



IMMFA White Paper on Tokenisation of Money Market Funds

Introduction

This white paper looks at how the evolution of digital assets is relevant to the international Money Market Fund (MMF) industry, identifying areas where technology advancements can increase the attractiveness and broader application of the asset class. It will focus particularly on the concept of fund tokenisation, including the following key points:

- The tokenisation of MMFs could bring significant benefits for money market investors and the effective functioning of the markets more broadly.
- By providing greater settlement flexibility, tokenisation will also make the asset class more attractive to new investors.
- The practice of tokenising funds, including MMFs, already exists, albeit in smaller, private ecosystems. Wider acceptance of MMFs in tokenised format could enable more efficient transfer of MMF units ('portability') and increase investors' use of MMFs as collateral to meet margin calls in both derivative and repo transactions.
- Although the use of MMFs for collateral is not contingent upon tokenisation, the portability of tokenised MMFs would be significant in removing operational obstacles. The use of MMFs as margin collateral would reduce pressure on MMF redemptions at times of market stress and thereby bring benefits in terms of financial stability.
- Regulatory and central bank support for both the use of MMFs as margin collateral and for tokenisation is essential before market wide adoption of MMFs for use as collateral can be realised.

About IMMFA

The Institutional Money Market Fund Association (IMMFA) is the trade association which represents the European short term money market fund industry. IMMFA's mission is to promote and support the development and integrity of the MMF industry by engaging with and informing policy makers, educating investors, and providing a primary point of contact for stakeholders.

IMMFA has 32 Members, consisting of 17 asset managers, referred to as Full Members, and 15 Associate Members consisting of service providers to MMFs such as custodial banks, credit rating agencies, transfer agents and technology providers.



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As of the end of 2024, IMMFA MMF assets under management (AUM) were over EUR1,100bn (EUR equivalent). This is comprised almost exclusively of institutional funds, denominated primarily in three currencies, USD, GBP and EUR, of which USD is the largest (USD663bn), followed by GBP (GBP245bn) and EUR (EUR255bn).

Although the overwhelming majority of IMMFA MMFs are stable Net Asset Value (NAV) in the form of either Low Volatility Value Net Asset Value (LVNAV) (78%) or Public Debt Constant Net Asset Value (PDCNAV) (18%), IMMFA represents all fund types and many of our Members offer a range of funds.

As of 30 September 2024, the ECB reported total European MMF AUM of EUR1,876bn. On this basis IMMFA MMFs accounted for 58% of the total in EUR equivalent terms.

What is a Money Market Fund?

Money market funds are mutual funds that invest in short-term, high quality money market instruments. They allow investors to access a professionally managed, diversified, high-quality portfolio without the operational complexity of investing directly themselves. As with other mutual funds, each investor in an MMF is considered a shareholder of the investment pool, i.e., a part-owner of the fund.

MMFs offer many benefits to investors, including but not limited to:

- Diversification of investments by type and issuer including credit diversification away from single exposure bank risk
- Same day liquidity¹
- Outsourcing of credit analysis to a professional cash management team
- Segregation of assets
- Competitive money market returns.

What are Digital Assets?

Digital assets are assets that are recorded using a digital ledger, which enable the global, instantaneous, low-cost transfer of value. The impact of digital asset technology is considered analogous to that of globalisation and the internet in enabling trade and the transfer of information.

There are several key areas within the digital asset arena which are important in the context of fund tokenisation, in particular, Distributed Ledger technology (DLT), crypto assets and stablecoins. We outline these below.

¹ In the overwhelming majority of short-terms MMFs.



What is Distributed Ledger Technology?

Distributed ledger technology (DLT) is increasingly being used to rebuild and create a more modern and efficient financial market infrastructure. It is key to the foundation of digital asset technology.

