WHITEPAPER

Tokenization of Funds

Mapping a way forward

The potential rewards of tokenization

The prospects described by tokenized funds enthusiasts are compelling. By issuing shares in investment funds on to blockchain networks, they say, fund managers can increase assets under management (AuM), invest in a wider range of asset classes, recruit new types of investor, transform the experience of their customers, engage and even defeat emerging digital competitors, and reduce dramatically their costs of operation and distribution.

These promises are easier to make than to fulfil. To realize them, every role in the value chain – fund managers, fund accountants, fund distributors, transfer agents, custodian banks, paying agents and order-routing networks - must adapt, and some may disappear. However uncomfortable that prospect is, the time is propitious for change. Indeed, crypto-currency index funds, including in tokenized form, exist already. There are reasons to believe mutual funds can gain from following their example.

The global asset management industry faces serious commercial challenges. While AuM continues to increase in line with rising markets and net inflows, fees are compressed by competition and the shift to passive investment strategies. Yet the pressure to invest, especially in digital and data capabilities to meet growing investor demand for on-line distribution, reporting, compliance and customization, continues to mount. As a result, costs are rising faster than revenues. Margins are being squeezed.

Tokenization could help fund managers reduce some costs, especially of operations and distribution. If trades settled instantaneously rather than after three days, the exposure of a fund to liquidity risk would fall. If all transactions were recorded on a shared ledger, the need for a centralized register would evaporate, taking with it the costs of frequent reconciliations and repairs of records of the same transactions between managers, transfer agents, paying agents and custodian banks.

Tokenization could also eliminate the costs incurred by transfer agents chasing fund managers or investors for cash or shares between the date of the order and its settlement some days later. Tokenized transactions simply cannot settle on blockchain networks unless tokenized cash is delivered against tokenized funds. If neither the payment tokens nor the fund tokens are available, the transaction ceases to exist, giving both parties a strong incentive not to risk failure.[1]

The cost of opening and maintaining accounts for investors could also be reduced by tokenization. Since the passage of the PATRIOT Act in 2001, whose provisions against financial crime were internationalized by the 40 Recommendations of the Financial Action Task Force (FATF) first published in 2012, around 200 jurisdictions have obliged financial institutions to verify and regularly re-verify the identity of beneficial owners of assets, including funds.

These checks, much of which are completed manually, represent a significant compliance cost for fund managers and their transfer agents. Tokenization creates the possibility of automating these checks by smart contracts built into fund tokens accessing verifiable identity data sourced from reliable, independent sources automatically. Ultimately, the purchase and ownership of tokens can be tied to the digital identity of the investor, building proof of beneficial ownership into every transaction.

A similar combination of automated data exchanges and smart contracts can check that a tokenized fund is distributed only where permitted (under "Blue Sky Laws" in the United States, for example, each state sets its own rules by which a fund can be distributed) and is suitable for the investor (in terms of, for example, their risk appetite or personal circumstances).

A smart contract can be written into the code of a token that permits an investment to proceed only if the automated checks of the status of the investor, the nature of the investment and the distribution permits of the fund confirm the purchase is suitable. This reduces mis-selling risk for fund managers and fund distributors as well as cutting the operational costs of running manual checks.

A bonus of these automated data exchanges is an improved client experience. Investors would no longer endure repeated and intrusive customer due diligence checks every time they invested with the same firm or bought a fund from another firm. Faster settlement would accelerate their market exposure as they invest and transform it swiftly to cash as they disinvest.

As the tokenization markets mature, and trading of tokens in secondary markets[2] develops as a complementary source of liquidity to redeeming funds with fund managers at a daily net asset value (NAV), price and transactional data will become available faster. This could not only enable investors to check transactions, portfolio valuations and investment performance in near real-time, but allow them to adjust their exposures.

[1] See page 6.
[2] See page 8.

