisation offers the scope to shape a new financial landscape, creating opportunities for both investors and asset managers. The potential greater access will no doubt raise the question of protection for investors. Tokenisation is still at an early stage and there is an opportunity for industry participants, product providers and regulators to collaborate and shape the outcome.

Importantly – and most saliently reflecting our support for an ‘investor first ethos’ – tokenisation brings potential for greater access and diversification benefits to end investors, whether they are retail, high net worth individuals or institutional. It also opens the possibility of access to other new types of assets such as art, wine – or even revenues from sports teams. The result for the end investors would be better accessibility to portfolio options with greater potential for long-term returns commensurate with their risk appetite, and increased ability to better weather market cycles.

This paper is a pioneer in exploring the broad spectrum of applying tokenisation across the entire range of alternative asset classes. We first set the scene by explaining the basic principles of blockchain technology and tokenisation. Then we introduce the general concept of alternative investment tokenisation, before discussing the implications and practicalities of this in relation to each alternative investment type.

When considering each alternative asset class, we assess their market size, the challenges involved and how tokenisation would be applied to them. We also present the various risks and constraints of tokenisation related to each particular asset. We take a more in-depth look at the seven different asset classes: hedge funds, private equity, venture capital, private debt, real estate, infrastructure, and natural resources by drawing on joint expertise of BNP Paribas Asset Management, Liquefy and CAIA Association. Finally, we discuss the likely future impact of tokenisation for banks, asset and wealth management.

5 World Economic Forum 2020. Debt to GDP is rising around the world

02 About the Authors

This paper reflects the complementary expertise of Liquefy, CAIA Association and BNP Paribas Asset Management in investigating the benefits and challenges tokenisation offers in the field of alternative asset management.



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Since founding in 2018, Liquefy has been widely recognised as the leading tokenisation expert in Asia with a focus on late-stage start-ups, real estate and funds. In 2019 the company conducted the first real estate tokenisation in Hong Kong and the largest real estate tokenisation project of the year, a luxury Mayfair hotel worth \$600m USD. Simultaneously, Liquefy also entered the Dubai market through the formation of a joint venture with the ruling Al Maktoum family. In October 2020, Liquefy became the first company globally to obtain a financial license in the UAE for online distribution and OTC trading of tokenised assets. Liquefy has built a diverse client base covering governments, funds and real estate developers. It is currently backed by multiple reputable Asian families and global investors spanning the US, China, Hong Kong and the Middle East.



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The Chartered Alternative Investment Analyst (CAIA) Association is a global professional credentialing body dedicated to creating greater alignment, transparency, and knowledge for all investors, with a specific emphasis on alternative investments. A member-driven organization representing professionals in more than 95 countries, CAIA Association advocates for the highest ethical standards.

Since 2002, CAIA Association has sought to serve investors by educating industry stakeholders on the most current knowledge and best practices across the ever-changing landscape of alternative investments. Through credentialing of investment professionals, advocating with regulators and senior leaders, and developing world class thought leadership, CAIA Association aims to raise the standards of the industry.

CAIA Association's mission is to improve investment and societal outcomes of capital allocation through professional education, transparency, and thought leadership across all investor alternatives in our industry.

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Paribas Asset Management is the asset management arm of BNP Paribas, one of the world's foremost financial institutions, and offers high value added solutions to individual savers, companies, and institutional investors. It has a broad range of skills in four investment divisions: Equities, Fixed Income, Private Debt & Real Assets, and Multi-Asset, Quantitative and Solutions (MAQS). Sustainability is at the heart of BNP Paribas Asset Management's strategy and investment decision-making process, making an active contribution to energy transition, environmental protection and the promotion of equality and inclusive growth. Its aim is to achieve long-term sustainable investment returns for its clients. BNP Paribas Asset Management has assets under management of EUR 445 billion* (as at 30 September 2020), with more than 500 investment professionals and almost 500 client servicing specialists, serving individual, corporate and institutional clients in 71 countries.

* EUR 598 billion of assets under management and advisory as at 30 September 2020

03

Basics of Blockchain and Tokenisation

Blockchain
Tokenisation
Benefits of Tokenisation
Process of Tokenisation

BLOCKCHAIN

Blockchain is a type of distributed ledger technology that allows digital transaction data to be recorded simultaneously across multiple sites without a centralised administrator. It has three main characteristics.

First, the ledger is distributed, meaning that data is simultaneously stored and accessible across multiple nodes. Second, it is decentralised; data is not controlled by a single administrator, which facilitates a trustless system. Third, it is immutable. The cryptographic algorithms that underpin blockchain mean that once a block is added it is nearly impossible to change.

This creates consensus among all participants on a single source of 'truth' as all the information stored on the blockchain is (nearly completely) tamper proof, resilient to attacks, accessible by all participants at any time and controlled by no central authority.

As a result, blockchain technology is particularly valuable where there is a demand for high data security and data sharing.

TOKENISATION

Tokenisation can be defined as the process of creating a digital representation of a non-digital asset; the digitisation of an asset. The underlying asset could be anything from financial products like shares and bonds, or real tangible assets such as real estate, art, collectibles or sports teams. Tokenisation enables the digital transfer and management of these real 'off chain' assets in the digital world. Tokenisation is not a new idea, but its execution using blockchain, a distributed ledger technology, opens a new realm of possibilities to create, record and transfer the tokens.

Security tokens are made available as a security token offering ('STO'). Unlike an initial coin offering ('ICO'), the value of the tokens issued are backed by the real 'off chain' asset.

Crucially, a tokenised security is a 'real world' security that exists independently off-chain,

with the added feature that it is represented by tokens that are embedded on chain.

There are several types of tokens that can be used for a tokenised security, including:

 **Security tokens** which represent ownership or interests associated with the underlying asset (e.g. ownership, right to dividends)

 **Utility tokens** which give holders access to specific rights and privileges such as use or access rights to a building or a service

 **Exchange tokens** which are used as a form of payment; one example is Bitcoin

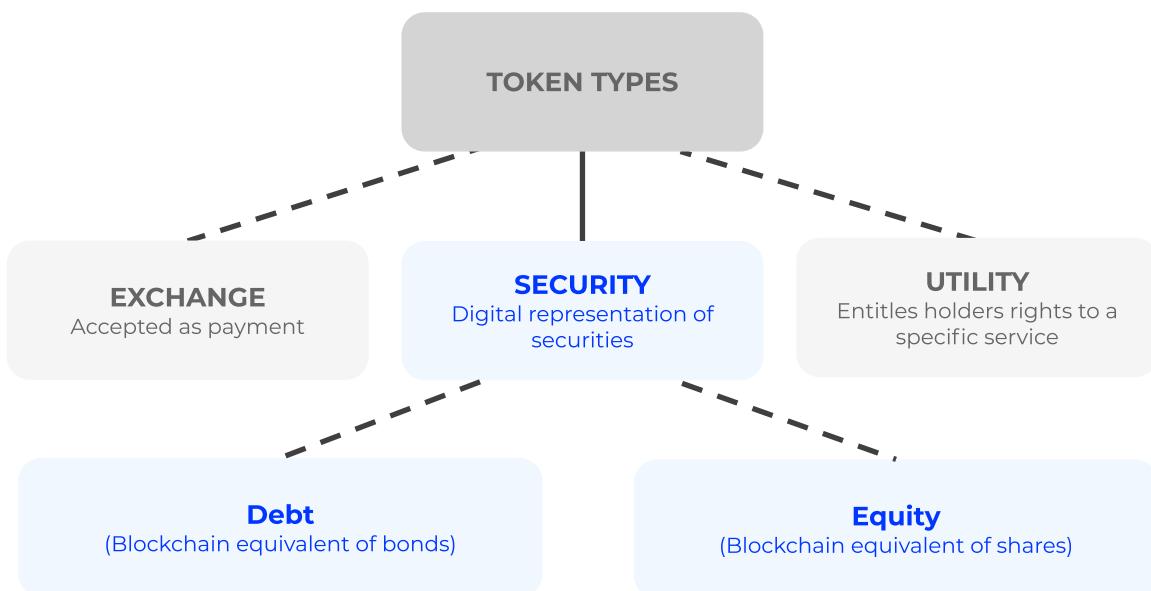
In passing, it should be noted that in practice, some tokens may be 'hybrids' exhibiting a mix of different characteristics, so token

classification may not always fall neatly into discrete categories.

In addition to the three general token types mentioned above, there are **fungible** and **non-fungible** tokens.

- **Fungible tokens** are interchangeable, such as exchange tokens.
- **Non-fungible tokens** are not interchangeable with each other and each one is valued uniquely.

For example, non-fungible tokens are those that represent fractional ownership in a single piece of art or collectible item. They can be programmed to contain information such as ownership rights, share classes and reference numbers as well as specifics such as location, temperature and age. Whether issued tokens are fungible or non-fungible will depend on the specific requirements of each case.



The three main token types (note that in practice tokens may have a mixture of these characteristics as a hybrid token). Within the security token taxonomy, there are debt and equity tokens. Debt tokens represent a debt instrument that entitles token holders to the repayment of principal and interest. On the other hand, equity tokens are comparable to owning stock and represent fractional ownership of the underlying asset.



The focus of this paper will revolve around tokenisation involving **security tokens** (those that represent an ownership / economic interest for token holders), rather than the issuance of exchange or utility tokens.

BENEFITS OF TOKENISATION

Beyond the typical advantages associated with digitisation such as speed, convenience and accessibility, the use of blockchain technology results in the operational efficiencies that come with smart contracts, as these are programmable actions that can automate processes and save time. Using blockchain to tokenise an asset allows the tokens representing the asset to be recorded, stored and managed digitally in an immutable, distributed way. There are six core benefits to this approach:

Fractionalisation

The asset can be split into far greater amounts than using traditional methods. This lowers the entry barriers to investments that have high minimum investments and lower ticket numbers.

Data transparency

Data can be stored and accessed securely on the blockchain due to the immutable and distributed nature of blockchain technology.

Shorter settlement time

Tokens can be traded 24/7 with a record that can be updated within minutes or hours (depending on the underlying blockchain), compared to traditional T+3/T+2 settlement times.

Operational Efficiency

Processes such as compliance, white-listing, escrow account management, dividend distribution, corporate action management and drag-along actions can be automated with smart contracts.

Flexibility

Tokens can be customised with unlimited share classes and flexible fee structures at low operational cost. Funds can be fractionalised, enabling greater flexibility in portfolio construction and exposure diversification.

Liquidity

Tokens can easily and securely be exchanged on a secondary OTC market securely using blockchain. The valuation of the core underlying asset may increase due to the possibility of secondary market trading and greater liquidity, thereby reducing the 'liquidity premium' of an asset.

PROCESS OF TOKENISATION

There are 4 main stages in the lifecycle of a tokenised security:

- 1 Tokenisation**
- 2 Primary Distribution**
- 3 Post Token Management**
- 4 Secondary Market Trading**

The most value tokenisation adds in the life cycle of a tokenised security is shaded in blue.

The tokenisation phase includes planning, deal structuring and the digitisation of the underlying asset. Following tokenisation, primary distribution and corporate action management would see many processes enhanced by digitisation, blockchain technology and smart contracts. Once the security has been tokenised, there can often be a flourishing secondary market for the sale and purchase of these tokens. Each of these steps is explored further below.

1. Tokenisation



Deal
Structuring



Digitisation

2. Primary Distribution



Investor
Management



3. Post Token Management



Corporate Action
Management



4. Secondary Market Trading



Secondary
Market Trading



1.1 Deal Structuring

Irrespective of the technology used, the structuring of the deal in any security offering remains crucial. With any technology it is important to consider a) where it can best be drawn upon to unlock value in the value chain; and b) its inherent limitations in the processes it optimises. For example, blockchain technology does not absolve parties from the responsibility of ensuring the information provided on the blockchain is verified diligently (i.e. it does not solve the 'garbage in, garbage out' conundrum)  or that the deal structure is designed robustly.

In a security token offering (STO), tokens are issued by an entity (natural or legal) to an investor. The STO typically confers specific rights and obligations to token-holders and clarifies the form of returns they will potentially receive for their investment.

During deal structuring, decision-makers must consider their business needs and the factors that could affect key aspects of the deal, such as:

- Business objectives
- Purpose and usefulness of tokenisation
- Fee structures
- Capital commitment of investment
- Liquidity demanded
- Share classes
- Valuation and trading price
- Changes in valuation due to tokenisation
- Relevant regulations and jurisdictions
- Tax implications

Decision makers must consider the applicable regulatory and governance issues. Unlike other nascent financial assets and financing options that also use distributed ledger technologies – such as cryptocurrencies and initial coin offerings ('ICOs') – STOs have relatively clear regulatory requirements that set out licensing, risk monitoring and reporting standards for token issuers, service providers and investors.

 The garbage in, garbage out conundrum refers to the idea that any output from an information system is only as good as the information put in. In other words, poor information input will produce poor information output.

Security Token Offering (STO) : Regulation in Hong Kong

In Hong Kong, STOs are typically treated as securities; the status of which is determined on a case-by-case basis. The HKSCF takes a 'substance over form' and technology agnostic approach to determining whether the products will be classified as a security. The lynchpin in determining whether a token is security is to ask if the token represents ownership or an economic right/interest from the underlying asset. If so, it is subject to a regime that governs the token's offer, issuance, marketing, distribution, investment management, and the operation of a platform for its secondary trading.

1. TOKENISATION

2. PRIMARY DISTRIBUTION

3. POST TOKEN MANAGEMENT

4. SECONDARY MARKET TRADING

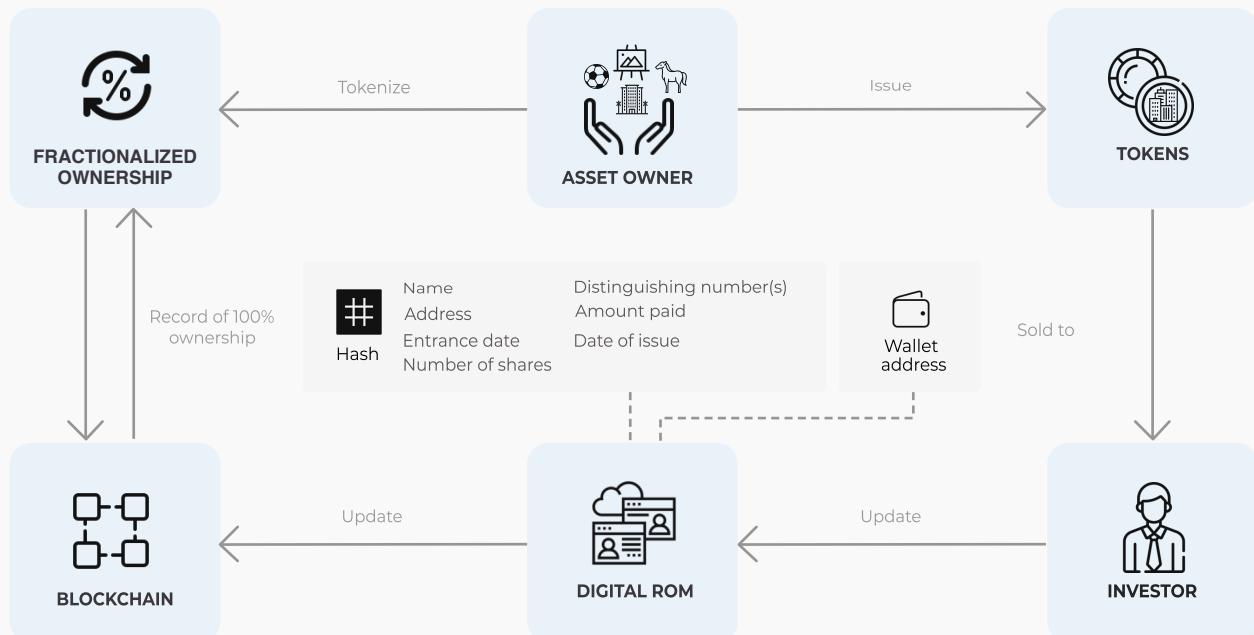
Treated as a traditional security, conventional governance and regulatory frameworks of securities apply, such as legal ownership, investor know-your-client (KYC) detailing and compliance, accounting and investment due diligence. However, it should be noted that tokens may also be classified as 'other financial instruments including, but not limited to, futures contracts, stored value facilities, insurance products, derivatives, structured products, commodities, e-money, loans, deposits and bonds.'

In Q3 2020, HKSFC approved, in principle, Type 1 (dealing in securities) and Type 7 (automated trading services) licenses for a virtual asset trading platform under its virtual asset licensing framework. Once approved, brokerages will be able to offer automated trading services for virtual assets, including the issuance of security tokens, signalling a step toward financial innovation and technological adoption.



1.2 Digitisation

Once the deal structure is finalised, the underlying asset can be tokenised using blockchain technology. The asset can be fractionalised into any number of tokens. The tokens can then be sold and issued from asset owners to investors. Each investor has a unique digital wallet holding relevant information such as name, address, entry date, shares, numbers, amount paid, etc. Each transaction will be recorded, updated and managed on a digital record of members ('ROM').