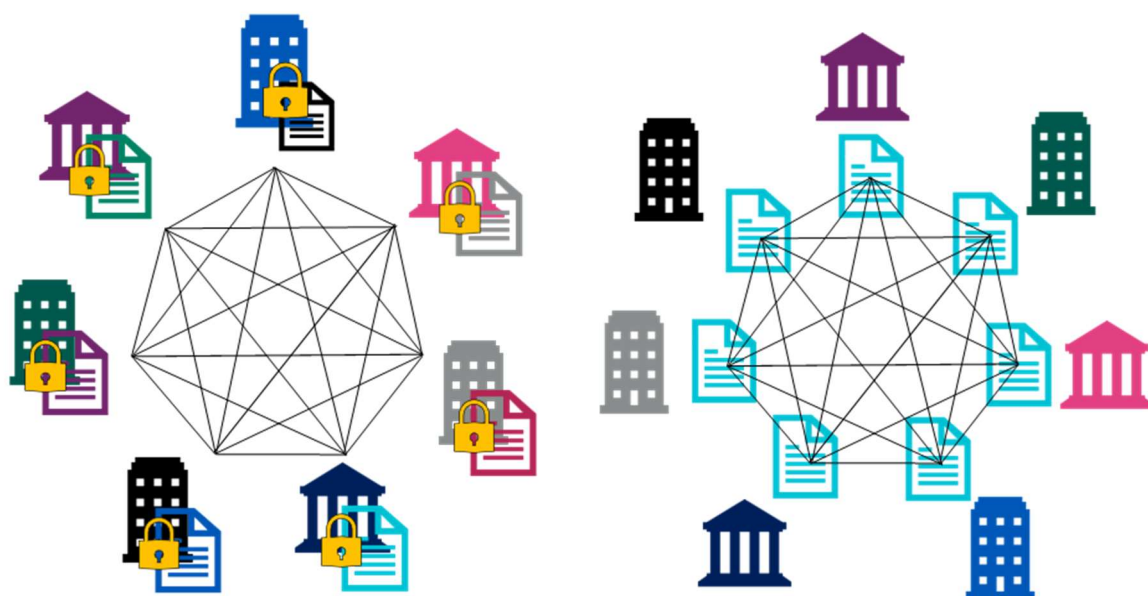
DLTs are digital ledgers that allow data to be stored in a trusted, verifiable and accessible way. Unlike traditional centralised databases or ledgers, which are maintained by individual entities (such as the transfer agent in the case of MMFs), DLTs consist of a single decentralized digital ledger which can be distributed across many entities. This means there is only one source of information to which all participants have simultaneous access.

Whereas traditional centralised ledgers require users to trust the party maintaining the ledger to maintain their own ledger and reconcile entries against the centralised ledger, DLTs do not require either. This is because all DLT users see the same ledger and, through an algorithmic consensus mechanism, the ledger is updated by a group of “nodes” (computers), that are disincentivised to be bad actors.

Centralised ledgers

VS

Distributed ledger





What are Blockchains?

Although blockchain and DLT are often used interchangeably, blockchains are more precisely a type of DLT. Like DLT, blockchains record transactions and data across a network of participants with multiple computers in a way that ensures the data is secure, transparent and immutable.² In the case of Blockchain, each transaction is stored in a block and these blocks are linked in a chain.³

Types of Distributed Ledger Technology

There are various types of DLT considered individually below:

Public/Permissionless DLT

Public/permissionless DLTs are networks open for all to use. There are no restrictions on who can interact with the network, although there may be restrictions on who can use or own tokenised assets in the network through other forms of permissioning. There are also no restrictions on who can operate a public/permissionless network (hence 'permissionless'), although there may be limitations caused by minimum investment or compute requirements. For example, Ethereum is a public/permissionless network. Many assets on Ethereum can be freely bought and sold by anyone, but some assets have restricted access.

Public/permissionless DLTs offer the greatest potential to scale across retail markets but can have security issues and operational problems such as network downtime. They also lack the ability to limit involvement with entities that should not be permitted access such as sanctioned entities.

Public/Permissioned DLT

Like public/permissionless DLTs, public/permissioned networks are open for all to use, but access to specific assets can be restricted. Unlike permissionless DLTs however, a public/permissioned network is operated by a select group of nodes. The ability to run a node is usually determined by some application, with the decision normally residing with the existing set of node validators. Hedera Hashgraph is one type of public/permissioned DLT, whereby the nodes are run by up to 39 large corporations.

Public/permissioned networks offer much of the scalability benefits of public/permissionless networks but have the added benefit of additional layers of security, operational robustness and regulatory controls.

² I.e., once a transaction is recorded, it cannot be altered. If an error is found, a new transaction must be added to correct it.