Diagram 1: Status Quo

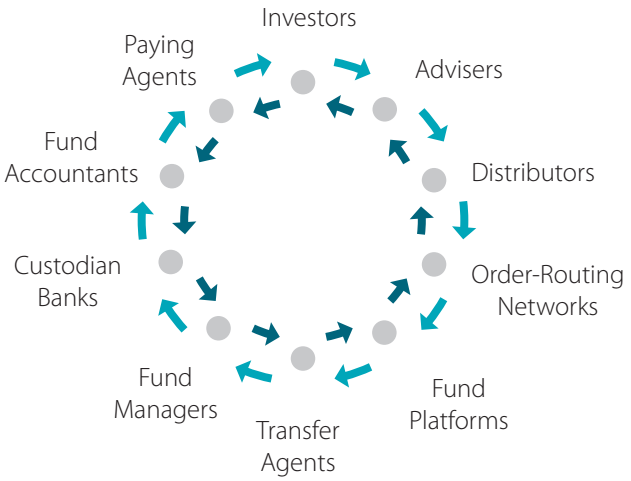
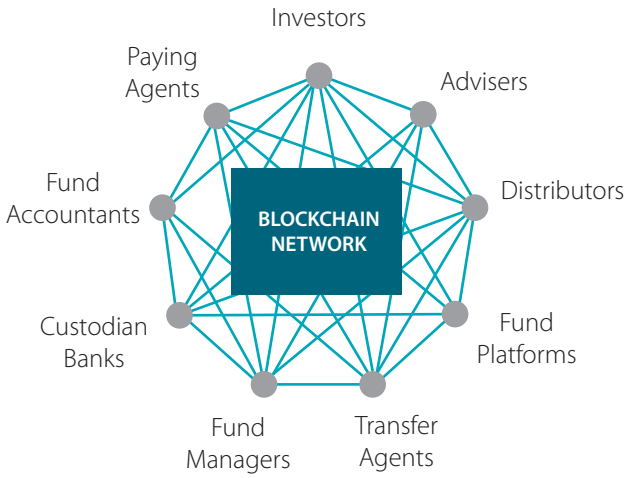


Diagram 2: Tokanized Future



In fact, tokenization could enable investors to tailor their exposures to their unique individual needs by taking the fractionalization of assets pioneered by equities and funds to a minute level. The minimum size of a Bitcoin investment, for example, is 0.00000001 Bitcoins. Such minimization would allow even modest portfolios to combine and re-combine fractions of assets into bespoke portfolios in ways that are impossible with the high minimum investment amounts of today.

Those daunting thresholds reflect the high transaction costs of the traditional investment process. By slashing the costs of issuing, subscribing and redeeming, registering and servicing funds, tokenization enables smaller lots to be accommodated. It could also open to smaller investors funds invested in asset classes, such commercial and residential real estate, infrastructure projects, private equity and debt, fine art and collectibles, from which they are presently excluded.

The risk for fund managers is that tokenization will also make it easier for investors to switch. In the tokenized markets of Decentralized Finance (DeFi), for example, investors are already moving assets every few minutes in pursuit of higher yields. But it is by offering equivalent speed and convenience that tokenization will enable fund managers to insulate themselves from the risk of generational change and potential usurpation by new entrants.

Millennials reared on the speed, convenience and transparency of digital technology already make up half the workforce, while the Baby Boomers that drove the fund market boom of the last 40 years are increasingly disinvesting to fund their retirements. To survive, let alone thrive, established fund managers need to digitize their offerings to investors. Tokenization potentially offers a way to do that.

How tokenization could help to drive digitization

At present, fund managers are separated from investors by intermediaries: financial advisers, fund platforms and order-routing networks on the fund distribution side and paying agents, custodians, depositary banks and fund accountants on the fund servicing side.

Transfer agents support fund managers by facilitating the interaction of the two sides. They run Know Your Client (KYC), Anti-Money Laundering (AML), Countering the Financing of Terrorism (CFT) and sanction screening checks, settle subscriptions and redemptions, report them to managers and maintain a register of investors.

Tokenization could simplify this. With tokens issued and traded on a blockchain, subscriptions and redemptions settle by delivery of fund tokens against payment tokens into the accounts – or, rather, the electronic wallets - of investors.

Because all transactions are recorded on the blockchain, ownership changes would register automatically, eliminating the need for a centralized register. Since all intermediaries can view data on the blockchain, there would be no need for bi-lateral reports either.

Such simplification would help fund managers digitize their dealings with investors. Account-opening would be faster thanks to integrated KYC, AML, CFT and sanctions screening checks. Speedier settlement, and elimination of reconciliations of the same transactions and holdings between multiple parties, would permit data-sharing in real-time. Investors could access data and buy and sell tokens directly. Fund managers would gain richer information about investors, closer to real-time.

Why tokenization does not imply disruption or disintermediation of every current role

Clearly, the simpler model would make it easier for fund managers to deal with retail investors directly. For many, this would represent a revolution. In the modern funds industry, the relationship with the investor is generally owned by a financial adviser, such as a wealth management firm or private bank, most of which use a fund platform to provide fund execution and account-servicing capabilities.

Managers that continue to service investors directly are a diminishing breed. Many find retail business too costly and complex. Technological change alone will not alter that strategic stance. Others, and especially those that continue to deal directly with investors, will welcome the opportunities presented by tokenization.