The issuance of a digital tokenisation can greatly increase liquidity by increasing fractional ownership while also capturing operational efficiencies with automated digital transaction settlement and management. Asset owners unlock liquidity in previously illiquid assets.

1. TOKENISATION

2. PRIMARY DISTRIBUTION

3. POST TOKEN MANAGEMENT

4. SECONDARY MARKET TRADING



2. Primary distribution

After relevant KYC, AML, suitability and accreditation checks for investors are carried out and passed, investors can be whitelisted and tokens can be issued. Subscription allocation is carried out prior to deploying the token, recording transactions on the ROM and distributing smart contracts. Token issuers retain authority to finalise the transaction throughout the process, whether this is after compliance protocols are run, while screening is conducted, or before smart contracts are executed.



3. Post Token Management

By leveraging smart contracts, programmable actions can be executed that save time and money. Such actions include managing real time alerts, issuing shareholder updates and communication, initiating and completing voting activities, distributing dividends / interest / principal, issuing new tokens, freezing and reversal, and conducting drag along activities, to name a few.



4. Secondary Market Trading

The development and clarification of global regulatory frameworks in response to asset tokenisation will support a thriving secondary market where tokens can be traded, with transactions recorded near instantaneously. This will increase the liquidity of an asset but may also positively affect the valuation of the asset itself.



04

Tokenisation of Alternative Investments

Alternative Investments

Use of Tokenisation Across the Alternative Investments Industry

Democratisation

ALTERNATIVE INVESTMENTS

Alternative investments may best be described as any financial asset that does not fall into a conventional investment category such as stocks, bonds or cash investments. Typical alternative investments include hedge funds, derivatives and private markets – which include private equity, venture capital, infrastructure, real estate, commodities and natural resources. Beyond that, fine art, wine, and antiques also sit alongside next-generation alternative investments such as e-betting and gaming. These all fall within the ambit of alternative investments.

Alternative Assets Becoming Mainstream

Appetite for alternative investments has grown considerably in recent years, reaching a worldwide assets under management (AUM) value of around USD 13.4 trillion. Traditional assets account for over USD 102 trillion. Between 2005 and 2011, the AUM of alternative assets grew by 14.2% compared to just 1.9% for traditional assets.⁶

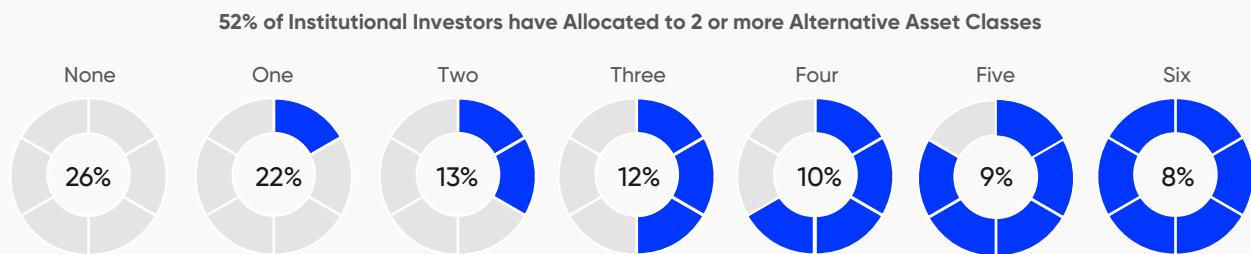
2018 Global Investible Market (in US\$ Trillions): Alternative Assets Increased to 12% of 2018 Global Investible Market from 6% in 2014



Source: Comparison of Traditional Assets versus Alternative Assets from "Next Decade of Alternative Investments 2020 Report", CAIA Association (2020)

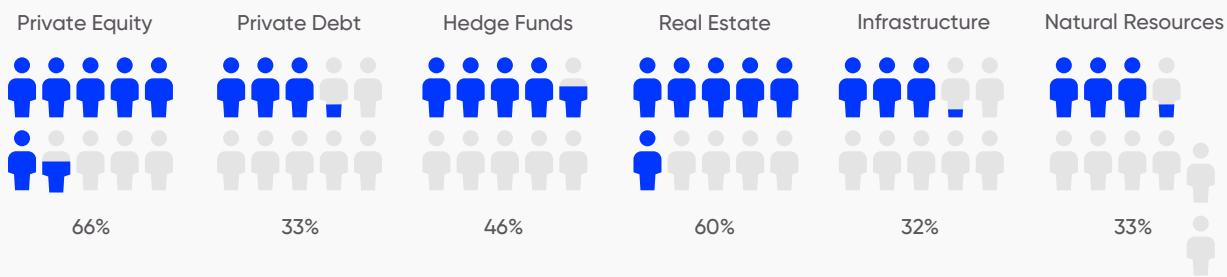
⁶ Mc Kinsey (2012): The Mainstreaming of Alternative Investments

In recent years, participation in alternative investments has grown exponentially and we are seeing an appetite for allocations across a widening range of asset classes. Growth in all sectors is expected, some more strongly than others:



Source: Institutional Investors by Number of Alternative Asset Classes Invested in from "Alternative Assets H1 2020", Preqin Investor Outlook (H1 2020)

Top Three Alternative Asset Classes for Institutional Investors: Private equity, real estate and hedge funds

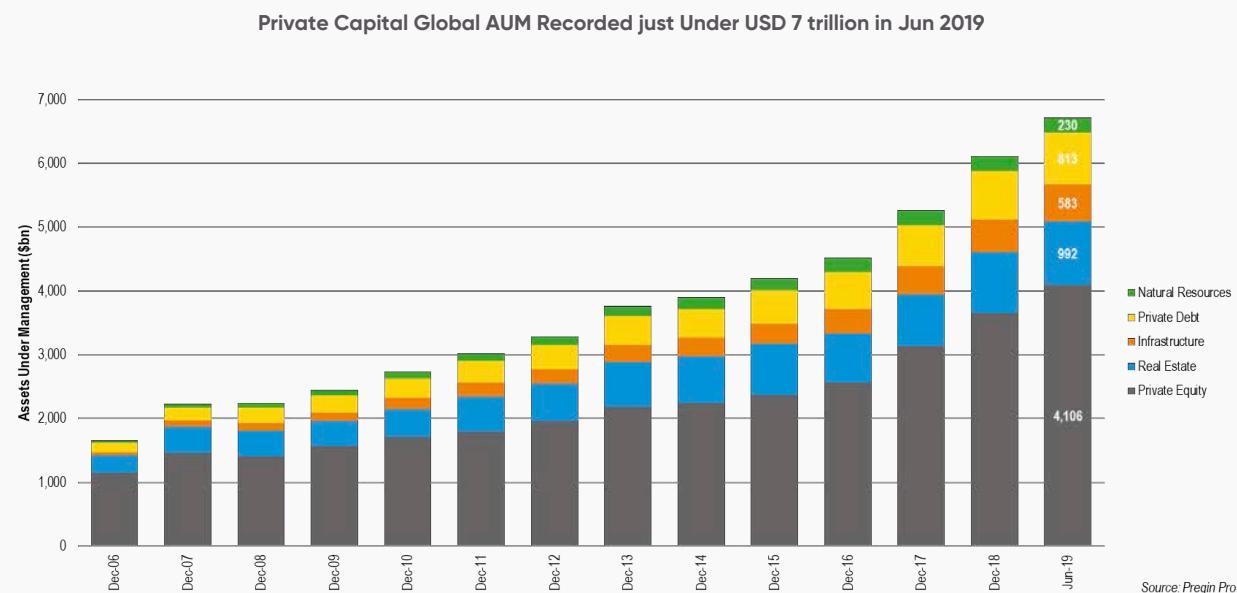


Source: Institutional Investors by Number of Alternative Asset Classes Invested in from "Alternative Assets H1 2020", Preqin Investor Outlook (H1 2020)

Increased Allocations to Private Markets

Of particular note is the investor appetite across private markets. This sector has seen a breakneck compound annual growth rate, and enjoyed significant capital allocation (especially over the last three years), despite the typically higher fees coupled with illiquidity. Investors looking for above-average performance and access to illiquidity premiums have flocked to the sector. The secular fall in interest rates in bond markets across the world and potential distortions in public equity markets have led investors to consider private markets as offering a viable alternative.

Additionally, during this period, private market asset managers have significantly increased their legitimacy and expertise, with many establishing robust track records and a strong following. This is demonstrated by increased institutional investor capital allocations around the world. It is widely anticipated that appetite and attention to private market asset managers will enjoy sustained demand ahead. Further, given existing trends, it is likely that private markets will see a disproportionate share of the growth in investment allocations in terms of greater asset inflows. A further trend demonstrated across much of the private markets industry is a disproportionate allocation of capital flowing to larger funds where AUM exceeds USD 5 billion. Both bifurcation and institutionalisation within the sector are notable.



Source: Global Assets Under Management by Asset Class from Preqin Pro, CAIA Association (Aug 2020)

There is significant fundraising growth across the entire private capital landscape. Aggregated annual inflows have exceeded USD 1 trillion for each of the last three years.⁷

Furthermore, private capital funds have a deep well of available assets to deploy; globally, there are record levels of available dry powder totalling USD 2.3 trillion at the end of 2019.⁸ This provides fund managers with the flexibility to invest as and when attractive opportunities arise.

USE OF TOKENISATION ACROSS THE ALTERNATIVE INVESTMENTS INDUSTRY

The asset management industry is poised for significant future disruption. It faces a considerable range of challenges, with both fee compression and mounting cost pressures forcing swift and decisive changes to compete and survive. A commitment to robust product innovation is one crucial element of competitive advantage being considered by many, and with it, the hope of maintaining their market position and relevance in a rapidly evolving landscape.

Alternative Investment is an Important Revenue Driver

Even though revenues from the management of alternative investments equate to around half of the total raised by the global asset management industry, it sits at just 16% of total assets under management.⁹ Looking ahead, it is anticipated that for many asset managers, revenues from the provision of alternative investment solutions to their clients will grow considerably and continue to make a marked contribution to their bottom-line revenues. Such a prospect will undoubtedly be

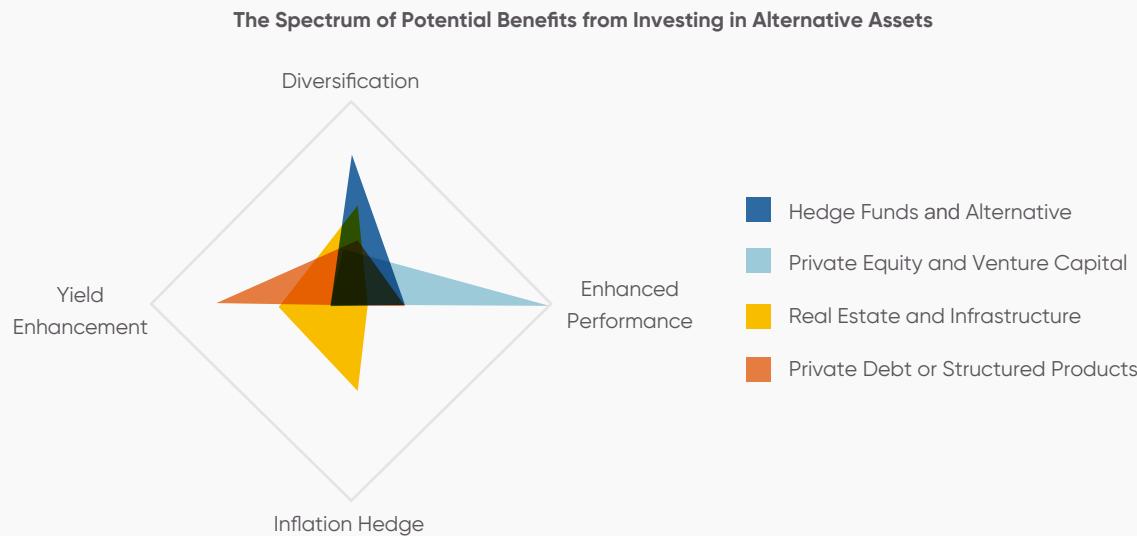
7 Preqin Pro (2020)

8 Preqin Pro (2020)

9 Boston Consulting Group : Protect, Adapt, and Innovate (2020)

fuelled by investors' increasing demand for greater performance, uncorrelated returns, lowered illiquidity premiums and greater access to diversification. Many investors are seeking to resolve the challenge of a widening gap between the performance of the assets they own and their ongoing liabilities. This suggests to us that the growth of alternative investments will remain considerable.

In such a context, it is no surprise that many asset managers are looking to expand their product mix and their capabilities, and that they are planning to make the most of this opportunity filled landscape to provide additional investment options to a wider investor community.



Source: CAIA Association members survey results from "The next decade of Alternative Investments", CAIA Association (Aug 2020)

It is therefore, timely to see the increasing convergence between fintech companies and financial institutions. This is undoubtedly accelerating the acceptance of technological advancements and the adoption of digitalisation. For example, artificial intelligence will rewrite how the future investment industry looks, operates, and evolves.

With greater implementation, technological solutions that eliminate process duplication and reduce operating costs – critical factors in the assets-under-management battle – should provide a significant knock-on effect in terms of overall efficiency and enhanced product features.

A key contributor here is the adaptation and use of blockchain technology. Blockchain is markedly transforming how assets are issued, traded, cleared and settled. Product mixes, asset management capabilities and client experience differentiation are likely to evolve to fit the new realities of what lies ahead, and to rely on technological advancement and greater utilisation of blockchain technology.

Considering how the adoption of passive investment radically changed the landscape of mutual fund investment, there is compelling evidence that the growth in adoption of tokenisation will do the same for the investment industry – including the alternative investment community. With real assets, ownership is binary: there is only ownership and non-ownership. Tokenisation could play a crucial role, and lower the barriers of entry to real asset investment.

Tokenisation has already proven successful in several fields. Of note are several real estate product initiatives, an area of the industry valued at more than USD 300 trillion. The real estate sector – which is ordinarily illiquid – is well suited for the choice of drawing upon blockchain infrastructure advancements, facilitate tokenisation and provide for the automation of electronic trading. The lessons learnt from real estate's successes will pave the way for other private market investments to look at the potential of tokenisation to enhance the accessibility of their product offerings. For the entire alternative investment industry, we believe there will be a considerable level of take-up of this approach.

DEMOCRATISATION

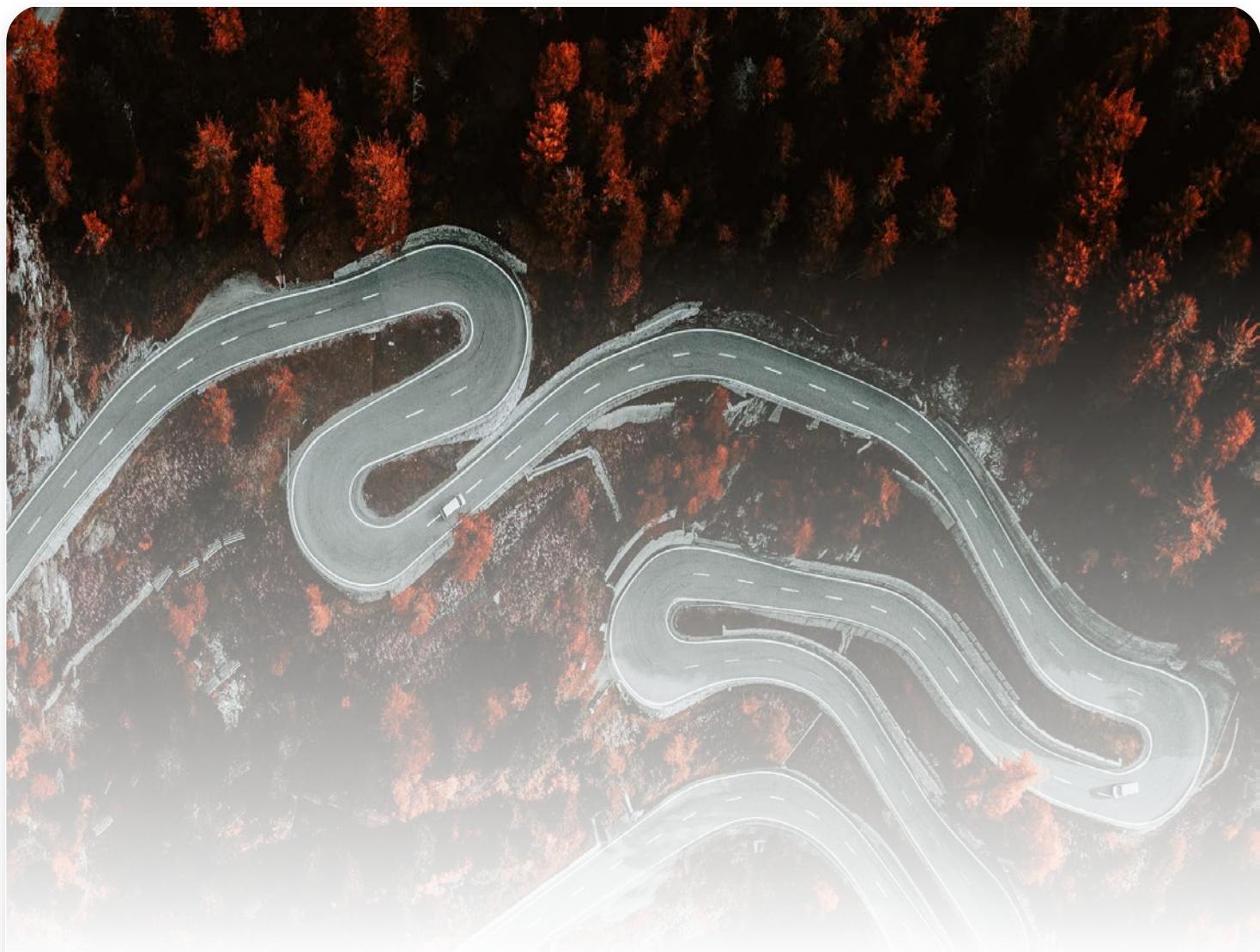
A further benefit of tokenisation is the ability for alternative asset investments to be democratised, i.e. made more accessible to a wider and more diverse range of investors.