³ It is worth noting that other types of DLT also exist, such as Directed Acyclic Graphs (DAGs), whereby data is stored in vertices in a graph to create scalability, and Hashgraphs, which take the benefits of DAGs and use enhanced messaging features to retain speed and improve security.



Private/Permissioned DLT

Private/permissioned DLTs have restricted access and operations. They are typically used by large financial enterprises for creating closed ecosystems which allow transactions between a limited number of close counterparties. They can be operated by one or many permissioned entities and vary in terms of decentralisation. They can be particularly useful for creating operational efficiencies and offer a secure way of communicating. However, they potentially lack the scalability of public networks, for reasons such as cost.

Digital Asset's Canton Network, JP Morgan's Onyx, and R3 Corda are examples of private permissioned DLTs (at the time of writing).

Cryptocurrencies and Stablecoins

Before considering the application of the tokenisation of MMF units, it is important to differentiate between cryptocurrencies and stablecoins (a subset of cryptocurrency defined below). Both are digital currencies in which transactions are verified and records maintained on a decentralised system which operates independently from a central authority.

Users of both cryptocurrencies and stablecoins use blockchains to exchange their currencies, thereby taking advantage of such things as faster settlement times, lower costs and reduced operational complexity. However, whilst both cryptocurrencies and stablecoins operate on blockchains, there are significant differences between them. Some cryptocurrencies such as Bitcoin are designed to be a store of value and to provide a hedge against fiat⁴ inflation and currency devaluations, but as the price is driven by market supply and demand, including for speculation, this can lead to rapid price swings. Other cryptocurrencies are designed not as a store of value, but to pay for the cost of using their respective networks, such as Ether.

Stablecoins are a type of cryptocurrency, but their purpose is to minimise price volatility, making them more suitable for payments, as an alternative to cash. Stablecoins seek to provide price stability by holding 1:1 reserves of a specific asset or currency (such as the US Dollar), allowing them to mirror the price of that asset or currency.

It should be noted that whilst stablecoins and cryptocurrencies do not pay interest natively⁵ when they are held in a crypto wallet, it is possible to generate returns by depositing them in a centralised lending platform or decentralised lending protocol.⁶ This does, however, introduce the counterparty risk of the borrower and there are examples of investors not getting their cryptocurrencies back, so risk management becomes very important.

⁴ A fiat currency is a government issued currency not backed by a physical commodity. It can be subject to inflation if too much is issued.

⁵ I.e., within the digital platform.

⁶ Decentralised protocols consist of standards codes and procedures that govern the decentralised financial application.



It is important to highlight that tokenised assets are not cryptocurrencies (unless the underlying asset is also a cryptocurrency). However, cryptocurrencies can be relevant to some tokenised assets if those assets are recorded on a public blockchain. Public blockchains, either permissioned or permissionless, accept their native cryptocurrency as payment for use of the ledger. For example, users of the Bitcoin blockchain must pay some Bitcoin (BTC) to add a transaction (which can be data, not necessarily a financial transaction) to the blockchain. Likewise, users of the Ethereum blockchain must pay some Ether (ETH) to add a transaction to the Ethereum blockchain.

Cryptocurrencies are also necessary to secure proof-of-stake blockchains, such as Ethereum, whereby node operators receive compensation for validating transactions. In this instance, cryptocurrency holders 'stake' their holdings to nodes to help them validate transactions and are rewarded for this with staking rewards. Without this incentive, there would be insufficient nodes running the network, and security would be significantly weaker.

Lastly, cryptocurrencies are crucial to ensure continued innovation in DLT. They provide the incentive for developers to continue to enhance and adapt technology to meet changing needs and evolving risks.

Tokenisation of MMFs - the Benefits

Like other assets, MMF units can be tokenised on distributed ledgers and thereby benefit from many DLT characteristics. These include the ability to:

- ***Hold assets in a digital format*** 'on-chain' to be used within the DLT eco-system.
- ***Instantly transfer ownership*** of the fund to another eligible party
- ***Fractionalize ownership*** to multiple decimal places beyond what is possible with traditional off-chain ledgers.
- ***Quickly, securely, and reliably process underlying data*** such as administrative or data relating to the underlying securities.
- ***Distribute interest in the form of tokens.***

In addition to the above benefits, as neither cryptocurrencies nor stablecoins provide interest in the same way as a traditional fiat currency in a bank account does, the ability to access MMF returns through DLT innovation is an attractive alternative.