Similarly, although investors can hold fund tokens in electronic wallets that they own and operate, most institutional investors will continue to use nominee wallets operated by custodian banks on their behalf. Likewise, most retail investors will continue to rely on advisers to access tokens via electronic wallets held in nominee names at fund platforms.

This will limit the benefits of tokenization since these nominee wallet holdings must be reconciled by custodian banks and fund platforms with the underlying investors. In addition, custodians and fund platforms would have to continue KYC, AML, CFT and sanctions screening checks of their own rather than rely on smart contracts embedded in tokens.

Custodians will also have to develop the capabilities to safekeep the private keys by which end-investors assert ownership of tokens. But they will otherwise be largely unaffected by the tokenization of funds. Depositary banks, which fulfil regulatory duties towards investors that are not altered by technology, would be even less disturbed.

The effects on fund accountants are likely to be limited – at least until secondary markets in tokens develop as an alternative source of fund prices[3] – to an increase in the frequency of NAV calculations from daily to intra-day.

Tokenization would require some service providers to adapt

For other intermediaries, the impact of tokenization will be more substantial. Order-routing networks such as the Fund/SERV system of the National Securities Clearing Corporation (NSCC) in the United States, the Calastone system in multiple markets and the FundSettle and Vestima systems in continental Europe, would be deeply affected.

Their point-to-point messaging services are redundant when subscription and redemption orders and other data are shared between all parties to a transaction simultaneously rather than transmitted between them in structured formats according to an agreed sequence.

Even data-sharing could be at risk. If fund tokens incorporated smart contracts that executed the order once crucial conditions are met - the investor authorizes the transaction and the fund manager accepts it – the order becomes inseparable from the investment. That eliminates the need for any subsequent sharing of information between the parties to the transaction.

Paying agents, which make the cash payment when investors subscribe to a fund and pay the investors when they redeem from a fund, could also be affected. In a tokenized marketplace, investors can hold cash in tokenized form in an electronic wallet, obviating the need for a paying agent to collect or pay money to a bank account off the blockchain network.

Not all investors will choose to hold cash payment tokens. And paying agents will still be required to convert payment tokens into fiat currency, at least until fiat currency becomes available on tokenized networks in the form of central bank digital currencies (CBDCs).[4]

[3] See page 8.
[4] See page 6.

But no intermediary will be more affected than the transfer agent, whose roles in settlement, registration and reporting would be impacted significantly. However, they could exploit new opportunities as data managers (aggregating and presenting to fund managers customer and market data from fund distributors and performance measurement agents as well as their own records) and technology partners (helping fund managers work with the multiple blockchains on which tokens will be issued and traded, by joining the networks on their behalf).

Changes of strategic direction are visible in the fund industry already, as firms re-position their businesses for a tokenized future, chiefly by exploring adjacent areas. Fund managers are acquiring wealth management businesses and investing in fund platforms. Fund platforms are pondering transfer agency capabilities. Transfer agents and custodians are investing in order and execution management technologies and fund platform and custodial services.

These developments suggest that a restructuring of the distribution and servicing components of the funds industry has begun. Yet the advertised benefits of tokenization - lower costs, reductions in market, liquidity and counterparty risks, automation of on-boarding and suitability checks, the broadening of asset classes available for investment, the transformation of customer service and the personalization of fund investing – cannot be grasped until they are translated into operational reality.

Issuance of fund tokens

Shares in open-ended mutual funds are issued by fund managers on demand into the account of the investor. In the same way, tokenized shares in a fund will be issued into the digital equivalent of a fund account: an electronic wallet. The wallet must have the capacity to accommodate digital currency as well as tokenized funds, just as a fund account must be linked to a bank account to make and receive cash payments. A number of proofs of concept have proved the issuance process works.

But a virtually unchanged process is true of new funds only. Tokenization of the 127,913 funds in existence globally at mid-2021, managing net assets of US$68.6 trillion,[5] would be a gargantuan task. Rather than migrate them all to blockchains, it is simpler to add a tokenized share class to existing funds or provide a tokenized version of every existing share class.

Either way, this means shares in the same funds might be recorded on the ledger of a blockchain network as well as by a transfer agent on a traditional register, duplicating costs and bifurcating the register. This is problematic because fund managers will expect integrated registers of investors in their funds.

One solution is for the transfer agent to take responsibility for the integration. Although the register on the blockchain network would not be maintained by the transfer agent (it is self-maintaining), transfer agents could access it and aggregate holders across the two registers.

This role for transfer agents could be expanded to facilitate exchanges of conventional fund shares for tokenized shares and vice-versa, with the transfer agent issuing (or destroying) tokens simultaneously with the cancellation (or issuance) of conventional shares. Simultaneous back-to-back exchanges of this kind would integrate the conventional register and the blockchain record semi-automatically.