...Democratise but protect

... is a precept that features firmly in the CAIA Association's recent whitepaper, "The Next Decade of Alternative Investments: From Adolescence to Responsible Citizenship". Greater access to an increased investment opportunity set for a wider investor audience will mean the need to ensure that there are sufficient safeguards in place. It remains to be seen whether this will be achieved via regulatory changes (some of which are already materialising around the world), a widening of the required associated fiduciary professional skills (as a pre-requisite before investments are possible), or via innovative technological tools that help to educate and inform. Various methods are likely to be adopted or blended to assist the adoption of tokenisation.

In effect, tokenisation makes an illiquid asset class liquid, thereby reducing the entry barriers that many investor segments face today. To date, investment access for many alternative investment targets have been overwhelmingly acquired by those who can commit significant capital allocations, such as institutional / sovereign wealth / pension and superannuation funds, or ultra / high-net-worth-individuals (also known as 'professional investors'). Typically, retail investors lack access to alternative investments.

Current global economic growth in Asia is robustly underpinned by major demographic changes within the region, wealth accumulation, and a significant switch in the proportion of wealth generation to the younger population. Middle classes are expanding rapidly, especially where the young / Gen Z (those born after 1996) are concerned. This growing base of emerging consumers will significantly power expansion of product innovation driven by technological expectation and increasing demands. With widening adoption and the frontiers of the digital economy ever expanding, a global "digital-by-default" mentality is taking hold, which will be particularly favourable for the tokenisation of types of investment that are currently largely inaccessible.



05

Overview of Alternative Investment Tokenisation

Hedge Funds
Private Equity
Venture Capital
Private Debt
Real Estate
Infrastructure
Natural Resources

HOW TOKENISATION ADDRESSES THE CHALLENGES

Greater transparency

Token-holder's rights and legal responsibilities as well as record of ownership can be embedded into tokens.

More inclusive access

Increased access to more investors to previously unaffordable or insufficiently divisible asset class.

Faster/cheaper transactions

Reduced transaction and lifetime cost through lower complexity and better operational efficiency.

Better liquidity

Tokens can be traded in secondary markets.

OVERVIEW

Hedge Funds



MARKET SIZE

- 77%
- 19%
- 3%
- 1%

CHALLENGES

- Lack of transparency
- Limited Access
- Non-normal returns
- Lock-up period

RISKS / CONSTRAINTS

- Requires a sizeable universe of hedge funds to construct a portfolio
- Liquidity hinges on functioning secondary market.

Private Equity



MARKET SIZE

- 54%
- 21%
- 24%
- 4%

CHALLENGES

- Lack of access
- Need for diversification
- Illiquidity
(5 to 7 years lock up)

RISKS / CONSTRAINTS

- Requires a sizeable universe of private equity funds to construct a portfolio
- Private equity requires more complex due diligence
- Liquidity hinges on functioning secondary market.

Venture Capital



MARKET SIZE

- 43%
- 11%
- 42%
- 5%

CHALLENGES

- Illiquidity
(5 to 7 years lock up)

RISKS / CONSTRAINTS

- Venture capital requires more complex due diligence
- Liquidity hinges on functioning secondary market.

Private Debt



MARKET SIZE

- Yellow: 61%
- Grey: 30%
- Orange: 7%
- Blue: 3%

CHALLENGES

- Lack of transparency
- Limited access
- Non-normal returns
- Lock-up period

RISKS / CONSTRAINTS

- Requires a sizeable universe of hedge funds to construct a portfolio
- Liquidity hinges on functioning secondary market.

Real Estate



MARKET SIZE

- Yellow: 58%
- Grey: 27%
- Orange: 10%
- Blue: 4%

CHALLENGES

- Lack of customization (limited to shares)
- Long settlement time
- Illiquidity and lumpiness

RISKS / CONSTRAINTS

- Tends to attract single asset or small portfolio of assets
- Liquidity hinges on functioning secondary market.
- Requires a sizeable universe of real estate assets to construct a portfolio.

Infrastructure



MARKET SIZE

- Yellow: 45%
- Grey: 34%
- Orange: 15%
- Blue: 6%

CHALLENGES

- High barriers to entry for investors
- Illiquidity
- High political and regulatory risk

RISKS / CONSTRAINTS

- Regulation
- Liquidity hinges on functioning secondary market.

Natural Resources



MARKET SIZE

- Yellow: 70%
- Grey: 12%
- Orange: 5%
- Blue: 13%

CHALLENGES

- Regulation risks
- Illiquidity
- Natural disaster

RISKS / CONSTRAINTS

- Requires a sizeable universe of natural resources to construct a portfolio
- Liquidity hinges on functioning secondary market.



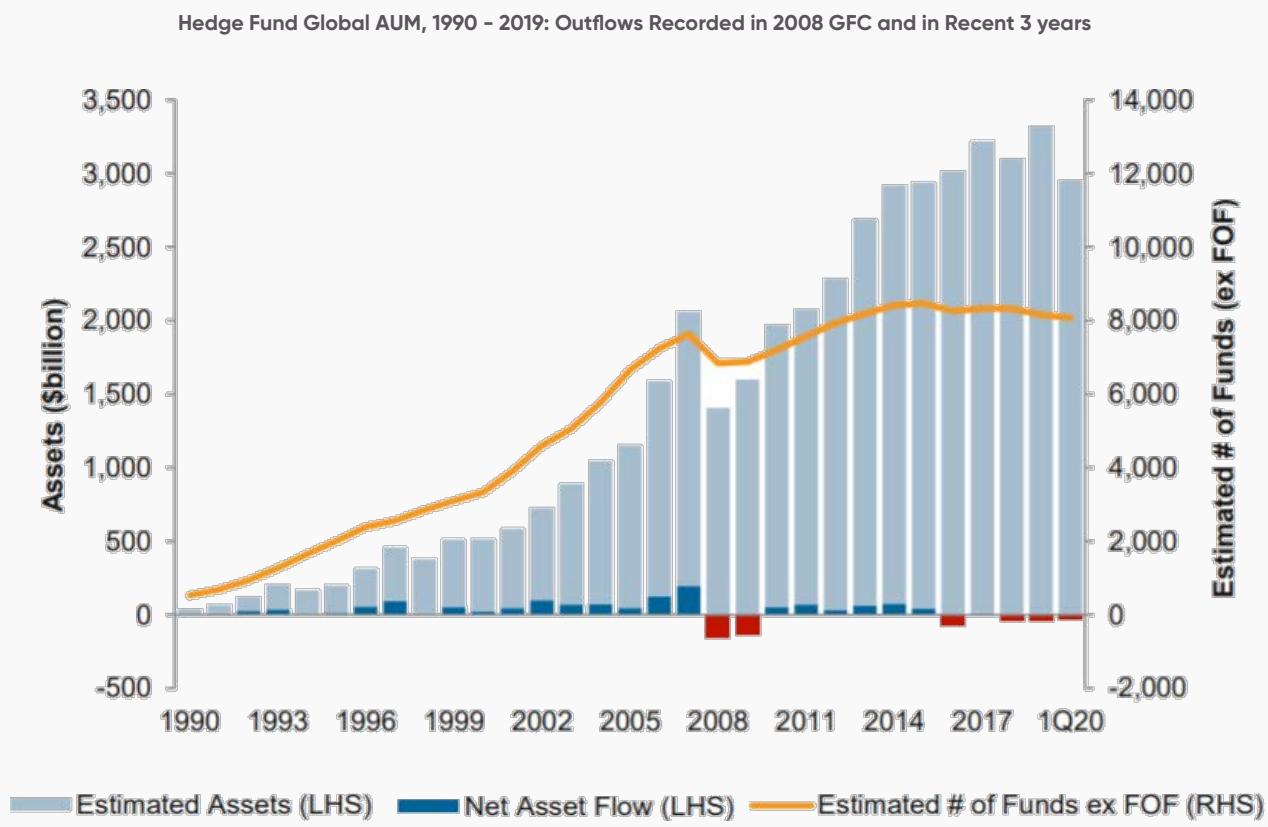
Hedge Funds

Hedge funds are privately organised and generally unlisted investment vehicles. They generate investment opportunities that are materially distinct from those offered by traditional investment vehicles, which are subject to regulations such as restrictions on their use of derivatives and leverage. Hedge funds generally pool the resources of accredited investors and have great flexibility to pursue specific investment strategies to offer potentially high returns.

There are various reasons for investor interest in hedge funds. First, hedge fund returns can offer low correlations with traditional investments and therefore, serve as a diversifier in a portfolio. Second, hedge funds have a high degree of flexibility which allows them to go both long and short to generate returns.

Market Sizing

Hedge funds' global Assets Under Management (AUM) has risen and fallen over the last decade. As of Q1 2020, it totalled USD 3 trillion.



North America located hedge funds represent the largest share, comprising 77% of global hedge fund AUM. Europe located hedge funds account for 19% of total, while Asia-Pacific and the rest of world accounts for 3% and 1% respectively.

Challenges of the Asset Class

- **Lack of transparency**

Hedge funds are typically organised as offshore private limited partnerships. They do not need to disclose their activities to the public, meaning they lack transparency. However, hedge funds do release selective information when they need to attract money from new or existing investors.

- **Non-normal returns**

There is no such thing as a 'normal' return from hedge funds. There could be many small gains and a few large profits, or many small gains and a few large losses. To reduce the risk, as measured by returns volatility, an investor would need to diversify across hedge fund managers and strategies.

- **Limited access**

Hedge funds are accessible only to those with significant capital. Due to the high minimum investment requirement, hedge funds are typically invested in by institutions and high net worth individuals.

- **Lock-up period**

Many hedge funds lock up investors' money for relatively long periods. This allows hedge fund managers to establish their strategy and exit investments in an orderly fashion. Lockups are typically for 30–90 days, but some may extend to a year or more.

How Tokenisation Addresses the Challenges

- **Greater transparency**

The technology behind tokenisation could increase hedge funds' transparency. The rights of investors, legal responsibilities, limitations and records of ownership can be embedded directly into tokens.

- **Better liquidity**

Tokenisation could also improve liquidity for hedge fund investors. Via traditional methods, investors need to apply to the hedge fund manager for a redemption to get back cash. With tokenisation, investors could sell their tokens on secondary markets to liquidate their assets.

Risks / Constraints of Tokenisation

- **Requires a sizeable universe of hedge funds to construct a portfolio**

To construct a diversified portfolio of hedge funds, there obviously needs to be a universe of hedge funds from which to choose. To achieve meaningful diversification, the typical range is around 15–25 hedge fund managers/strategies. This in turn means that there needs to be a pool of at least 60–100 hedge funds/strategies to select from.

- **Requires a secondary market with sufficient depth**

While the tokenisation of hedge funds offers improved liquidity, this depends on sufficient demand for the tokenised hedge fund itself.



Private Equity

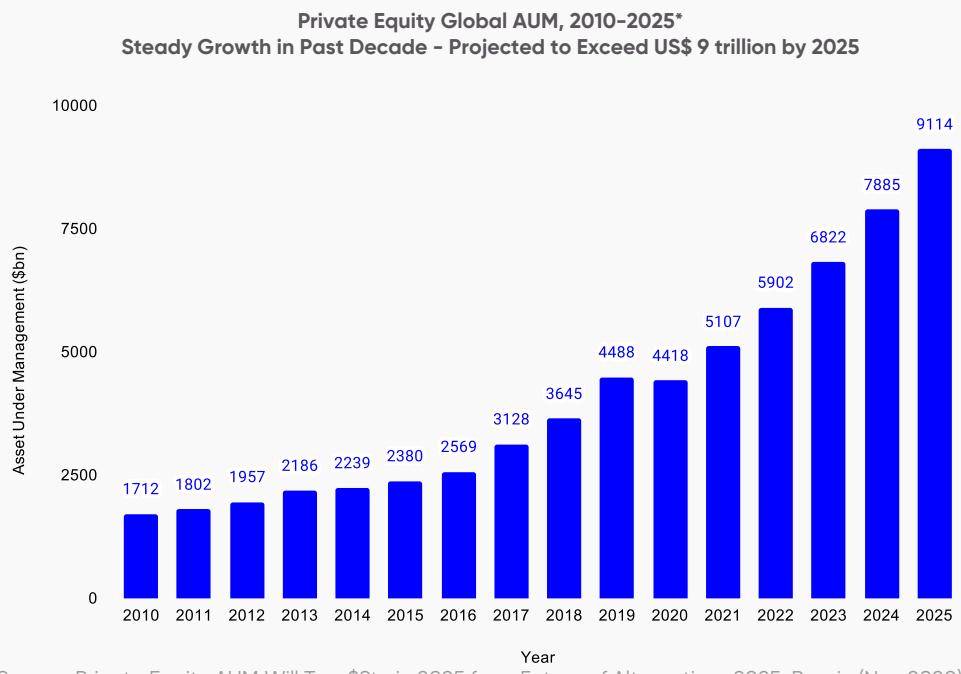
Private Equity (PE) is risk capital provided to businesses outside of the public markets. PE is about driving improvements in businesses over the long term. PE investments are illiquid and are generally traded only on acquisition and exit.

There are two approaches to investing in private equity. First, an investor can make direct investments in one or many private companies. This is the typical approach chosen by the largest and most experienced investors. Second, an investor may make indirect investments through a private equity fund, or via a private equity fund of funds. This is the most common approach.

PE funds are generally considered to be portfolio return enhancers because they can provide sources of returns that are not available from traditional asset classes. First, PE funds have long holding period of seven to 10 years, so their underlying portfolio companies can undertake multi-year business transformations. Second, PE funds can provide funding where traditional lenders are unwilling or unable to do. This allows PE funds to invest in new but growing companies, or in poorly performing companies with potential for turnaround.

Market Sizing

PE global AUM (excluding venture capital) was valued at USD 3.4 trillion as of end 2020.¹⁰ US-focused PE funds represent at least half of global PE AUM (54%) and the US is widely considered to be the largest geographical market and the most developed market for PE fund investing. Europe (21%) and Asia (24%) have both gained in importance in the last decade. The Rest of World accounts for the remaining 4% of global PE AUM.



Challenges of the Asset Class

- **Lack of access**

PE is typically only accessible to institutions and high net worth individuals due to the high minimum investment requirement and long holding period of several years.

- **Illiquidity**

Investors may not be able to sell their interest in PE efficiently on the secondary market in terms of time and/or cost. Due to this structural illiquidity, investors require sufficient resources or exposure to other liquid assets to be able to hold their PE interest until maturity.

- **Returns dispersion**

Unlike traditional stock and bond funds, there is substantial performance dispersion between the top quartile and bottom quartile PE funds. For example, top quartile PE funds could achieve high teens return, while the bottom quartile could achieve less than 5% returns.

¹⁰ We have excluded Venture Capital (VC) from the discussion of PE as they are covered in other sections of the paper. If included VC the total is US\$4.4 trillion in 2020. Source: Preqin.

- **Need for diversification**

While individual PE funds may attempt to achieve a certain level of portfolio diversification, research has shown that the most effective way to minimise capital risk is by diversifying across different fund managers and fund vintages. This would be difficult to achieve for the average retail investor.

How Tokenisation Addresses the Challenges

- **Increase access to a wider group of investors**

Tokenisation could allow PE to be accessed by a wider group of investors by lowering the minimum investment quantum. Currently, typical investments start from USD 10 million if investing directly into a PE fund. An investor could lower the quantum by investing through a commingled fund which acts as a single Limited Partner (LP). This would reduce the quantum to around USD 200 000.