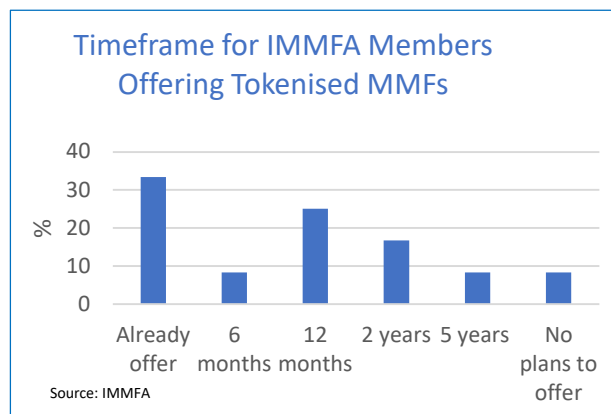
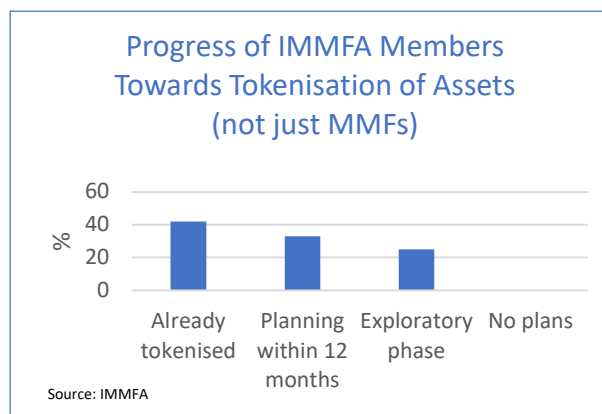
Making the case for MMF Tokenisation

Any discussion of the tokenisation of MMF units should not be held in isolation but as part of a broader market-wide debate around tokenisation of multiple asset classes. ***There is demand for shorter settlement cycles and improved operational efficiencies in all markets and the trend towards such efficiencies will continue to grow. The use of digital technology and tokenisation will support this progression.***



A survey of IMMFA Members for this paper revealed the following results:

- 42% of respondents already have some form of tokenised asset in the market.
- A further 33% plan to within the next twelve months.



On tokenised MMFs more specifically, one third of respondents already offer some form of tokenised MMF (which may be included in the broader question of offering tokenised assets). A further one third plan to offer tokenised MMF within the next six to twelve months plus a further 17% within two years. This indicates that Members expect tokenised MMFs to have wider take-up in the relatively near future.

Only 9% of respondents had no current plans to offer tokenised MMFs.

Tokenisation of MMF units can lead to benefits for both investors and for the MMF product itself in terms of utility value:

- For investors, tokenisation offers a series of advantages, including **faster settlement, instantaneous transfer, access to new distribution channels and the potential to be used more efficiently in the collateral management space.**
- In terms of the utility value of MMFs, improved settlement flexibility as **existing physical constraints are bypassed may promote access to a broader investor base** and greater usage as collateral.

In combination, these potential advantages could appeal to a broad range of investors, increasing the overall appetite for MMFs and **deepening the investor base.**

Proof of Concept

The IMMFA Member survey illustrates an underappreciated aspect of MMF unit tokenisation which is that the practice already exists, proving that the concept works. At the time of writing, the use and transfer of tokenised MMF units currently takes place in small, private ecosystems, except for a small number of IMMFA Members tokenising on public chains. Wider acceptance of MMFs in tokenised format could enable more efficient transfer of MMF units (portability) and increase investors' use of MMFs as collateral to meet margin calls. To



encourage wider adoption of MMFs for this purpose, buy-in from public blockchains and connectivity to those blockchains is essential.

The market will also benefit from the proliferation of papers and studies being prompted by a range of policy makers and regulators seeking engagement on several related matters such as standardisation of approach and application. As we continue to see a broad range of market participants engage on this topic and appreciate the benefits that can be unlocked, that in itself is likely to have a hugely positive impact on development as the traditional market infrastructure moves towards wider adoption of tokenised MMF units.