Such an integration would of course be partial and gradual, since it would integrate only the parties to the exchanges which took place. But it is superior to the alternative of placing conventional shares in a sequestrated account and issuing tokens against them, which would leave the bifurcated register untouched and lumber fund managers with the costly task of linking tokens to shares.

In practice, investors will have incentives to prefer tokenized funds. It will enable them to profit from lending their tokens to cover short sales or pledging them as collateral against an advance of credit, in a similar way to common practices in the conventional markets and as pioneered for tokens in the DeFi markets. Unlike the DeFi markets, however, the lending and pledging of fund tokens will remain subject to regulation to protect investors – and especially retail investors.

Subscription and redemption of fund tokens

Investors can already subscribe directly for fund shares from some managers, and those relationships could continue in tokenized markets. In fact, tokenization would make it easier for fund managers to disintermediate distributors. However, initially at least, only a minority of managers are likely to want to incur the costs and complexities of issuing tokens directly into the electronic wallets of investors. Most investors will probably also prefer at first to appoint a third party to operate a wallet on their behalf.[6]

[5] Investment Company Institute, Worldwide Public Tables, Second Quarter 2021, Table 1 (data in US dollars).
[6] See page 4.

What tokenization would certainly change for every manager and investor is how subscriptions and redemptions are settled. At present, they are generally executed once a day at a price set by the NAV, and settled three days later (T+3) through the issue or cancellation of shares in the fund by the fund manager against the receipt or payment of cash through the banking system.

Tokenized funds will (pending the development of secondary markets in tokens that are liquid enough to discover prices[7]) continue to be settled at a NAV (though the automation of price and expenses data flows might allow this to be calculated more than once a day in the tokenized markets of the future). Settlement, however, will not take place on T+3 through the banking system. Instead, subscriptions and redemptions will settle "atomically" on the blockchain.[8]

"Atomic" settlement means that the exchange of fund shares for cash equivalents[9] is linked so that the transfer of the one asset occurs if (and only if) the transfer of the other asset also occurs. In other words, settlement is conditional on the cash and shares being available for exchange in the electronic wallets of the buyer and the seller. Settlement finality depends on simultaneous exchange. If either the cash or the shares are not delivered, the transaction does not take place.

An intriguing possibility is more efficient settlement of Exchange Traded Funds (ETFs) through tokenization. ETFs are subscribed and redeemed in-kind, through the receipt from or delivery to the fund manager sponsoring the ETF of a basket of securities identical (or at least similar) to the holdings of the ETF. By tokenizing the underlying securities – the contents of the baskets of securities – tokenization could simplify the ETF settlement process.

Technical obstacles to the settlement of tokenized fund transactions

Tokenization represents a substantial change in the nature of fund settlement. Today, final settlement depends on a trusted intermediary – namely, the transfer agent – recording subscriptions and redemptions in the register of holders of the fund. "Atomic" settlement of fund tokens, by contrast, is akin to an exchange of cash for goods. There is no intermediary. If neither the cash nor the token is delivered, the transaction does not take place.

In other words, tokenized transactions exist in settleable form only. They cannot be agreed and recorded first and cancelled later. This has the considerable advantage of eliminating the counterparty risk that a buyer fails to deliver a cash equivalent or a seller fails to deliver shares. But "atomic" settlement also creates two technical difficulties.

The first is that the electronic wallets on the blockchain must in most cases be fully funded prior to settlement, or the transaction will not happen. Unlike a failure to deliver in a conventional transaction, the failing party does not have three days to buy or borrow the missing asset. The transaction does not enter a suspended state to await repair but ceases to exist. This imposes costs on issuers and investors, which must borrow or maintain excess balances in their wallets.

The second difficulty is that fiat currency is not yet available on blockchain networks, so the cash leg of a transaction must be fulfilled with payment tokens. These are created by investors or fund managers depositing cash at a bank, which then issues payment tokens against the deposit, usually in a 1:1 ratio.[10] The payment tokens entitle the holder to a fraction of the cash on deposit, which can be used to settle the cash leg of a token transaction.

Using payment tokens to settle fund transactions is a clumsy solution to the lack of fiat currency on blockchains. Holders that wish to convert payment tokens to fiat currency must exchange the tokens with the issuing bank. The deposits underpinning payment tokens also suffer from an uncertain regulatory treatment, making them less attractive to banks to issue.[11]

CBDCs are widely seen as the ideal solution to this problem, by making central bank money available on blockchains. However, Stablecoins, or tokenized forms of commercial bank money backed by cash deposits or money market instruments are likely to persist alongside CBDCs and could also be used to settle fund transactions on blockchain networks. Fund managers well-versed in money market investing are likely to issue Stablecoins, enabling settlement to bypass the banking system altogether.