In addition, investors may also invest in the private company before it goes public. It is generally difficult to buy shares in a private company because they are only available when the company sells shares to raise funding, or when existing shareholders sell. Furthermore, these stakes often cost USD 250 000 or more. Tokenisation would allow investors to buy tokens from certified exchanges at a smaller minimum.

- **Better liquidity**

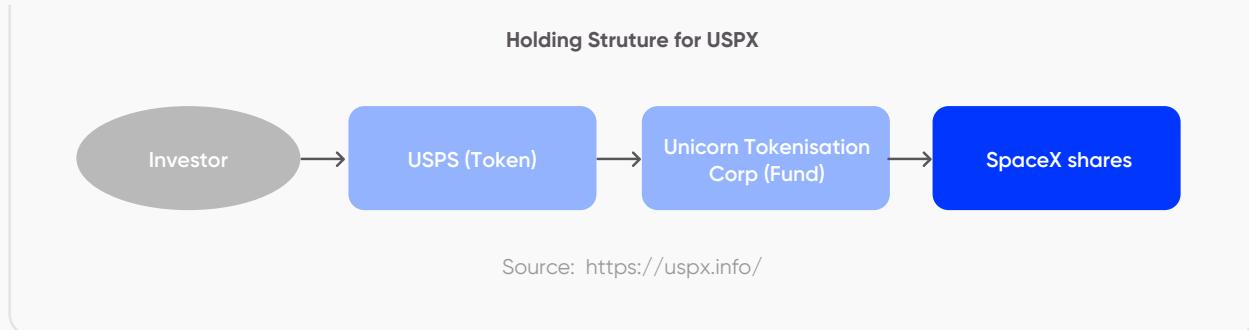
Another benefit is the potential for cheaper secondary transactions. Currently, stakes in PE funds are sold to secondary funds or other LPs. The sale process can take a long time, with the involvement of many intermediaries.

Case Study: USPX Private Company Tokenisation

Founded in 2002, SpaceX is one of the best-known companies in the aerospace and space transportation industry. It is the first private company to successfully launch, orbit and recover a spacecraft.

In August 2020, SpaceX sought USD 2.1 billion in a new round of equity funding, valuing the company around USD 44 billion. Since it is not a public company, its stock is not traded on any stock exchange. An investor can only participate when SpaceX sells its stock during an investment round, or when shares are sold on the secondary market by existing shareholders.

USPX is a token issued by an unlisted fund. It represents an economic interest in SpaceX. Each token is worth one-tenth of a share. Holders can trade USPX on the secondary market through exchange platforms like Orderbook and Codex.one.

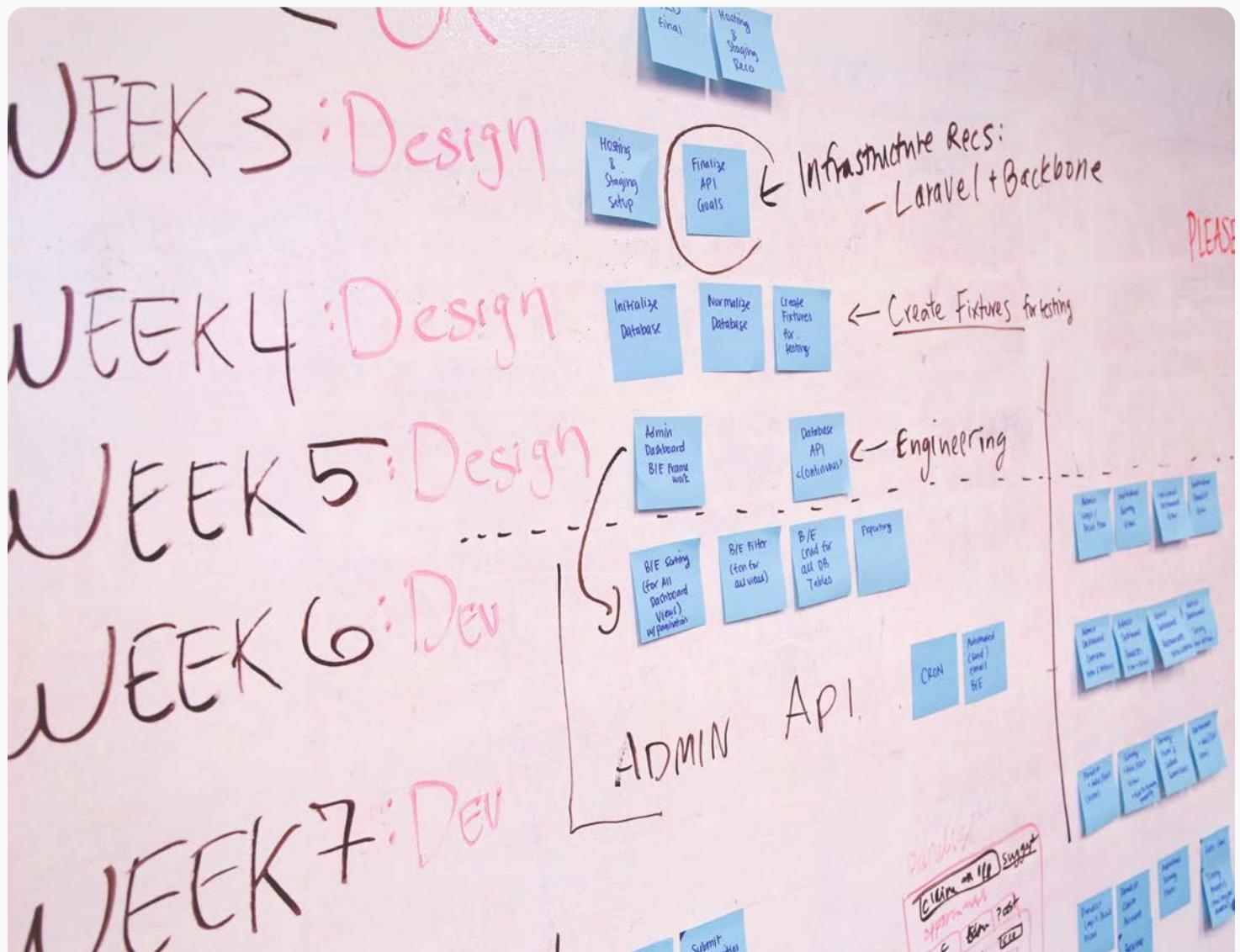


Case Study: ICHAM Unicorn Opportunity Private Equity Fund

ICHAM Unicorn Opportunity Fund is a private fund that will invest in unicorns by buying equity from existing shareholders in the secondary market. It raised USD 20 million in December 2020 by selling tokenised units to accredited investors. The minimum threshold to invest is at USD 20 000, much lower than the typical threshold of USD 100 000 to USD 1 million.

Risks / Constraints of Tokenisation

- **Requires a sizeable universe of private equity funds to construct a portfolio**
To construct a diversified portfolio of PE funds, an investor needs to consider both manager and vintage diversification. To achieve diversification, the typical range is around 15-25 PE fund managers. In turn, this means that there needs to be a pool of at least 50-100 PE funds to select from.
- **More complex due diligence**
Another consideration is the need for manager due diligence. Unlike mutual funds, where there are compulsory information disclosures, PE funds are not as transparent and do not require such disclosures. Therefore, greater effort is needed for manager due diligence.
- **Capital calls or cash drag**
For a PE fund, the manager makes capital calls from limited partners only when they are making an investment into a portfolio company. They do not hold a capital commitment in a low interest bank account which would drag down the investment performance. A tokenised fund would have to either manage capital calls in the same format or find a way to manage the funds before they are invested.



Venture Capital

Venture capital fulfils an important role in capital markets for companies that lack access to equity or debt funding options. This is particularly true in the case of start-ups, which are usually too small to have the assets required to secure a bank loans, and are also barred from accessing public markets. Venture capitalists thus fulfil the important function of providing funding to early stage start-ups in return for equity.

Venture capital firms generate returns for investors upon successful exit of their portfolio companies; either it is bought out by a bigger company or exits successfully through an initial public offering. Venture capital is a high-risk investment: many invested companies are expected to fail. However, the investments that do win, win big. In venture capital firms, there are generally two types of partners - limited (LP) and general (GP). LPs provide funds but do not take part in the everyday management of the fund. They are typically institutional in nature. Management of the fund is left to GPs who generate returns for LPs in return for a management fee.

Market Sizing

Venture capital AUM has significantly increased over the last five years. Global venture capital AUM was valued at USD 988 billion as at H1 2019.¹¹ As of Q1 2019, the Americas accounted for 73% of VC-backed companies (as calculated by number of closed deals), with 19% and 8% for Europe and Asia Pacific respectively.¹²

Challenges of the Asset Class

- **Illiquid investments**

Venture capital funds are illiquid investments. Start-ups require around five to seven years before they are mature enough for an exit. Prior to an exit, the invested capital is locked up in the fund, making venture capital extremely illiquid.

How Tokenisation Addresses the Challenges

- **Greater ease of secondary transaction**

Tokenisation of a venture capital fund would entitle token-holders to an economic interest in the fund. There would be two main classes of tokens: GP tokens and LP tokens. Subject to the specific terms of the deal, LP tokens can then be sold to other investors with the transaction updated immediately on a digital record of members.

 *Importantly, the gains in liquidity could translate into changes in the valuation of the fund itself.* 

Investors can more easily release their capital even within the five to seven-year fund maturity time frame. This is because they can roll-over locked up funds to other investors in a secondary market where LP tokens can be bought and sold.

- **Flexibility of structure**

The tokenised fund itself could be structured as an open-ended / evergreen fund (i.e. there is no limit to the number of tokens issued or the number of investors), or as a close-ended investment (i.e. the number of tokens issued is fixed). Tokenisation could be applied to a single fund or individual portfolio companies.

¹¹ Preqin pro as of Nov 2019.

¹² KPMG Venutre Pulse 2019.

Case Study: Invictus' Hyperion Fund

This was the world's first tokenised venture capital fund. It aims to enable exposure to traditional venture capital for independent and retail investors by lowering the entry barriers. Hyperion Fund is a closed-end, tokenised venture capital fund that invests in early stage blockchain-focused companies. Tokens are ERC-20 standard and provide holders with diversified exposure. There is also enhanced liquidity as tokens can be bought and sold at buy-burn events. The ERC-20 token can be transferred freely on the Ethereum blockchain or listed exchanges.

During the buy-burn protocol, Hyperion Fund will buy back the tokens at their net asset value price on the open market (similar to traditional share repurchases) on a quarterly basis. Token-holders can sell to Hyperion's purchase order to realise their returns. Importantly, the corresponding value in tokens is also burned, preserving the price per token for existing token-holders.

Case Study: Sonic Capital Venture Fund

Sonic Capital Venture Fund is Asia's first venture capital and impact investment fund to be tokenised, with Liquefy as its chosen technology provider. With tokenisation, Sonic Capital will lower the entry barriers to investment, offer earlier liquidation opportunities, greater information transparency and better governance models as each token-holder will be entitled to voting rights. Sonic Capital seeks to bring a greater level of transparency to investors to a traditionally opaque investment process.

In this case, different security tokens were offered for various classes of interests in the fund, such as GP and various LP interests. These tokens are embedded with specific data points relevant to each type of investor share class. With Liquefy's proprietary tokenisation platform, KYC and AML requirements will be automated by the compliance protocol (compatible with both individual jurisdictions and specific issuers' demands), thus lowering operational costs. Meanwhile, operational costs for the management and deployment of the fund will be reduced with digitisation and smart contracts.

Risks / Constraints of Tokenisation

- **Manager selection risk**

With any fund selection, an investor is taking on manager selection risk. The investment outcome is dependent on the manager's performance. However, this risk can be mitigated if a balanced and diversified portfolio of venture capital funds can be constructed.

The main benefits of tokenising venture capital funds are increased liquidity and operational efficiency enabled by digitisation, blockchain technology and smart contracts.

Digitisation	Blockchain	Smart Contracts
<ul style="list-style-type: none"> ● Democratised Funds can be fractionalised, lowering barriers of entry of new LPs. ● Liquid Tokens can be bought and sold instantly by investors in a secondary market (subject to lock up periods) enabling greater closed pool liquidity. ● Efficient Token transactions can be updated immediately on a digital record of members. 	<ul style="list-style-type: none"> ● Disintermediated Authorised parties have access to distributed information, resulting in reduced dependence on traditional intermediaries such as share depositaries, clearing houses, transfer agents, custodial providers, etc. ● Transparent Information can be directly embedded into tokens, increasing traceability and auditability. 	<ul style="list-style-type: none"> ● Automated Automated execution of compliance protocols, due diligence, KYC and AML procedures. ● Seamless Automated execution of post-issuance matters and corporate action management such as dividend distribution, shareholder voting, cap table management and drag along activities. ● Compliant Automated compliance environment that can cater to multiple jurisdictions and specific restrictions established by asset owners.



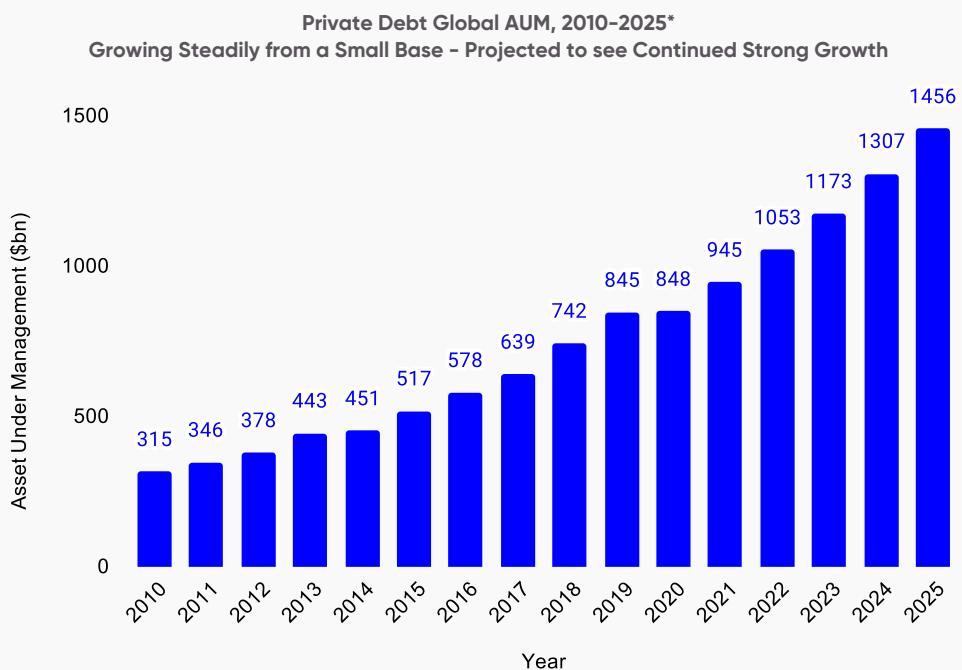
Private debt

The expansion of private debt dates back to the 2008/9 Global Financial Crisis when banks stopped serving the middle segment of the corporate market. Typically, private debt refers to loans offered to firms with earnings below USD 100 million. According to the Bank for International Settlements, the growth of the private debt market represented about 8% of total credit growth to non-financial corporates over the 2010 to 2018 period.

Annual returns on private debt are attractive for institutional investors, averaging 10% since 2008, a figure much higher than the public debt market. However, the attractiveness of the market has resulted in an increase in dry powder (cash kept by asset management companies to purchase assets), increasing, according to Preqin, from USD 105 billion in 2010 to USD 300 billion in 2018.

Market Sizing

Private debt global AUM was valued at USD 845 billion as of end 2019. The asset class has enjoyed massive growth over the last few years. Asset managers have been competing for asset sourcing to fuel the demand for higher yields from sovereign wealth funds, pension funds and other institutional investors. Preqin's analysis shows that there more than 4 100 investors making allocations to the asset class.¹³



Source:Private Debt's Spectacular Rise Will Continue from Future of Alternatives 2025, Preqin (Nov 2020)

The market remains dominated by North American assets. Other markets are less mature, and the European direct lending market is estimated to be 10 years behind the US, according to Preqin. In Europe, managers are focusing on the deals the banks are avoiding.

Challenges of the Asset Class

Despite its recent popularity and significant opportunities, private debt, like other asset types, still faces many challenges. One of the main ones remains the many distinct, complex phases in the private debt investment process

13 Source: Preqin Pro (2020)

Investment Process in the Private Debt Sector**Origination**

- Multi-channel origination partnerships to provide a comprehensive coverage
- Eligibility criteria provide pre-screening
- Technology enabled application process

**Selection,
Due diligence**

- Quant credit scoring model utilizing big data technologies provides scalability
- Fundamental analysis, including legal and competitive analysis
- Negotiate preliminary term sheet

**KYC,
structuring &
underwriting**

- Multi-faceted KYC process at each step in the process
- Documentation and negotiation of final loan agreement
- Loan operational disbursement process

**Monitoring
& Reporting**

- Monitoring of loans performance
- Decisions on pre-default and post-default actions to take
- Prepare reporting

Source: BNP Paribas Asset Management (2020)

● Inefficient deal origination / sourcing

Deal origination is the process when firms source investment projects, finding and gaining knowledge of deals in the market. One way to target deal originations is mainly through a "network approach", which relies on investment firms' existing client networks and reputation. Even though it is a labour-intensive method, a "network approach" may result in minimal conversions and inaccurate estimations of 'leads to deals' completions.