Having noted the positive impetus, however, we would add that for MMF tokenisation to be more widely adopted, regulatory and central bank recognition and acceptance that MMF units could be used effectively as collateral is critical.

Given PDCNAVs⁷ are the most conservative fund type, investing almost entirely in government assets, regulatory obstacles should be less challenging in their case, but a more comprehensive solution, inclusive of other fund categories, is required in order to reap the maximum benefits.

Given digital technology is relatively recent, the regulatory framework for the tokenisation of funds, including MMFs, is still in the early stages of evolution. Consequently, approaches differ across jurisdictions. ***Regulation needs to develop and cohere for tokenisation to gain market-wide acceptance.***

The Use of Tokenised MMFs in Collateral Management

MMFs in tokenised format could offer greater utility in that they could avoid the traditional settlement constraints under which MMFs currently operate and add to financial stability through ease of collateral portability in a range of transaction types, for example, cleared and uncleared margin and Repurchase agreements, rather than requiring cash movement.

Use of Tokenised MMFs as underlying Assets in Repo Transactions

The fact that tokenised MMFs are easier to transfer means that MMFs could be used in repo transactions as collateral against cash. Tokenised MMFs could be transferred instantaneously, providing a much quicker and smoother settlement process. This means, for instance, that tokenised MMFs could be used to raise cash to meet variation margin requirements where cash is typically exchanged daily and sometimes intraday. This would have the benefit of avoiding MMF redemptions.

⁷ PDCNAVs invest 99.5% in government securities and cash. In 2021, ESMA consulted on broadening Central Clearing Counterparties (CCP) investment policies, including whether to make MMFs permissible. In principle PDCNAVs meet the collateral eligibility requirements i.e., they are highly liquid and have minimal credit and market risk. ESMA concluded that all categories of MMF should continue to be excluded given that policy decisions relating to MMF reforms had not been finalized.



Current Repo/ Reverse Repo Transaction

Taking an overnight repo transaction as an example (given that MMFs are very active users of overnight reverse repo) and using the traditional systems available currently, the process is as follows:

- Cash is transferred in exchange for securities collateral either Delivery Versus Payment (DVP) or, if the transaction is triparty, the securities are not delivered but held by a custodian
- This flow is reversed the following day
- This settlement process may take several hours (one reason MMFs typically transact their repo early in the day and ahead of other transactions).

Potential Digital Repo/Reverse Repo Transaction

In an alternative digital scenario, the same transaction would be settled within minutes. The following 'steps' would happen *in real time*:

- Step 1: The counterparties agree/confirm trade
- Step 2 The cash borrower tokenises the collateral
- Step 2: The cash lender funds a blockchain deposit account
- Step 3 Trade settlement takes place
- Step 4: The parties monitor settlement and maturity *in real time*.

In addition, ***when tokenised MMFs are used as collateral they retain the benefit of full transparency of the underlying securities***. It is possible to take off-chain data such as valuation, liquidity, and credit ratings of the underlying MMF securities and compute a more accurate and appropriate haircut for the MMF token collateral at the time of the token transfer. ***This allows counterparties to reflect counterparty risk more accurately in their portfolios***. In cases where counterparties take a more conservative approach to haircuts, it can also result in more business being done. This 'look-through' to the underlying assets may be particularly important when considering the potential shared credit risk between a receiving counterparty and an underlying security.

In the two relatively recent market crises MMFs demonstrated their resilience, continuing to fulfil their purpose by meeting redemptions in full and on time and meeting their regulatory objectives. Notwithstanding the fact that MMFs demonstrated resilience, the ability to utilise MMFs as collateral would have been extremely beneficial in mitigating the impact of liquidity strains.

Use of Tokenised MMFs as Margin Collateral in Derivative Transactions

In March 2020, the 'dash for cash' included significant redemptions from some MMFs as investors who were using derivative strategies and were therefore margin sensitive sought liquidity to meet increased margin calls resulting from the extreme market volatility. Some such investors withdrew cash from MMFs to meet these calls from the most liquid source. In



many cases these investors increased holdings in MMFs again once other less liquid trades had settled.