[7] See page 8.
[8] "Atomic" settlement is possible off the decentralized blockchain ledger.
[9] Atomic" settlement on the decentralized blockchain ledger is not possible while the cash leg is not "on chain" as well, which requires cash equivalents such as payment tokens to be used, pending the introduction of CBDCs.
[10] A 1:1 issue of payment tokens against a deposit of commercial or central bank money at a bank is the simplest way of creating a payment token. Payment tokens can also be backed by pools of non-cash but highly liquid collateral, with the ratio between the tokens and the collateral stabilised algorithmically; or be issued directly by a bank as a Stablecoin against cash or non-cash collateral or against the security of the balance sheet of the bank as a whole.
[11] See page 8.

But neither CBDCs nor Stablecoins can solve the principle problem created by "atomic" settlement: that the wallets of buyers and sellers must be pre-funded with fund tokens or cash equivalents. Pre-funding imposes a cost. There is a consequent risk that the costs of maintaining funded wallets outweigh savings in transaction costs.

One way fund managers contain transaction costs in conventional fund markets is by netting offsetting transactions with fund distributors, and so reducing the amounts payable. Peer-to-peer settlements, transaction by transaction, between investors and fund managers cannot be netted but demand full funding. While orders could still be netted prior to submission for "atomic" settlement, it would not eliminate the cost of funding altogether, since a net amount will still be payable.

This will matter less if tokenization reduces fund transaction costs to such nugatory levels that any amount of settlement becomes a trivial expense. But the ability of tokenization to cut transaction costs ultimately hinges on settlement of fund transactions migrating to the blockchain at scale.

That is what will yield the savings through simultaneous data-sharing instead of bi-lateral reports and reconciliations; the elimination of the need for transfer agents to chase investors or fund managers for cash; the replacement of a central register by a self-maintaining register; and the use of smart contracts to ensure fund token holders receive their correct entitlements in a timely fashion.

Ultimately, if tokenization is to happen, the potential long-term gains must provide sufficient incentive for fund managers and investors to embark on the process of change. Once they do, but not before, intermediaries will adapt their roles and services to support them.

The regulation of fund tokens

There is another interested party which must also adapt to the possibilities created by tokenization. This is the regulatory authorities in all the major fund markets of the world. After all, tokenization in one jurisdiction is of limited value to global fund managers that issue funds in multiple markets.

Although regulators throughout the world have responded to the surge of blockchain-based token offerings that began in 2017, and international regulators have sought to develop a global consensus on how to regulate tokens, both the regulations and the laws that govern tokenization remain jurisdiction-specific, uncertain and evolving.

They range from primary legislation that specifies the roles, rights and obligations of token issuers, investors and intermediaries (as in Liechtenstein) to guidelines that indicate which tokens and tokenization activities require regulatory authorization (as in the United Kingdom). In the absence of clear legal definitions of tokens and smart contracts, and subsequent case law, there remains an unavoidable degree of legal and regulatory uncertainty.

This is disconcerting for fund managers. As regulated entities, supported by other regulated entities, they are disinclined to act first and seek regulatory approval later. However, in the United Kingdom at least, guidance from the Financial Conduct Authority (FCA) has proved sufficient to enable the tokenization industry to proceed on the basis that tokens issued on to private rather than public networks are governed by the existing rules that govern securities and cash payments.

First, the issuance of tokens on to a private blockchain network, as opposed to a public one, enables fund managers to meet their regulatory obligation to conduct KYC, AML, CTF and sanctions screening checks on every investor that opens an electronic wallet. By making clearance of these checks a pre-requisite of joining a network, inadvertent breaches of compliance obligations are less likely to occur.

Secondly, fund tokens are regulated as securities by the FCA.[12] This gives investors in particular the assurance that risks will be managed; market integrity will be protected by disclosures; market manipulation and insider dealing will be inhibited; and that tokens will be held safely.

Despite being classified as "security tokens," fund tokens issued in the United Kingdom are regulated under the Collective Investment Schemes Sourcebook (COLL) of the FCA[13] in the same way as shares in a mutual fund today. In other words, fund token issuers must issue a prospectus and a Key Investor Information Document (KIID), comply with the detailed COLL rules on investments, borrowings, risk management and valuation, and appoint a depositary to protect investors.