However, some innovative fintech companies have recently been working with investors to help bridge the need for financing from SMEs on the one hand, and the need to source assets for investors on the other. For instance, BNPP AM works with several partners to help sourcing and performing a first level of assessment, facilitating end-to-end credit applications for SMEs.

Case Study: Caple & BNPP AM

Founded in 2015, Caple is a European specialist in SME growth credit. Providing credit in close cooperation with BNP Paribas Asset Management, Caple interacts with SME clients through a network of independent and experienced professional advisors. Caple provides support with technology and timely SME credit applications and performs a first level of credit assessment for BNP Paribas Asset Management.

Since May 2018, Caple has been helping BNP Paribas Asset Management provide financing to SMEs in the UK and in the Netherlands for amounts ranging between circa £/€ 500 K to £/€ 5 m.

● Excessive dry powder

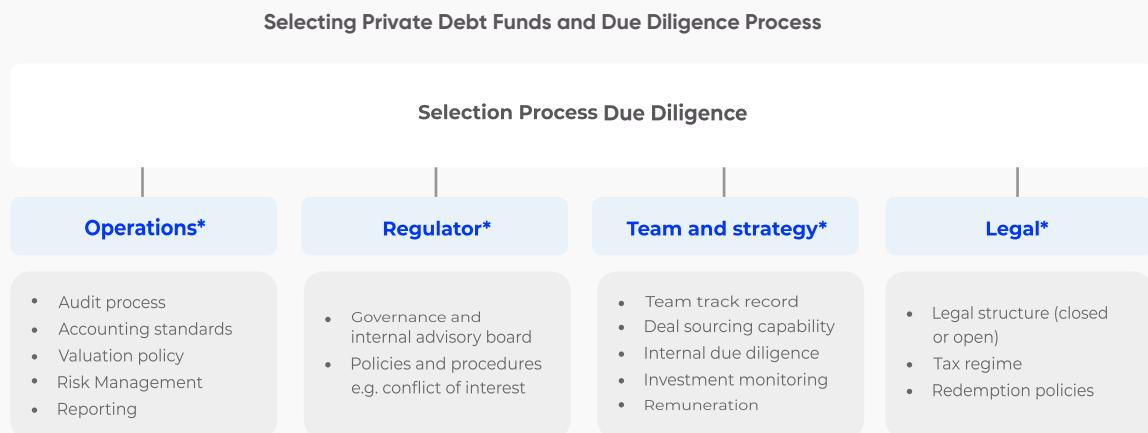
Despite these innovative ways of sourcing private debt assets, dry powder in the industry is at one of its highest levels since 2010; according to Preqin, there was nearly USD 300 billion of dry powder in 2018 and USD 261 billion at the end of 2019.

In and of itself, dry powder is not negative. It allows investors to have a safety net by providing stability or the option to hold and wait for more attractive investments, especially during an economic downturn. However, maintaining too high a level of dry powder is harmful to both investors and borrowers; it may indicate dysfunctional capital deployment and asset sourcing issues between investor and borrowing companies.

● Intense due diligence process

Private debt investments are idiosyncratic and less transparent than other traditional assets, and unlike conventional fixed-income instruments, issuers do not disseminate through data companies their P&L and balance sheets information to the market. Extensive analysis is required, and investment firms must have experienced and knowledgeable internal or external teams to ensure stringent transaction selection.¹⁴

Thereby, having local people on the ground, a strong deal history, and company analysis capabilities to provide details such as sponsor, advisor, counterparties, senior team, etc. is critical. Relying on the investee firm's pitch and information is not enough as the due diligence needs to be comprehensive and to include multiple angles (see below chart).



Selection process analysis requires a high level of expertise and resources, resulting in a considerable amount of time and money for investment companies. This can result in unequal bargaining positions, which may exclude modest businesses from access to financing.

¹⁴ Mercer (2015, May). Private Debt in an Institutional Portfolio. <http://www.mercersignaturevents.com/investmentforums/2017/hongkong/presentations/Private-Debt-in-an-Institutional-Portfolio.pdf>

● High analysis and monitoring requirement

In the private debt market, completed investments must always be assessed and monitored using rigorous and regular P&L analysis. According to Mercer, many investors experience difficulties when it comes to continuous analysis, finding monitoring to be resource-intensive and often requiring more time than expected.

According to Mercer, similar to the due diligence stage, extensive resources are required to conduct continuous analyses of borrowers. Qualified and experienced resources are even more critical when data is not standardised and centralised, sometimes generating a lack of transparency. This situation forces investors to be more vigilant and rigorous.

● Complex debt covenants

Debt covenants, also called banking or financial covenants, are agreements made by lenders on how borrowers will operate according to specified rules. In other words, to protect their collateral and credit assumption when issuing the loan, lenders use loan covenants as promises of what the borrower is and is not allowed to do.

However, a restrictive covenant, preventing one party from carrying out certain actions, may sometimes produce adverse effects. Indeed, firms with high growth opportunities may find themselves restricted and suffocated by covenants in their operational and strategic choices.¹⁵

Covenants are complex and must find the right equilibrium. On the one hand, they must provide security to the lenders, and on the other, they must allow borrowers sufficient freedom to evolve and perform. Beyond the need to define the covenants to a level acceptable to both parties, loan contracts can involve a significant number of these financial and non-financial obligations. Automation and standardisation of these clauses remain therefore a challenge when trying to industrialise the lending process.

¹⁵ Bazzana, F. & Broccardo, E. (2019, October). The role of covenants in Public and Private Debt. <https://docplayer.net/20456581-The-role-of-covenants-in-public-and-private-debt.html>

- **Illiquidity and lack of secondary market**

Like other alternative assets, the private debt market suffers from low liquidity. This creates many challenges. Investors do not have a lot of flexibility, often holding assets until maturity. The opportunity cost can be high as it is difficult for investors to convert assets into cash and take advantage of more appealing investment opportunities during this holding period. The longer and more illiquid the asset, the higher the opportunity cost. Lack of liquidity is a particularly serious issue due to the medium to long-term nature of private debt investment.

Having a secondary market for private debt is, by definition, challenging on a loan-by-loan basis. Securitisation initiatives have helped provide some liquidity at a portfolio level, but a single loan transaction in the secondary market would require an investor to dedicate significant time and effort retrieving and analysing information about the borrower, assessing documentation, agreeing on a price, and organising the monitoring process.

How Tokenisation Addresses the Challenges

Despite the attractiveness and the rise of private debt investment during the last decade, this asset class still faces several challenges. To address this, some fintech start-ups offering private debt tokenisation solutions have started to emerge.

Tokenisation can respond to many private debt challenges, particularly in terms of transparency, global market opportunity and transferability.

- **Standardization and transparency**

The private debt investment process requires considerable resources, from origination to due diligence, the continuing need to monitor investee's P&L, to overall financial health. The transparency and decentralisation of data provided by blockchain could solve these significant challenges for both investors and investees.

From an investor's point of view, traceability and real-time data transparency can help tackle heavy-duty processes, especially during the initial phase (companies' analysis, deal history and other required due diligence) and day-to-day analysis. In addition, data transparency may allow established investors to reduce their dedicated analysis budget significantly and at the same time allow new investors with smaller budgets to access verified data without consuming significant resources. This accessibility and transparency may result in a more balanced bargaining position between established and smaller investors.

For borrowers, the opportunity to disseminate their P&L information to a wider base of investors may offer them the opportunity to access to a larger investor base and potentially reduce the costs of financing (as part of the burden of standardisation falls back into the hands of the borrowers' companies).

● Transferability and liquidity

One of the primary strengths of tokenisation lies in enhancing the asset's liquidity. Improving liquidity and transferability may radically change the private debt sector, notably by enhancing exchanges among investors and creating a secondary market. Better liquidity potentially enables fund managers to manage better vintage funds and reduce opportunity costs. This enhanced transferability and liquidity would also help borrowing companies attract more investors and attain funding at a more attractive price.

● Matching assets / SME with investment networks

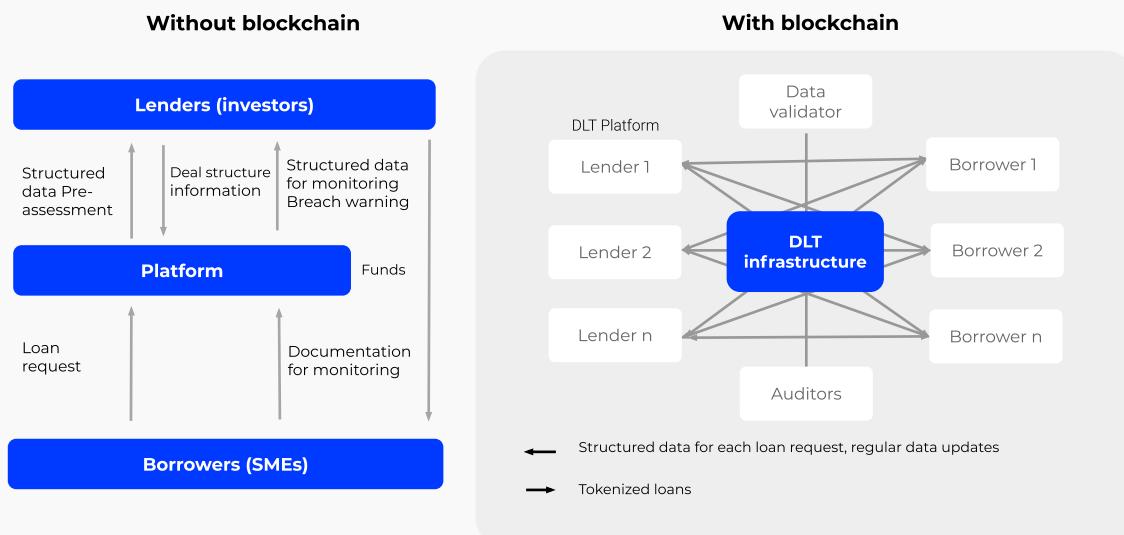
As we have seen, access to exciting opportunities relies on the network an investment company may have and its ability to connect small to medium-size enterprises (SMEs), directly or through intermediaries to lending platforms.

Indeed, blockchain combined with other technologies and intelligent matching algorithms could act as an accurate matchmaker between investors of any size and borrowers from around the world. Deal sourcing platforms use algorithms that match companies' preferences such as lenders, the industry, the risk involved, transaction size, and geographical location. On the borrower side, the loan request is no longer made via a bank but via a lending platform facilitating access to lenders.

Developing matchmaking platforms without using blockchain is also possible and may provide excellent results. However, not all platforms carry out due diligence before the initiative is launched as these platforms are not yet regulated, unlike banks.

Blockchain technology can ensure transparency and data integrity, resulting in robust protection for investors and borrowers.¹⁶ This would enable all those involved (data validators / auditors, etc.) as well as lenders to connect with companies on the same infrastructure. It would connect borrowers to lenders in a responsive, instantaneous way.

Comparison of Intermediated Lending Platforms and Disintermediated Blockchain Platforms



Source: BNP Paribas Asset Management (2020)

¹⁶ NN Investment Partners (2017, May). Alternative credit and its asset classes.

Blockchain technology can offer positive outcomes for both investors and borrowers. Increasing the global pool of investors will help even the most geographically remote and modest companies and entrepreneurs to secure financing to realise their goals.

- **Easier co-investments opportunities**

As yields remain low, large investors in private debt are looking for alternative structures. According to Preqin, 62% of institutional investors with USD 50 billion or more in AUM want to co-invest with their manager. It provides those large investors a reassuring setup when investing in more risky assets. Blockchain technology offers the opportunity to infinitely fractionalise assets, making it easier for investors to co-invest in deals.

- **Bigger investor pool and global market opportunity**

As we have seen previously, fractionalisation and simplification of issuance processes through blockchain technology and digitisation may significantly increase investors' access to investment opportunities without considering their size, initial resources or geographical location. The opportunity to have a larger pool of investors and more efficient ways to access global markets is extremely beneficial, especially in private debt where there are high levels of market heterogeneity.

According to Preqin, the US market remains the most dominant; studies show that over the past 15 years, the volume of leveraged institutional loans in the US has been more than six times greater than in Europe. This disparity reveals the tremendous pool of lending opportunities in the US compared to elsewhere. Better access and worldwide frictionless processes will enable investors and borrowers to enhance their global relationships and investment opportunities.

Blockchain technology can offer positive outcomes for both investors and borrowers. Increasing the global pool of investors will help even the most geographically remote and modest companies and entrepreneurs to secure financing to realise their goals.

- **Reduced dry powder and cash drag issues**

Blockchain can enhance the liquidity of loans provided by lending platforms, generating a real advantage to asset owners and managers. Indeed, it can enable lenders to source companies, reduce dry powder and improve the performance of their funds. In fact, dry powder is not only indicative of small corporates' need for funding but also a cash drag issue that can adversely affect the performance of funds.

Risks / Constraints of Tokenisation

Despite blockchain's technological benefits, the nature of private debt (such as a lack of liquidity and complex covenant structures) mean that there are constraints / challenges to investment, even with tokenisation.

- **Lost advantage due to lowered liquidity premium**

A liquidity premium can be defined as an additional remuneration requested by investors to compensate for their purchased asset's lack of liquidity. In a low-interest environment, the liquidity premium is considered an advantage for institutional investors hunting for yield. According to Validus, private debt investors are often earning an additional 100–200 basis points (or more) compared to other assets such as public market debt, despite a lower average loss ratio.¹⁷

- **Reduced dry powder and cash drag issues**

Blockchain can enhance the liquidity of loans provided by lending platforms, generating a real advantage to asset owners and managers. Indeed, it can enable lenders to source companies, reduce dry powder and improve the performance of their funds. In fact, dry powder is not only indicative of small corporates' need for funding but also a cash drag issue that can adversely affect the performance of funds.

- **Difficulty of programming strict covenants in smart contracts**

Covenants are complex and sensitive subjects. On the one hand, they ensure clear and explicit protections between lenders and borrowers, but on the other, they can limit borrowers' opportunity, especially in the case of promising expanding companies. Adhering to covenants forces companies to comply with specific restrictions, for example in the area of investment decisions, dividend policy and leverage ratio.

One could initially suggest using smart contracts to automate the covenant process. However, covenants are often negotiated and set-up on a case by case basis making it difficult to automatize the associated development of smart contract for each one of the covenants.

¹⁷ Validus Risk Management (2014, May). A Risk Management Framework for Private Debt Investors. https://validusrm.com/wp-content/uploads/2018/04/Risk_Mgmt_Private_Debt_Chapter.pdf



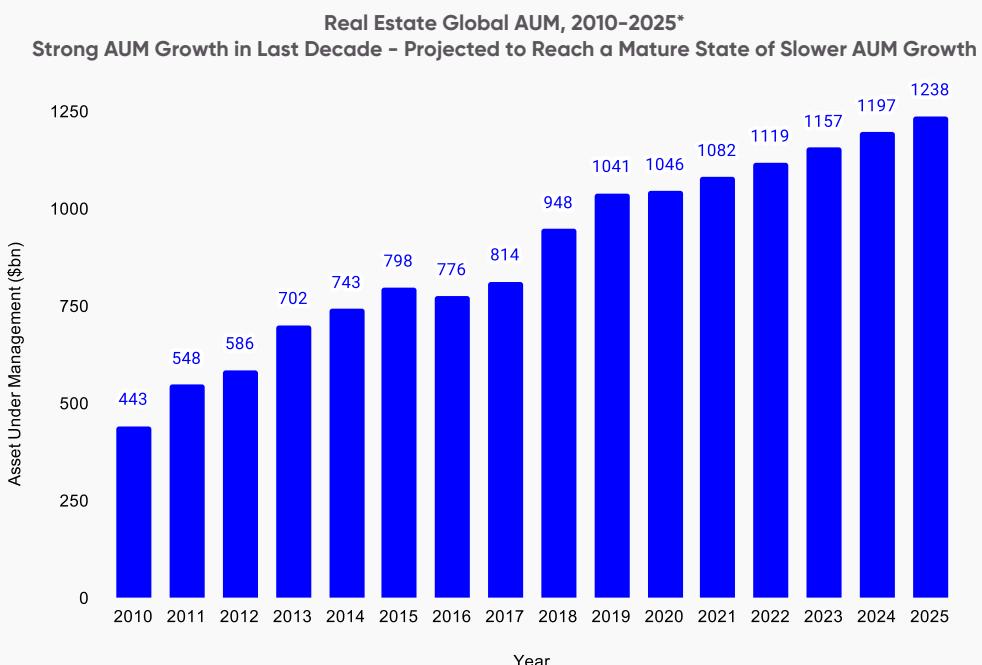
Real Estate

Real estate can be classified as commercial real estate or residential real estate. In addition, real estate investment can be categorised into different investment styles, namely: core, added-value and opportunistic. Core real estate tends to have a lower risk profile and most of the return on it comes from income rather than value appreciation. Opportunistic real estate is at the opposite end of the risk-return spectrum as it tends to be higher risk but offers potentially higher returns from value appreciation.