The unprecedented velocity and size of these redemptions meant that some MMFs were forced to sell short-dated assets into an illiquid market in order to maintain their liquidity buffers over and above the regulatory minimum liquidity requirements, the so-called 'bright line'. Removal of the link between minimum liquidity thresholds and the possible imposition of fees and gates ('delinking') is now widely accepted as a means of addressing this issue and alleviating procyclical pressure, but the ability to post MMFs directly as collateral would further mitigate the risks associated with sharp increases in liquidity demands.

Had MMFs been considered eligible as cash collateral, these margin sensitive investors would have been able to post the MMFs directly, avoiding the need for managers to redeem funds in order for the investors to post cash. ***Tokenisation would make the process of using MMFs as margin collateral operationally easier because it allows for instantaneous settlement and the bypassing of traditional cutoff times.***

As noted above, in many cases, the cash proceeds were subsequently reinvested into MMFs or other substantially similar money market products. ***Facilitating the use of MMFs as collateral, through the effective use of tokenisation, would reduce this procyclical pressure and bring substantial corresponding benefits to financial stability.*** As a result, undoubtedly some of the stress in underlying short-term funding markets (notably the Commercial Paper and Certificate of Deposit markets) could have been alleviated.

The link between MMF redemptions and margin calls was similarly observed in September 2022 in the wake of the UK government's 'mini-budget'. Unprecedented moves in UK gilt prices required some pension schemes using leveraged strategies to post additional margin against derivative and/or repo exposures. Again, the ability to use MMF units would have eased the procyclical pressures experienced by pensions schemes, as well as the pressure on MMFs themselves.

The structure of a digital eco system would have enabled the passing of MMF units between consenting counterparties at any time, thus reducing the requirement to sell units in MMFs and physically instruct the delivery or receipt of cash subject to the constraints of market cut-offs.

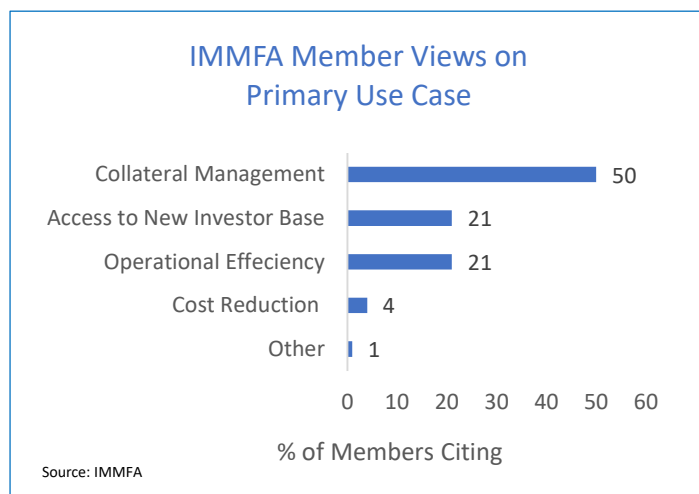
Digital Financing Applications

The advent of digital financing applications will bring significant benefits in this context. Decentralised Finance (DeFi) is an all-inclusive term for any application that uses decentralised finance such as public blockchain technology and which enables peer to peer transactions. These applications, sometimes referred to as dApps, are being developed as part of the shift away from traditional centralised financial systems. They will offer one unified platform accessible via the web to manage on-chain balances, execute, settle and mature



transactions. This activity allows for the insulation of volatility in the funds themselves as all client activity is done away on the DeFi app.

Primary Use Case for Tokenised MMFs



Half of IMMFA Members surveyed for this paper viewed collateral management as the primary use case for tokenised money funds, reflecting the market trend towards tokenisation. That said, there are other potential benefits to tokenising MMF investments. One fifth of respondents also saw operational efficiencies as a benefit of tokenisation, whilst a further one fifth saw it as a means of reaching new investors.