The regulation of cash tokens

The regulation of the cash equivalent payment tokens used to settle fund transactions is less settled in the United Kingdom. Ideally, they would be regulated separately as Stablecoins, but these remain the subject of a public consultation.[14] In the meantime, payment tokens can fit within the Electronic Money Regulations of 2011(EMR)[15], which legitimize digital payment instruments that can store value, be redeemed at par and offer a direct claim on the issuer.

This confers a degree of legal and regulatory certainty on payment tokens, because the EMR obliges issuers of e-money to safeguard the investors' cash by placing it in a segregated account separate from in-house funds; investing it in secure, low-risk, liquid assets approved by the FCA and held by a third-party custodian bank; or securing an insurance policy or bank guarantee against loss. These constraints could make e-money issuance an unattractive business for banks since they are unable to profit from on-lending the cash in the same way as deposits.

A difficulty for fund managers is that FCA client money rules[16] oblige them to hold payment tokens in the same way as cash: in a segregated client account separate from in-house funds. This could happen if settlement is not "atomic" and payment tokens are delivered to a manager prior to delivery of the fund tokens.

In "atomic" settlement, by contrast, the issue will never arise: transactions would settle fund token versus payment token (TvT). In fact, payment tokens could take the form of "programmable money," by which smart contracts would trigger payment simultaneously with the delivery of the fund tokens into the wallets of counterparties.

A secondary market in fund tokens

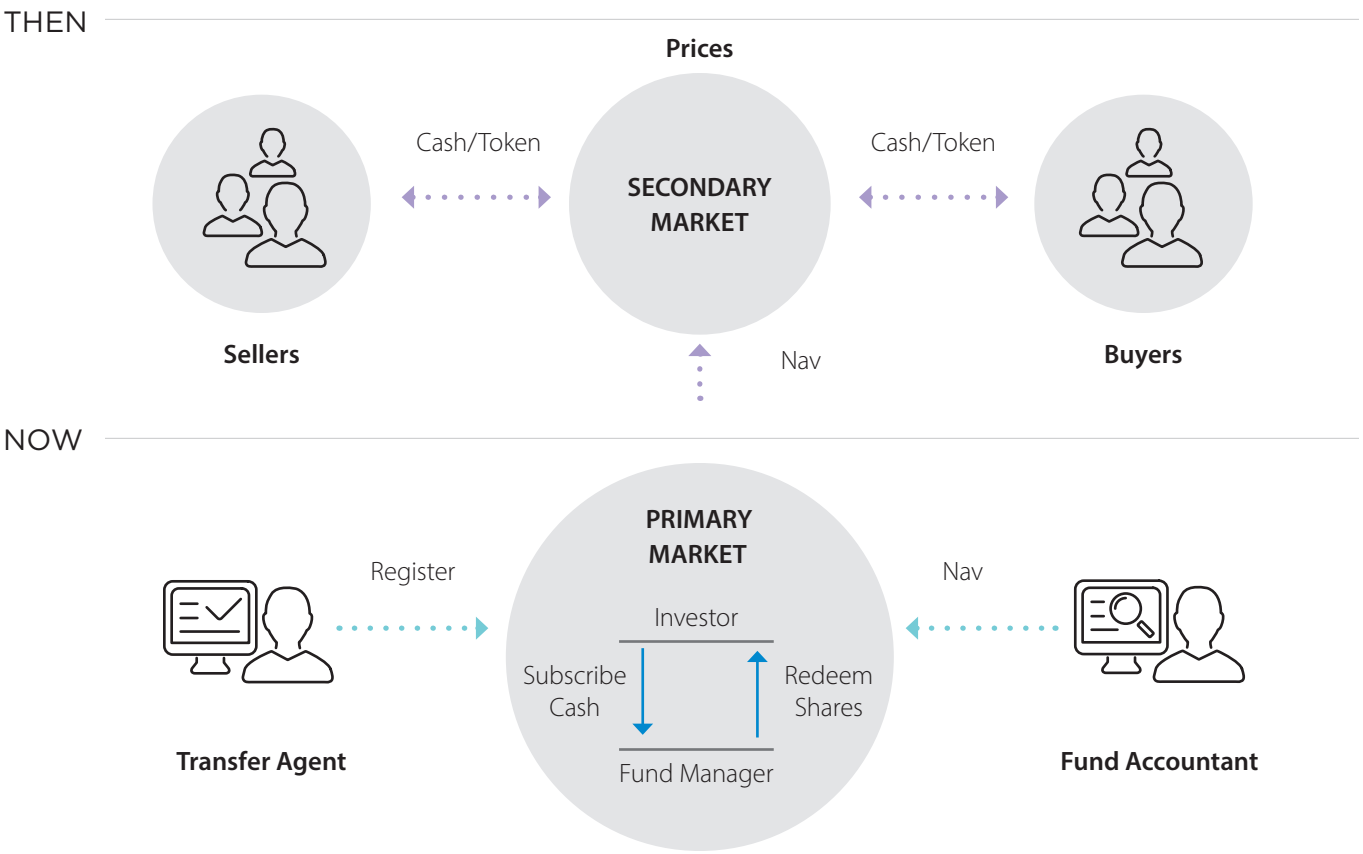
But the most exciting possibility raised by tokenization is not programmable money. It is the development of a secondary market in tokens. At present, fund managers operate as principals rather than issuers. Shares in a fund are created to meet subscriptions and destroyed to satisfy redemptions. Orders are priced not in response to purchases and sales but at the NAV set by the fund accountant.