Real estate has accounted for a significant proportion of wealth for thousands of years. It is generally seen as a good inflation hedge. In addition, real estate can benefit from long-term trends such as urbanisation and urban renewal. Real estate also has the potential to be a diversifier in a portfolio of traditional assets such as stocks and bonds. In general, major real estate indices have a low correlation to stock indices.

Market Sizing

Private real estate global Asset Under Management (AUM) has risen steadily since the Global Financial Crisis in 2008. Private real estate global AUM increased to USD 992 billion in H1 2019 from USD 400 billion in 2009, thus more than doubling in a decade.



Source: AUM Growth of 3.4% a Year Will Not Lift All Real Estate Segments from Future of Alternatives 2025, Preqin (Nov 2020)

Challenges of the Asset Class

- **Illiquidity and lumpiness**

Real estate remains one of the most illiquid asset classes due to significant capital commitments, long, expensive transaction processes and limited public markets. Consequently, there is a high liquidity premium.

- **Lack of customisation and low flexibility in rebalancing**

While there are funds listed on exchanges that allow steady income and portfolio exposure to real estate (real estate investments trusts, 'REITs'), they are arguably an imperfect solution for several reasons:

- Lack of customisation (limited to shares)
- Low operational efficiency (repetitive processes and siloed data)
- Long settlement times (T+2/3)
- Low data transparency (especially for non-listed REITs)
- Low flexibility in rebalancing exposures within the portfolio (REITs typically cannot be customised)

How Tokenisation Addresses the Challenges

- **Targeted exposure option**

Tokenisation could offer a more customisable and liquid alternative to REITs.

First, it could be applied to single real estate assets, REIT and unlisted REITs so that investments are not limited to only shares in a REIT. Second, tokenisation enables the fractionalisation of exposure to a managed or customised portfolio, allowing exposure rebalancing.

- **Cost savings from operational efficiency**

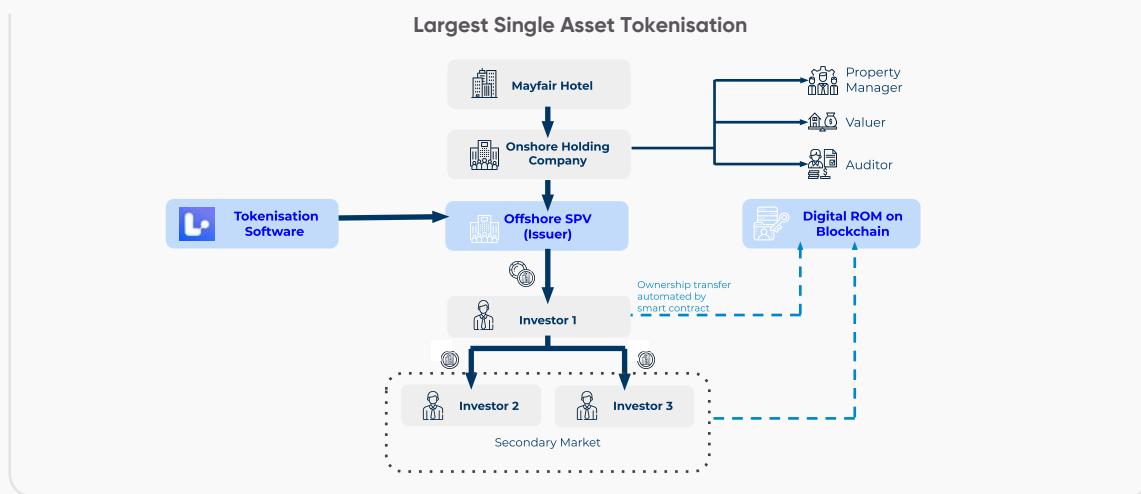
Tokenisation of real estate unlocks advantages for investors and asset owners in the valuation and liquidity of the asset. Fundamentally, the core cash-generating ability of the property does not change, but tokenisation can unlock value via savings in transaction time and administration fees.

Digitisation results in reduced settlement times, near instantaneous updates on a digital register of members, seamless execution of token issuance and post-token management processes via smart contracts, and automated compliance protocols. Information becomes more traceable, transparent and less siloed with blockchain technology.

Furthermore, with tokenisation, the possibility of a secondary market means that tokens can be sold securely, 24/7 around-the-clock. The liquidity premium of real estate can be reduced due to operational efficiencies gained from digitisation.

Case Study: Largest Single Asset Tokenisation

In 2019 Liquefy was the technology provider in the tokenisation of an award-winning luxury hotel in Mayfair, London, valued at USD 600 million. 49% of ownership in the hotel was tokenised and sold to investors. Participating investors benefited from lower upfront capital, lower entry barriers due to fractionalisation, and operational efficiencies gained in faster, more secure transaction processes. Token-holders will be able to transfer part of or all their tokens on a secondary market, further unlocking liquidity.



Risks / Constraints of Tokenisation

- Tokenisation of single asset requires confidence in the platform or sponsor**

To successfully tokenise a single asset, the market will need to have confidence in the platform or sponsor. In addition, the bid offer spread cannot be too wide, and the tokens should not trade below underlying net asset value for prolonged period of time.

- Requires a sizeable universe of real estate assets to construct a portfolio**

To construct a diversified portfolio of real estate, there needs to be a sizeable universe of real estate tokens. To achieve meaningful diversification, there should be more than a handful of real estate tokens that investors can include in their portfolio. The alternative is the tokenisation of real estate funds. The real estate funds are already in appropriate legal form, already fractionalized, and most likely have some form of diversified portfolio.

Tokenisation of real estate offers investors, asset owners and managers a better alternative to real estate exposure than REITs across many dimensions.

	REIT Funds	Tokenisation
Fractionalisation	Limited variety and fixed proportions	Digitalisation enables fractionalisation to customise portfolio exposure
Operational Efficiency	Long, repetitive processes; siloed data; long settlement time	Digitalisation enables quicker settlement subject to the blockchain; smart contracts can automate processes
Settlement Time	Investor redemption request to receiving money around T+2/3	Digitalisation with digital ROM can be instantly updated
Data Transparency	Low data transparency (esp. unlisted REITs)	Blockchain brings data transparency, immutability and accessibility
Flexibility	No flexibility to balance exposure, limited to REIT exposure	Digitalisation enables fractional exposure traded within a managed or customised portfolio
Liquidity	Limited to shares	Digitalisation enables single assets, funds and unlisted REITs to be traded

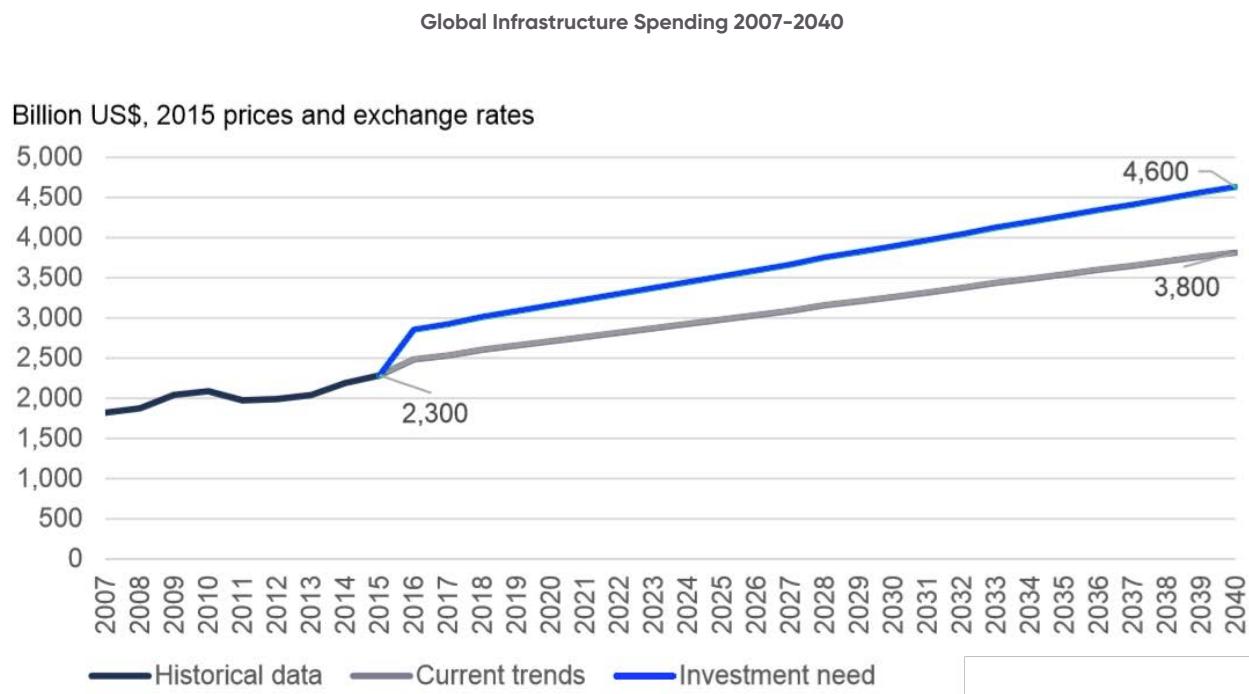


Infrastructure

Infrastructure is an essential asset allocation component for investors – especially for those looking primarily for steady cash flows and an attractive risk-return with favourable treatment by regulators when it comes to solvency capital ratio. Infrastructure covers heavy infrastructure assets such as social infrastructure (e.g. hospitals and universities), transport, telecoms, conventional and renewable energy and utilities (e.g. water treatment facilities, heating networks).

According to McKinsey,¹⁸ current global infrastructure spending is around USD 2.5 trillion a year. This is expected to increase by 2040 to reach an average investment need of USD 4.6 trillion a year.

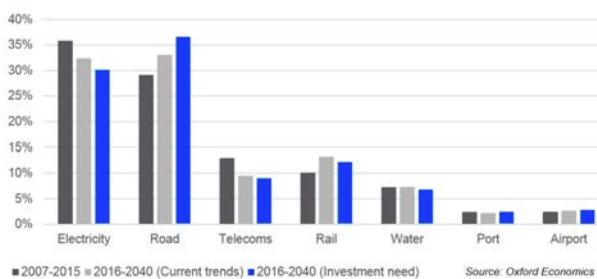
¹⁸ McKinsey & Company (2016, June). Bridging global infrastructure Gaps. report link



Source: Global infrastructure outlook, Oxford Economics (2017)

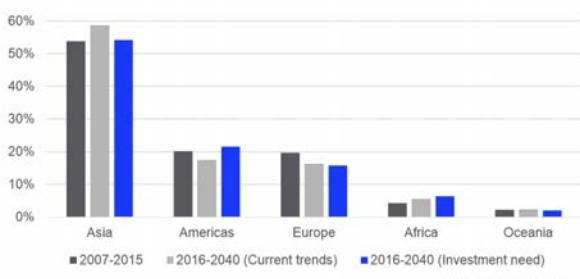
Although infrastructure investment is a global phenomenon, there is still significant regional investment disparity, especially in Asia where it accounts for more than 50% of global infrastructure spending, compared to 22% for the Americas or even 15% for Europe. We are looking as well at country disparities with four countries, China, the US, India and Japan, accounting for more than half of global investments. China alone accounts for 30% of global infrastructure needs.

Share by Sector of Global Infrastructure Investment 2007-2040



Source: Global infrastructure outlook, Oxford Economics (2017)

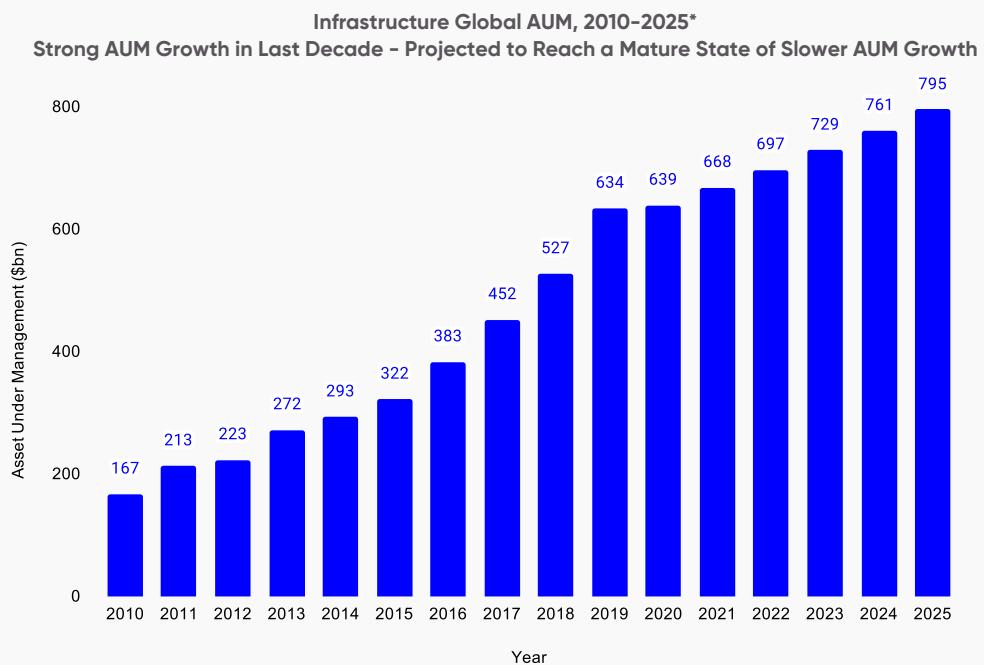
Regional Share of Global Infrastructure Investment 2007-2040



Source: Global infrastructure outlook, Oxford Economics (2017)

Market Sizing

Total unlisted infrastructure AUM has been increasingly steady over the last decade. Global infrastructure AUM was valued at USD 634 billion as at end 2019.¹⁹



Source: Laying the Foundations for Infrastructure Growth from Future of Alternatives 2025, Preqin (Nov 2020)

Challenges of the Asset Class

- **High barriers to entry**

The essential nature of infrastructure assets generates many difficulties for newcomers attempting to compete with existing and established operators, resulting in a monopolistic or quasi-monopolistic market position in many countries.

Infrastructure tends to require significant upfront investment (capital expenditure), making the investment accessible only to large players, or requiring the involvement of government through the structure of PPPs (public-private partnerships) or concessions. Regulatory approval, underwriting / upfront fees and extensive due diligence increase the underlying costs of a project, which can represent between 15% and 22% of the overall project costs and hence results in high entry barriers for potential investors.²⁰

- **Illiquidity and lack of secondary market**

Compared to other asset classes, infrastructure is illiquid as it is associated with a long-term investment strategy with a nascent secondary market. The tangible nature of infrastructure makes the asset a less frequently traded one; according to the International Institute for Sustainable Development,³ some limited partners of infrastructure funds are usually locked in for 10 years and find it difficult to exit their position before the fund is liquidated.

¹⁹ Preqin Global private debt Report 2020. Preqin, November 2020.

²⁰ Uzsoki, D. Tokenisation of infrastructure: A Blockchain based solution to financing sustainable infrastructure. International Institute for Sustainable Development. January 2019. <https://www.iisd.org/publications/tokenisation-infrastructure-blockchain-based-solution-financing-sustainable>

However, while nascent, the secondary market for infrastructure is relatively small but growing fast. Campbell Lutyens, a consulting firm advising on infrastructure secondary markets, estimated that there was a total of USD 6 billion of deals in 2017 alone, compared to a total of USD 18 billion in the preceding six years from 2011 up to 2017.²¹ To give some perspective, during the summer of 2020, Blackstone managed to close a fund of USD 3.75 billion of secondary market infrastructure debt. This trend is driven by the fact that vintage funds from the 2006–2010 period are now arriving at their end while the underlying assets have a longer maturity.²²

● Limitation of small project sizes

Significant costs associated with infrastructure projects, such as regulatory approval, underwriting fees, due diligence, and other associated fees make it difficult for small infrastructure projects (below USD 100 million) to absorb them. These type of projects are disregarded by banks and other institutional investors on the basis that the due diligence costs and effort render them not worth pursuing.

● High risk landscape and lack of standards

Regulation, rules, legislation, taxes and even cultural characteristics differ according to each country and may impact investment outcomes. According to Harvard Business Review,²³ government action, politics, stability and dependencies on regulatory bodies vary significantly across countries. Additional precautions and a strong understanding of the political, geographical and legal environment is recommended when investing in foreign infrastructure assets. Analysts spend a lot of energy analysing these risks, which are formalised in many different country-specific ways, depending where the asset is based.