The Future for Tokenised MMFs

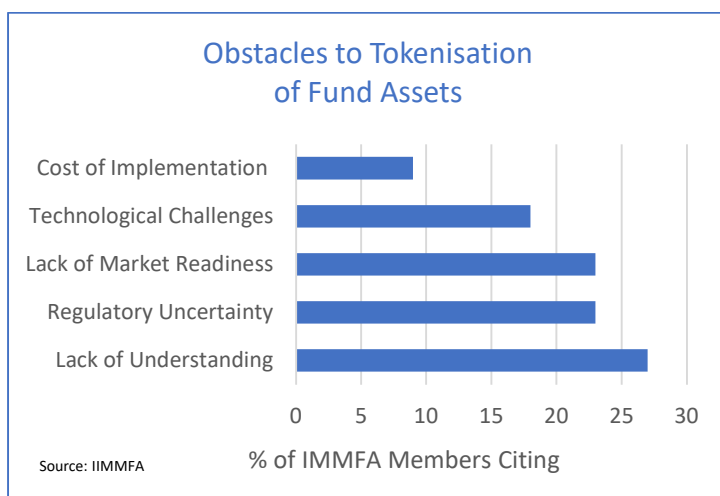
Given the ability to instantly transfer ownership in a tokenised MMF to investors, it could be possible in the future to see MMF tokens being used to settle transactions of other digital assets. This could include other tokenised funds, securities or real assets, if they are on the same chain or indeed, in the future, cross chain, as interoperability solutions become more established.

It is broadly accepted by all market participants that there is a valid use case and value in the deployment of tokenisation in the financial markets. At its core ***the reduction/removal of operational friction*** can only benefit the growth and stability of an asset class such as MMFs.

Undoubtedly there are several challenges to wider adoption of distributed ledger technology and tokenisation. In our survey, 23% of IMMFA Members felt that regulatory uncertainty created barriers, whilst a further 23% highlighted a lack of market readiness, reflecting the lack of pull factor for these assets at this point in time.

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It is clear that greater education and upskilling is also needed: 27% of respondents noted a lack of understanding of the technology in their business and a further 18% highlighted technological challenges. These results likely reflect the fact *that integration with existing infrastructure and operating models is needed to operate at scale in future.*

Whilst there is a clear market trend towards asset managers offering, or planning to offer, tokenised access to MMFs, (see survey responses above) an encouraging 17% of respondents are already holding or using tokenised MMFs in their business (primarily in their broader asset management businesses), with 25% to follow in the next twelve months. ***Within two years we expect 75% of the survey respondents to hold tokenised MMFs.***

Perhaps most interesting is the coalescence around the two iterations most applicable to the industry in the near term. As noted above, in the first instance this is the application to collateral management. It should be clear to all market participants that the key understanding in this use case is ***that investment managers are facilitating units that are legal representations of the underlying fund.*** It is on this basis, leveraging technology already in place, that this digital representation has already been done within some private chains. Given the volume of collateral passing through the financial markets, and the regulatory drive towards more centralised clearing of derivatives, we believe such an approach to reduce friction and increase utility should be embraced wherever possible. ***It is important to note that the use case for MMFs as collateral stands, regardless of tokenisation.*** Tokenisation can, however, play an important role in making the use of MMFs as collateral operationally easier.

Moving beyond the collateral application, the creation of digital share classes within current MMF complexes could, in our view, provide the most likely basis for growth by leveraging the existing regulatory structure of MMFs, i.e., MMFR in Europe and Rule 2a7 in the US. This familiarity of structure for traditional investors would allow them to unlock the greater utility of the product facilitated by tokenisation while maintaining the protections afforded by well understood regulations. One consideration for MMF managers would be the introduction of new service providers to underpin such an offering.

Finally, IMMFA Members have noted the need for greater clarity around distribution models and the certainty of the ability to adhere to regulatory obligations, such as Anti Money Laundering and Know Your Customer requirements, as assets are mobilised on public distributed ledger technology or distribution by third parties is expanded.



Conclusion

The tokenisation of MMFs can be expected to bring benefits in terms of collateral management, operational efficiencies and increased investor appeal. The use of MMFs as margin collateral need not depend on tokenisation but tokenisation would remove a significant operational barrier, and we would argue that this could bring broader benefits in terms of overall financial stability.

We close by reiterating our previous observation that the regulatory environment for tokenisation is evolving with different approaches meaning that the various jurisdictions are at different stages. Given that change is happening at pace, we have not commented specifically on current regulation. We look forward to ongoing collaboration with all market participants and to continued engagement with the relevant authorities to leverage these technological advancements across various use cases, while maintaining an optimal balance of operational efficiency, commercial viability, and risk management.

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