The process is inherently inefficient. A transfer agent takes, queues and prices orders on the basis of a NAV, settles them by book entry in a central register, and then reconciles the orders to the cash positions of the investors and the funds. Three days elapse before fund shares and cash are released by settlement, exposing the fund and the investors to market movements and counterparty risk. The money flows also oblige the fund manager to incur the costs of re-balancing the fund.

In a tokenized market, by contrast, payment tokens are exchanged for fund tokens instantaneously and with settlement finality, eliminating both market and counterparty risk. Changes of ownership are recorded automatically on the blockchain, eliminating the need for a central register.

It is unlikely that the principal-traded market will be replaced entirely by a secondary market in which investors trade fund tokens directly with each other. Instead, fund tokens will trade in a hybrid manner, rather as ETFs trade in line with a published NAV as well as investor demand, currency movements and arbitrage trades. Arbitrageurs will close any differences in price between the tokenized and non-tokenised versions of the fund.

[12] Financial Conduct Authority (FCA), Guidance on Cryptoassets: Feedback and Final Guidance to CP 19/3, Policy Statement PS19/22, July 2019.
[13] Financial Conduct Authority (FCA), Collective Investment Schemes (COLL).
[14] HM Treasury, UK regulatory approach to cryptoassets and stablecoins: Consultation and call for evidence, January 2021.
[15] Statutory Instrument 2011 No. 99, Financial Services and Markets, The Electronic Money Regulations, made 18 January 2011. These regulations define e-money as electronically stored monetary value that represents a claim on the issuer; is issued on receipt of funds for the purpose of making payment transactions; is accepted by a person other than the issuer; and is not excluded by the EMR from the definition of e-money.
[16] Financial Conduct Authority (FCA), Client Assets Sourcebook (CASS).



The benefits of a secondary market in fund tokens

If the underlying assets of the funds were tokenized as well, fund managers would no longer have to cover liquidity mismatches between subscriptions and redemptions by selling underlying assets or borrowing from banks. The underlying assets could instead be sold in tokenized form in the secondary market.

Fund performance would improve because funds could reduce the low-yielding cash reserve they hold to meet redemptions. The value of AuM would stabilize once investors could sell tokens rather than redeem shares. Rebalancing costs would fall too. A secondary market in fund tokens would increase the volume of transactions available for netting, reducing settlement costs. Experience from ETFs suggests investors would gain directly from lower charges at issuance and a narrowing of bid/offer spreads.

Bid/offer spreads are of course a measure of liquidity, but it is improbable that tokenization in and of itself will boost liquidity and suppress price volatility. Electronic bulletin boards, in which tokens for sale can be advertised, and lead-broking and market-making intermediaries, will also be required. The importance of these functions is evident already in the crypto-currency and DeFi markets.

The inherent difficulty of generating liquidity mitigates expectations that tokenization can make a range of intrinsically illiquid asset classes easier to turn into cash. However, tokenization could add a measure of liquidity. The Long-Term Asset Funds (LTAFs) proposed by the Investment Association in the United Kingdom, for example, are more likely to succeed in tokenized form because investors can sell their holdings at any time in a secondary market rather than waiting for periodic liquidity events at three, six or 12 month intervals.

Tokenization cannot overcome the intrinsic illiquidity of the assets LTAFs are designed to hold - private equity and credit, infrastructure, real estate, fine art and forestry – but it could reduce the discounts paid by issuers and the wider spreads imposed on investors by illiquidity. The fact that tokens can not only be bought and sold at low costs but fractionalized into trivial denominations will add liquidity by broadening the range of investors that can participate in markets currently subject to higher minimum investment amounts.

Minimum investment amounts reflect increased risk, and regulators will want to protect investors from harm. But the shrinkage of publicly listed equities, and the accompanying growth of the private equity industry, has also cut retail investors off from a range of investments. Tokenization could readmit them to asset classes currently available to institutional investors only.