Risk Landscape for Infrastructure Projects			
Risk Factor	Planning/Design/Construction Phase	Operation Phase	Termination Phase
Business Factors	<ul style="list-style-type: none"> Site Design Construction Financing 	<ul style="list-style-type: none"> Commercial Operating-cost Performance Refinancing 	<ul style="list-style-type: none"> End value
Political & Regulatory Decisions	Affecting specific project <ul style="list-style-type: none"> Cancellation & change Environmental & permit Community 	<ul style="list-style-type: none"> Expropriation Breach of contract Asset-specific regulation 	<ul style="list-style-type: none"> Concession duration/renewal Asset transfer Decommissioning
	Affecting sector/entire economy		
	<ul style="list-style-type: none"> Change of industry regulation Taxation Currency transfer & convertibility <ul style="list-style-type: none"> Judicial Corruption / market distortion 		
Macro & Socio-economic Environment	<ul style="list-style-type: none"> Macro changes Socio-economic changes 		
Force Majeure	<ul style="list-style-type: none"> Man made events Natural disasters 		

Source: World Economic Forum, Boston Consulting Group, 2015, Mitigation of Political & Regulatory Risk in Infrastructure Projects.

21 Gourntis, K. Secondary market will only get larger. Infrastructure Investor. November 2018.

<https://www.infrastructureinvestor.com/secondaries-market-will-get-larger/>

22 Jacobius, A. Blackstone closes secondary market infrastructure fund at US\$3.75 billion. Pensions & Investments. July 2020.

<https://www.pionline.com/alternatives/blackstone-closes-secondary-market-infrastructure-fund-375-billion>

23 Louis T.Wells, Eris S. Gleanson (1995, September–October). Is foreign infrastructure investment still risky. Harvard Business Review.

<https://hbr.org/1995/09/is-foreign-infrastructure-investment-still-risky>

How Tokenisation Addresses the Challenges

Tokenisation can help the infrastructure asset class by improving liquidity, standardisation and the overall costs structure of a project, lowering the entry barriers for new investors.

A token could represent a share of the debt issued to finance the infrastructure project. The token would be embedded within relevant smart contracts detailing the features associated with the debt such as its criteria, the nature and quality of the asset, and associated risks and covenants. Equity senior and junior debt could be bundled or unbundled according to investor needs.

- **Enhanced liquidity**

By tokenising infrastructure assets, typically classified as a robust illiquid asset, the asset's liquidity can be enhanced. Such fractionalisation and standardisation might pave the way for the development of a secondary market.

In the future, institutional investors looking for efficiencies in their investment processes and banks seeking to streamline the financing process could work together to create an issuance platform and the associated secondary market. This would result in greater liquidity.²⁴

Creating a secondary market via tokenisation would benefit both the investor and the issuer. The underlying infrastructure investment will be more attractive to investors as it can be liquidated upon the maturation of the vintage fund. In addition, new types of products with shorter maturities could be created and distributed to a wider investor base.

- **Lower complexity and transaction costs**

Blockchain technology, especially smart contracts, will significantly enhance transaction efficiency by automating previously complex, intermediated and expensive processes.

According to the International Institute for Sustainable Development, the benefit of the blockchain on overall fees associated with infrastructure investment should be below 5% as the sector matures, versus 15% to 22 % today without Blockchain.³ The secondary market will also benefit from cheaper transactions as trading fees are reduced drastically due to the secure and immutable nature of blockchain technology.

- **Larger pool of investors and better diversification**

Reducing the entry cost and fractionalising the asset increases the number and types of institutional investors in this sector, while potentially opening access to the asset class for high-net-worth individuals. New types of products could be created with shorter maturity and more attractive yields.

The access to financing for smaller infrastructure projects should improve the diversity of projects that investors can access.²⁵ Underlying sub-sectors or other kind of projects could

²⁴ Infrastructure Investing, Key Benefits and Risks. JP Morgan, 2015.

<https://am.jpmorgan.com/blobcontent/1383271579721/83456/Infrastructure-Investing-Key-benefits-and-risks.pdf>

²⁵ Tokenisation: The future of real estate investment? University of Oxford, January 2020.

<https://www.sbs.ox.ac.uk/sites/default/files/2020-01/tokenisation.pdf>

find their places in portfolios. For instance, small renewable projects are difficult to finance on their own due to their size. Moreover, financing a large portfolio of small projects is also difficult due to the lack of standardisation and the costs associated with the minimum level of initial due diligence and information monitoring at project level. Having standardised, reliable information for each project that can be consolidated at the portfolio level will enlarge the scope of projects that can be financed, offering diversification for investors.

- **Better transparency**

Developing a robust decentralised ledger technology designed for infrastructure can be highly beneficial in addressing the heavy regulation and due diligence this asset class faces. Contract terms and regulations can be embedded into smart contracts and executed to realise immutable and transparent legal agreements. Distributed ledger technology ensures the error-free and accurate traceability of every operation, which will drastically help current systems align with due diligence operations and future regulations.

Finally, blockchain's transparency²⁶ and real time information combined with data aggregation will help future investors make better informed investment decisions. This is highly pertinent as a transparent comparison between different investments and a complete, accurate and updated information set is sometimes lacking and remains imperfect in the current infrastructure market.

Risks / Constraints of Tokenisation

- **Diverging regulation**

Regulation and specific laws have yet to be designed and enacted, notably on the legal recognition of blockchain registers and smart contracts. However, some countries have decided to move forward,²⁷ such as Italy with its law no. 12/19 dated 11 January 2019,²⁸ which legally recognises timestamping. Similarly, in the US states of Arizona and Tennessee, smart contracts have recently been legally recognised,²⁹ with the law stating that "no contract relating to a transaction shall be denied legal effect, validity, or enforceability solely because that contract contains a smart contract term."

Regulating a distributed ledger technology system can be challenging as regulation and applicable laws may differ and diverge across each node. Countries are not moving at the same pace and much effort is still needed to consolidate infrastructure regulations with blockchain technology, and to coordinate a common framework across countries. However, attitudes are changing, and some countries have already understood the ground-breaking implications of blockchain for infrastructure investment.

26 Kostopoulos, N. (2019, March) Blockchain metrics will add transparency to investing and better inform investors. Readwrite. website

27 Barbet-Massin, A. Reflections on the legal recognition of Blockchain timestamping by the Italian lawmaker. Actualités du Droit, March 2019. <https://www.actualitesdudroit.fr/browse/tech-droit/blockchain/20718/reflections-on-the-legal-recognition-of-blockchain-timestamping-by-the-italian-lawmaker>

28 Atto Senato n 989. Senato della Repubblica, January 2019. <http://www.senato.it/leg/18/BGT/Schede/Ddliter/51070.htm>

29 Montes, W. Legal recognition of Blockchain. Medium. June 2018. <https://medium.com/blockchainr/legal-recognition-of-blockchain-c223df81fcf2>



Natural Resources

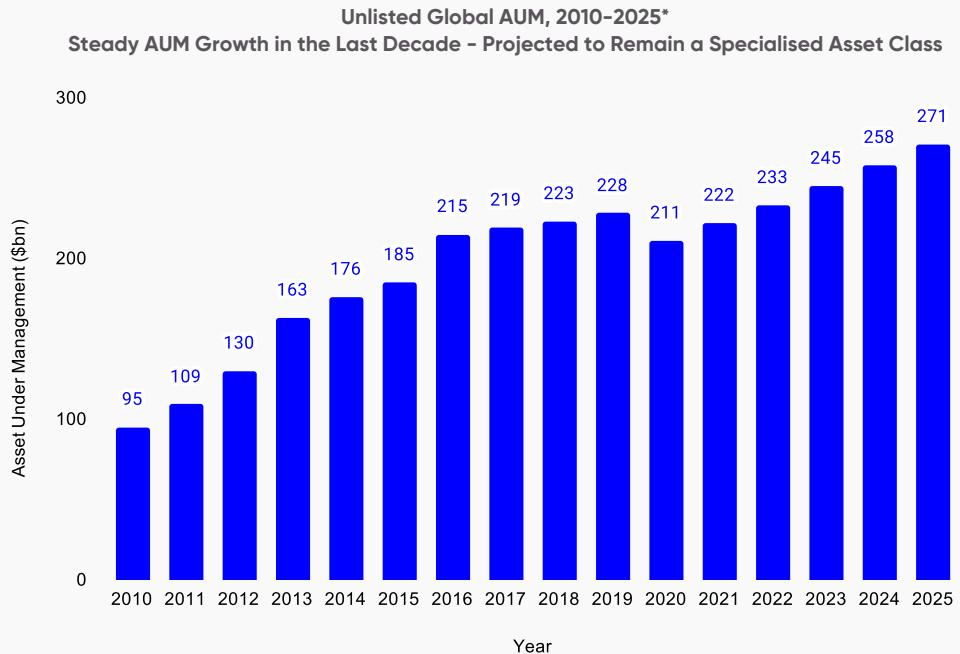
As an asset class, natural resources has a broad scope, covering anything mined or collected in raw form. It can be further categorised into renewable and non-renewable natural resources. This section focuses on natural resources across five strategies: energy (including oil and gas), agricultural and farmland, metals & mining, forests and water.

As society becomes more environmentally conscious, the demand for renewable natural resources will likely increase and non-renewables will decrease.

There are 4 key reasons why investors invest in natural resources. First, they act as a store of value and become more attractive when inflation rises. Second, rising income drives demand for natural resources. Third, some countries have begun buying up natural resources to ensure a consistent future supply of crucial raw materials. Finally, natural resources are considered as a diversifier for a portfolio as they have different return drivers than traditional asset classes.

Market Sizing

Natural resources' global AUM has steadily increased in the last decade to USD 808 billion at end 2019 from USD 229 billion at end 2010, a 3.5x increase over a nine-year period.



Source: Seismic Changes Will Shake Natural Resources Investment from Future of Alternatives 2025, Preqin (Nov 2020)

North America is the most established market for natural resources with over 70% of all active managers. Europe accounts for over 12% of managers, while Asia and the rest of world accounts for 5% and 13% respectively.

Challenges of the Asset Class

- **Natural disaster and operational inefficiency**

Investing in natural resources exposes investors to natural resource-specific risks such as natural disaster. In addition, to achieve optimised production, there often needs to be intensive asset management and operational excellence. Thus, the investor is exposed to operational inefficiency risk.

- **Illiquidity**

Most natural resource projects require a long time horizon. For example, hardwoods may need a rotation of 60 to 80 years to produce high quality sawn and timber products. Even with intensive management, the investment horizon is only shortened to 25 to 30 years.

- **Regulatory risk**

Government actions can raise or reduce the value of natural resource assets. For example, changing crop subsidies, energy policies, export caps and taxable subsidies all have significant impacts on the value of natural resources.

- **Concentration risk**

Some producers may be clustered in the same geographical area, or specialise in a specific natural resource, thus creating concentration risk.

How Tokenisation Addresses the Challenges

- **Enhanced liquidity**

Tokenisation will allow for fractional ownership of natural resources thus allowing a wider group of investors to invest lower amounts. Instead of owning an entire forest or farm, investors will be able to own tokens of the underlying assets. A secondary market for tokens will also allow holders to trade their holdings.

- **Targeted exposure option**

Currently, investors can get exposure to natural resources through listed options with listed company shares or Exchange Traded Funds. However, companies may have a mixed portfolio of natural resources, as opposed to a pure play on a specific natural resource. With tokenisation, it would be possible to get exposure to a specific natural resource project, or asset. For example, an investor can buy tokens from different farming companies and focus on a single type of crop to capitalise on the trends of the crop, while minimising individual company risk.



Case Study: Atomyze

Atomyze, a start-up by Russian mining and smelting giant Nornickel, is aiming to be the platform to sell tokenised metals, including palladium, cobalt, copper and other precious metals. Nornickel will be the first issuer of tokens on the platform and the first phase is limited to its major industrial partners including Trafigura, Traxys, and Umicore.

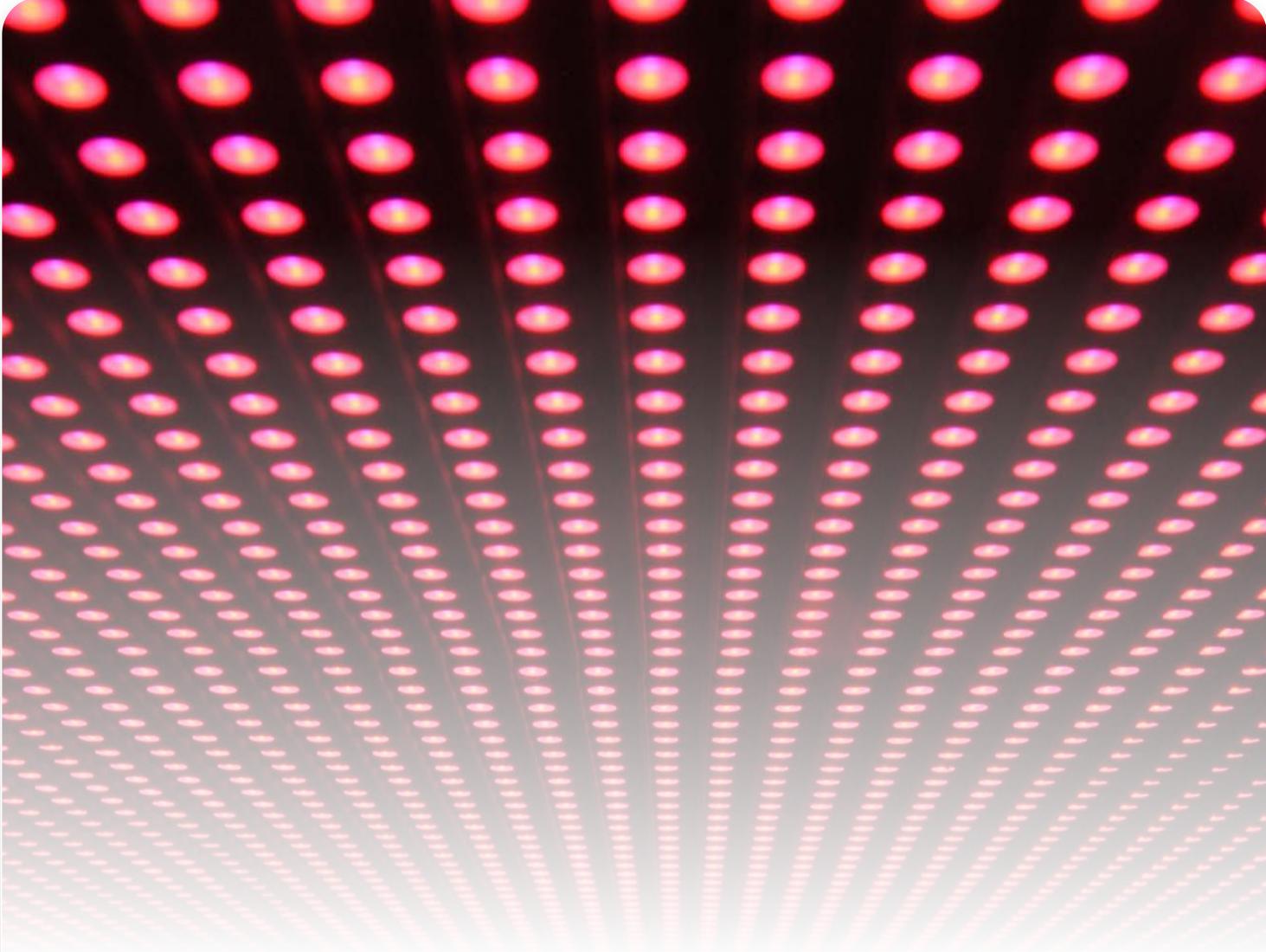
Nornickel plans to use Atomyze platform's services to tokenise part of its contractual volumes. The issued tokens will be backed by metal reserves, which will undergo a regular audit. Nornickel believes that tokenisation helps to digitalise sales contracts and provide flexibility to producers and their customers. For example, Nornickel customers could resell their excess orders via tokens instead of renegotiating the whole contract. In addition, investors interested in taking a position in the prices of metals can do so by buying tokens, instead of buying shares of the metal mining company or futures of the metal which typically require large ticket sizes.

Source: <https://www.nasdaq.com/articles/russian-metal-giants-tokenization-firm-expands-to-america-2020-10-16>

Risks / Constraints of Tokenisation

- **Requires a sizeable universe of natural resources to construct a portfolio**

To construct a diversified portfolio of natural sources there needs to be a universe of hedge funds to choose from. To achieve diversification, the investor would need to be able to invest in more than a handful of natural resources tokens.