How tokenization could accelerate the personalization of investing

In the long run, tokenization could have effects far more profound than lower transaction costs, improved price discovery, added liquidity and a broadening of the investor base for funds.

At present, funds are generic products, promising, say, income or capital growth, or compliance with a set of environmental, social and governance (ESG) criteria. Tokenization, by contrast, has the potential to create investment combinations tailored precisely to the needs, wants and values of the individual investor.

High net worth investors already enjoy personalized portfolios created from indexed equity products tailored to achieve particular exposures, through structured notes or family funds. These individualized portfolios are different from collectivized mutual funds, and they appeal to younger generations.

Millennials have grown up with digital technology. Generation Z has never known a world without smartphones. They demand immediacy, simplicity and transparency. For them, mutual funds are a complicated product that is difficult to understand, slow to purchase and hard to personalize.

Tokenization could enable funds to clear these barriers. Fund tokens are cheaper, easier and faster to buy and sell than fund shares. They can embody smart contracts that complete due diligence checks fast enough to allow a younger investor to open a wallet, akin to those they own or use to trade and hold crypto-currency, in minutes rather than days.

Above all, tokens enable fund portfolios to be personalized. They enable any asset to be tokenized and fractionalized, broadening the range of investable assets, and allowing even relatively small amounts of savings to be diversified and tailored to personal preferences.

Funds might over time become branded "wrappers" for portfolios unique to each investor, which are hard to distinguish from managed accounts. That is not yet the case. What is clear now is that tokens have an intuitive appeal to a large class of mostly younger investors.

According to Newzoo, 2.9 billion people play computer games. The crossover between computer game players and crypto-currency enthusiasts means crypto-currency tokens exist already to enable video gamers to buy and sell in-game items on blockchains. Non-fungible tokens (NFTs) are effectively an invention of video gamers. Technologically speaking, tokenized funds are already part of an eco-system that Millennials and Generation Z inhabit.

Tokenization is about data not technology

To succeed in the tokenized investment eco-system that is now emerging, in which asset classes are interchangeable at low cost and investments are personalized, fund managers need to be client-centric.

That means ensuring investors can open accounts (wallets) in seconds, build portfolios by making simple choices, view transactions and valuations and performance in real-time, and see their instructions executed instantly.

The key to delivering such services is not tokenization per se but data. The KYC, AML, CFT and sanctions screening checks that precede wallet-opening must be completed in minutes, by instant access to client identity data.[17]

The smart contracts that execute suitability tests, settle transactions and pay entitlements depend on access to accurate data from "oracles." Customer service relies on a single view of the past behaviour of the client, assembled by Application Program Interfaces (APIs) from multiple databases.[18]

A logical owner of these data management responsibilities is the transfer agent. The transfer agent already runs and re-runs investor due diligence checks, settles transactions, controls the payment of entitlements, and delivers insights into the behaviour of fund distributors and their customers. By operating nodes on blockchain networks on behalf of fund managers, the transfer agent can continue to provide these services.

[17] See pages 3 and 4. See also *KYC and AML screening in the funds industry: A solution to the problem*, SS&C White Paper, 2020.
[18] See *The Client Book of Record (CBOR): The key to customer-centric fund management*, SS&C White Paper, 2021.

Conclusion

Tokenization could repair the damaged profitability of fund management by reducing costs and increasing sales. That is why managers are appointing digital transformation agents, experimenting with tokenized issues and share classes and investing in tokenization start-ups and proofs of concept. Fund managers see tokenization as an opportunity to cease to be merely buyers of innovation and become issuers that shape the future of their industry.

They have reasons to be confident. Tokenization can simplify the chain of intermediaries that separates fund managers from investors. It can accelerate the digitization of their offerings and extend the range of investable assets they manage. Eventually, principal-based issuance and redemption of shares in funds could give way to an active secondary market in fund tokens, enabling funds to escape daily NAVs and trade in a way comparable to investment trusts and ETFs.

There are many obstacles to be cleared before these benefits can be realized. Chief among them is the fragmentation of the data that will make automation of settlement, registration and fund servicing possible. Achieving efficient inter-operability between disparate data sets could be accelerated by agreement on data and technology standards. Regulators will also encourage issuers and investors to use smart contracts and electronic wallets that are audited to the highest standards.

There remain other regulatory uncertainties, and the lack of fiat currency on blockchain networks is a major constraint. But the greatest barrier to progress of all is time. The transition of a global industry to the future cannot be accomplished in a single bound. The danger is that the unavoidable length of the transition becomes an argument for doing little or nothing now. That would be a mistake. There is value to be realized today as well as tomorrow.