06

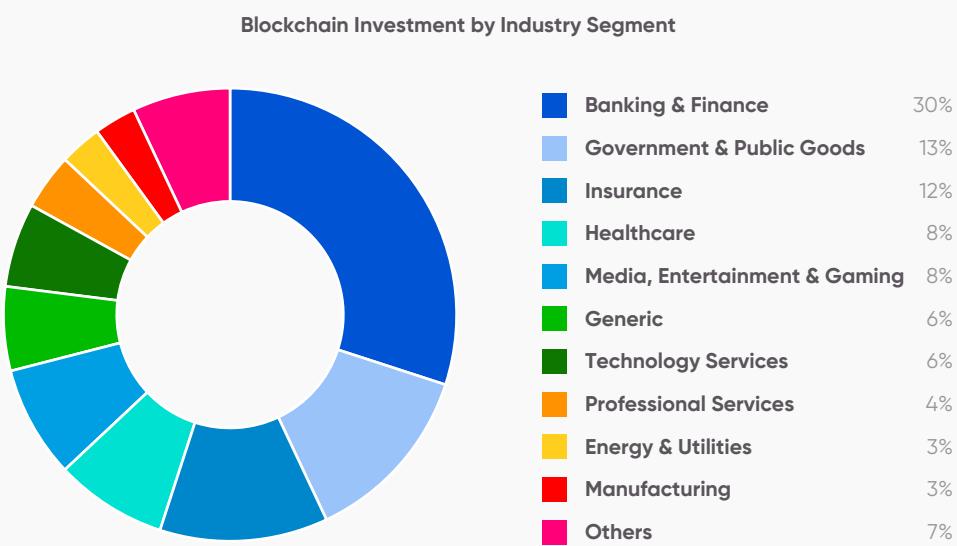
The Future of Alternative Investment Tokenisation

How can Banks Pioneer Scalable Increase in the Distribution of
Tokenised Assets?

The Future of Wealth Management and Tokenisation
Conclusion

WHAT ROLE CAN BANKS PLAY IN THE TOKENISATION OF ALTERNATIVE ASSETS?

By industry segment, the financial services industry has consistently been the largest investor in blockchain in the last few years. Total investments by the financial industry represent 30% of total blockchain investments, ahead of manufacturing and healthcare.



Source: Global Blockchain Benchmarking Study, Cambridge Center for Alternative Finance, Invesco, 2017

Blockchain can help upgrade the legacy systems of banks. Tokenisation can automate and streamline capital market processes while broadening asset distribution for investors.

In the context of alternative investment tokenisation, banks have a pivotal role. They can fund companies and projects, providing them with otherwise inaccessible capital. Moreover, banks can source assets thanks to their relationships, streamline the financing process, and distribute it through their asset and wealth management networks (discussed below). Banks have a key role to play in the new 'token economy', enabling new business models while ensuring regulatory compliance in the following ways:

- **Funding / sourcing smaller companies or assets**

Banks have trusted relationships with corporate and institutional players, remaining a privileged intermediary to finance and source different assets. They remain a necessary coordinator among regulators, investors and technology providers to offer services that meet companies' or projects' financing needs.

Some companies are willing to collaborate with banks to explore the impact of new technologies and new types of financing. Specifically, this can benefit smaller projects, operated by companies which traditionally have solid relationships with banks. For example, some of the first infrastructure projects to be tokenised included a water pipeline project in North Dakota.

As highlighted by the International Institute for Sustainable Development in a paper on the attractiveness of tokenisation to finance sustainable infrastructure: "small-scale projects often deliver the most economic and social impact per dollar spent. Therefore, their contributions to local economic development and societal well-being are paramount in both developed and developing countries." Tokenisation may offer the opportunity for banks to increase the societal and local impact they have by tokenising the small sustainable infrastructure projects of cities or companies that would otherwise have struggled accessing finance (cf. Tokenisation of Infrastructure section).

- **Streamlining processes with embedded compliance**

Today, one of the main limitations for banks in handling small projects is the onerous process associated with credit analysis. By structuring the data associated with the project into a token, credit analysis can be executed more rapidly so that the financing can be provided in a more timely manner. For example, tokenisation provides the opportunity to integrate 'investor side' compliance into the token, by allowing qualified whitelisted investors to access certain assets, matching requirements with an AML / KYC repository (which can also be operated 'on chain').

- **Enabling new business models**

Over the past few years, many fintech companies and major financial institutions have worked together to reap the benefits of tokenisation. Most financial institutions focus on replicating current bond or equity issuance on chain, duplicating the real-life processes digitally. However, these experiments tend to disappoint from banks' ROI-centric point of view.

- **Creating custody / safe keeping infrastructure**

Banks offering custody services should continue to offer those services for tokens and tokenised assets as they do for their other existing assets. In fact, custody is often the first business large financial institutions enter first when announcing partnerships with crypto services providers.

Having recognised the potential benefits of decentralised technologies in their industry, banks have started to take significant interest in blockchain, reflected in the sectors' considerable investment in this technology. Banks have a pivotal role as the fulcrum between the companies or projects in need of financing, in addition to the custodial services they can offer.

Banks potentially have a major role to play in tokenisation, but without the collaboration of other interested parties actors such as regulators, investors, corporates, technology players, education players and financial associations, banks would not be able to reap the benefits of tokenisation. Inside banks themselves, the changes cannot come only from innovation or technology teams understanding the ins and outs of tokenisation without onboarding the rest of the organisation, from the leadership to legal, compliance, and operations.

However, in the context of alternatives, the prospect of creating a 'token economy' which blurs the line between public and private markets can offer attractive new business

opportunities for traditional banks. The benefits derived from the redefinition of transaction, protocol and process structure will allow tech-savvy financial institutions to find better processes at more attractive costs, enabling new business from clients such as those from SMEs, emerging countries and smaller projects. For private companies, the token economy could also enable them to stay private for longer, and to focus on the growth of their business rather than the short-term profits that public markets may require.

Tokenisation lowers the entry barrier to investment in some markets. Such examples include art, wine, movies or music copyrights, carbon credits or other alternatives, all of which are typically reserved for specialised boutique firms. Many asset classes and business models can be developed in a scalable way using the same technological tokenisation infrastructure. By handling 'traditional' alternative assets first, banks can enter collectible markets first, amortizing the infrastructure costs and opening new opportunities for their wealth and asset management arms.



What others think

"Tokenisation can address some of the fundamental challenges of financing sustainable infrastructure projects." International Institute for Sustainable Development.

THE FUTURE OF ASSET & WEALTH MANAGEMENT AND TOKENISATION

As highlighted in section 3, tokenisation would endow alternative assets with greater liquidity and access to a broader range of investors. It would bring potential for greater access and diversification benefits, changing the nature of the services that wealth and asset managers may provide to their clients.

- **Cascading products and services to smaller investors**

Efficiency, reduced compliance cost, data management, increased liquidity and fractionalisation through blockchain technology will allow wealth and asset managers to offer products to client segments beyond the ones they currently serve.

Tokenisation: Cascading Products and Services Down and Across the Client Segments

Type of clients	Retail	Wealth	Institutions
Change in offering	Access to today's wealth products at a cheaper price/lower investment amount	Access to today's institutions' products at a cheaper price/lower investment amount Access to new assets and services	Access to today's institutions' products, at a better liquidity Access to new assets and services

Source: BNP Paribas Asset Management (2020)

Tokenisation is opening up the market for smaller and non-institutional investors. In addition, its global distributed network, transparency and ability to develop peer-to-peer platforms across borders will facilitate the emergence of new investors across the world, especially those from emerging countries accessing micro-investment solutions.

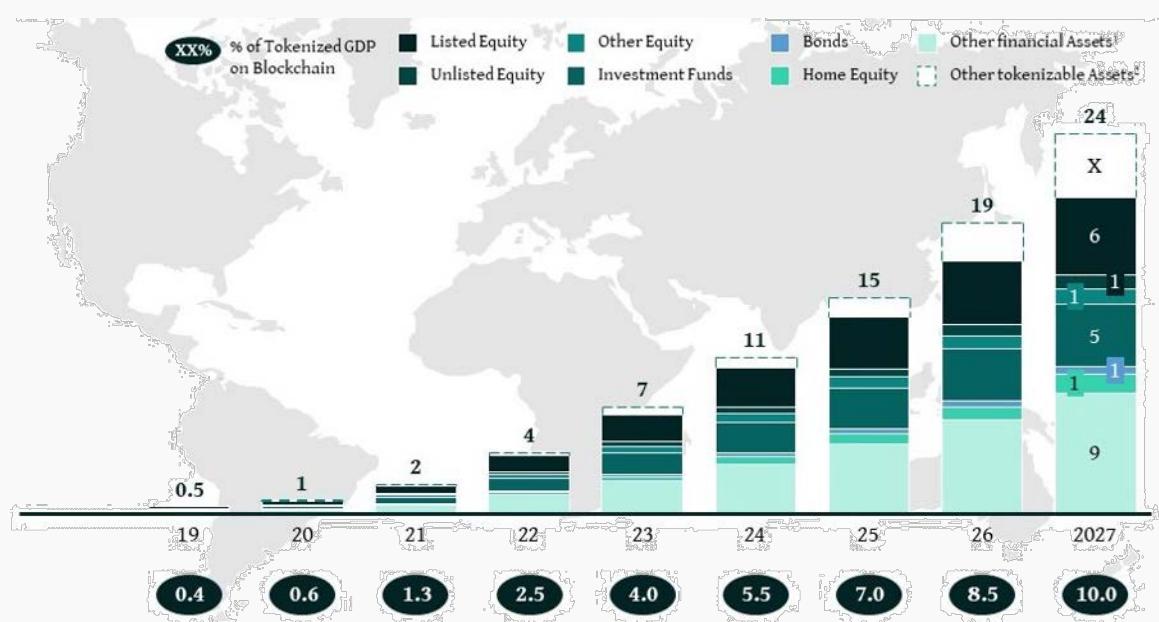
- Enabling new opportunities for asset managers to invest in banks' tokenisation platforms**

As highlighted in the previous section, banks can play a key role in financing smaller type of projects or companies. This will offer new opportunities to source assets for asset managers. In the previous private debt and infrastructure tokenisation section, challenges around sourcing assets to fuel the demand for higher yield of institutional investors was highlighted. It is expected that tokenisation will enable asset managers to access assets that previously could not be commercialised. These could potentially be distributed as an allocation within a diversified portfolio to institutional clients and wealth management clients.

- Creating of new types of assets**

Tokenisation will bring about the emergence of new markets for tokenised assets, notably in intangible assets. As highlighted in the previous section, new types of alternative assets will be created as part of the 'token economy'; we may see the emergence of assets such as movie or music copyrights, wine, art, or other collectibles being tokenised. As highlighted by the World Economic Forum, by 2027, a large part of the world's GDP will be tokenised and 'other financial assets' may represent more than 9% of the world's GDP. In addition, they estimate that 5% of the world's GDP may be tokenisable, demonstrating the potential for growth of those new types of alternative assets.

Projected Tokenised Market Volume to 2027 (USD trillion by Asset Class)



Source: The future of financial infrastructure, World Economic Forum (2015).

- **Strengthening client relationships**

Savings from streamlined processes and cost reductions brought about by tokenisation may allow asset and wealth management institutions to improve their existing internal processes. Indeed, the opportunity to reallocate resources and time toward achieving better client relationships is more important than ever due to the increase of client mobility and competition among established financial institutions and new entrants.

In addition, alternative assets are intrinsically more tangible and understandable for retail investors (movies, real estate, art, infrastructure projects) than traditional bonds and equities. As a result, tokenisation of alternative assets will allow asset managers will be positioned closer to the client than before.

Capturing Operational Efficiencies in Front, Middle and Back Offices

Front Office	Middle & Back Office	Other
High Impact Fund Distribution Smart Assets: Low Impact Trading liquid securities Medium Impact Trading illiquid securities	High Impact Post-trade custody and settlement	Medium Impact Client onboarding (KYC) Low impact Reference data management

Source: How Investment Management CIOs Can Identify Practical Blockchain Use Cases, Gartner, Invesco (2018)

Middle and back-office activities will be impacted by blockchain technology. Resource re-allocation from back to front office activities can improve asset and wealth management firms' business as they can create new products with customised analysis and profiles. Many processes during client-facing situations will also be impacted, such as KYC or AML. The automation of these time consuming activities allows firms to devote more time to strengthening their client relationships.

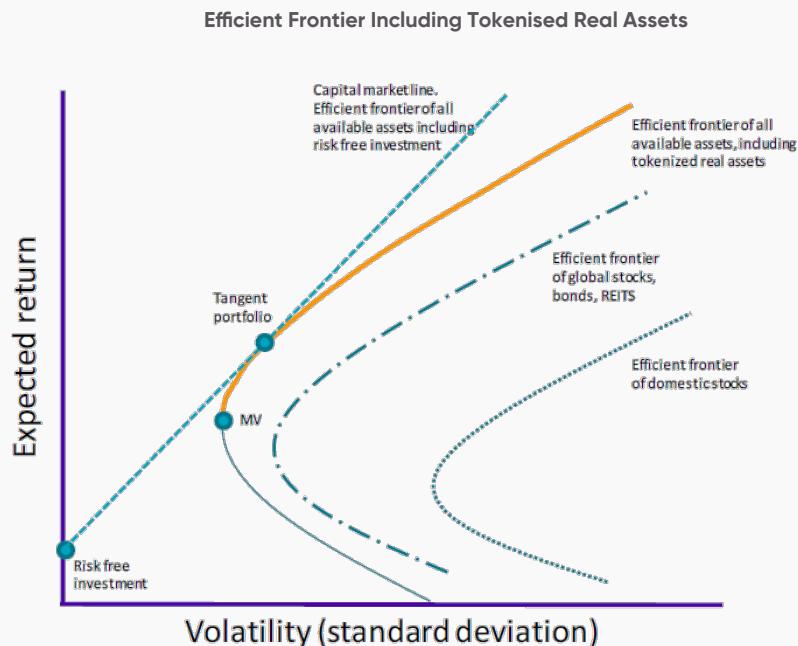
- **Reinventing portfolio optimization**

New business opportunities for asset managers may emerge as asset tokenisation evolves and becomes more sophisticated. For example, token investing or advising. As highlighted by Jeroen van Oerle in a recent CAIA Association paper, one of the first activities to be impacted will be portfolio construction, as the investment universe will expand from equities or bonds into a broader spectrum of assets with differentiated risk / return profiles.

Investable asset pools will be broader. Applied to the Capital Asset Pricing model (CAPM), Jereon van Oerle argues that it may offer a potential tangent portfolio with a better risk / return profile than the current optimal portfolio including only global stocks, bonds and REITS.

Robust portfolio optimisation services with the ability to model real assets and overcome the challenges of historical valuation data will likely become crucial competitive advantages for asset managers.

Similar to banks, wealth and asset managers must consider their constraints in order to manage change, while making sure investors are educated about the new risks tokens can involve compared to traditional assets. This means ensuring tokens are suitable for them and are employed with the long-term objective of growing their wealth.



Source: Tokenising Real Assets, CAIA Association, Jeroen van Oerle, Q3 2019



What others think

"Financial education efforts would be indispensable for the protection of investors in tokenised markets, especially given the potential for increased participation of retail investors in such markets." OECD

CONCLUSION

1 Tokenisation has great potential for assets that are illiquid and have high barriers of entry

Tokenisation offers the potential to increase liquidity via fractional ownership; promote transparent and secure data; and enable 24/7 trading. It would thus lower barriers of entry, providing greater operational efficiency and liquidity. The greatest gains may be those that could be achieved through broader access to previously illiquid assets or asset classes with high barriers of entry, such as real estate, luxury collectibles, sports teams and even funds such as private equity, private debt, venture capital or infrastructure vehicles.

2

Wealth and asset management industry: Opportunity to innovate and thrive

As an innovative new technology, tokenisation would bring changes to wealth and asset management, allowing a broader pool of investors to access new products and services better suited to meeting their financial needs.

Tokenisation could contribute to a reshaping of the structure of the asset and wealth management industry through the digitisation of real assets. This will put clients back at the centre of the relationship, not only benefitting from products that are cheaper, but also through access to a diverse range of asset and services that are adaptable and customisable to individual needs.

For the alternative investment industry, tokenisation could allow for product innovation in a very competitive environment over the coming years. Whether fund management companies choose to play the game offensively or defensively in this environment remains to be seen. However, institutions that engage solidly with technology, focus on future opportunities, innovate and adapt quickly to new market realities, while keenly listening to investors' needs and requests, are sure to thrive.

3

Investors: Equitable access to investment options

For the investors, tokenisation will provide wider investment options and access to types of investment and value creation that are currently beyond the reach of many. These will be more cost effective products permitting better control, transparency, portfolio optimisation and risk management tools to govern how assets are allocated.

4

From issuance to the management of alternative investments tokens: actors to work together to manage associated risks with tokenisation

At issuance level, platforms and issuers should ensure tokens have embedded the appropriate compliance in order to ensure the suitability to investors, especially if new type of investors are targeted. At investment management level, due diligence and analysis should be at the same standard as what was done with the original instruments and risks controls in place. Finally, regulators, banks, investors, technology platforms, and associations should all work together to educate the market about the opportunities as well the risks that tokenisation creates.

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