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Evidence from Real-World Asset Ledgers

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What Does Tokenization Actually Intermediate? Evidence from Real-World Asset Ledgers*

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Abstract

This paper examines asset tokenization as a form of financial intermediation, focusing on tokenized U.S. Treasury funds. We analyze investor demand, servicing costs, adoption, market fragmentation, and returns across products that differ in market depth, on-chain activity, investor access, fees, and design. Tokenization primarily deals with share issuance, ownership recordkeeping, permissioned transfers, and cancellations, while portfolio management, custody, valuation, and cash settlement remain off-chain. Holder participation and transfer activity grow, consistent with on-chain usability. Nevertheless, adoption remains concentrated, and multichain issuance is associated with greater fragmentation across networks. Management fees do not decline as new products enter the market. Although lower fees are associated with broader participation, more transfer activity, and stronger holder growth, however, they are not associated with more capital raising. The median products annual percentage yield averages 35 basis points below the benchmark. Overall, tokenization adds a new distribution and servicing layer to traditional funds without materially changing the underlying investment process.

Keywords: Real-world asset tokenization, Financial intermediation, Tokenized funds, U.S. Treasuries

JEL classification: G20, G23, O33

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1 Introduction

Global financial markets already rely extensively on dematerialized securities recorded and transferred through centralized systems maintained by financial institutions. Tokenization introduces a different architecture for organizing these activities: ownership is represented by a digital token on a distributed ledger, and smart contracts specify the rules governing the token and its use. Tokenization has expanded from early experimentation to adoption by traditional asset managers, commercial banks, and other financial intermediaries, generating interest in its potential to broaden distribution, automate financial processes, and integrate conventional assets with blockchain-based markets (Carapella et al., 2023; Adrian et al., 2026). Yet tokenized products generally continue to rely on established legal structures and traditional service providers. Duffie (2026) emphasizes safe cash settlement as a central constraint on large-scale tokenized finance and shows that fragmentation between conventional and tokenized payment systems can raise funding costs and slow adoption when settlement balances cannot move readily across systems.

Because most financial securities are already held electronically, the economic novelty of tokenization does not lie simply in replacing a physical claim with a digital one. It lies instead in how the intermediary services surrounding the claim are organized. Smart contracts can perform functions related to issuance, ownership recordkeeping, transfer, compliance enforcement, and settlement on shared blockchain infrastructure, while the underlying asset continues to depend on conventional managers, custodians, administrators, brokers, transfer agents, and paying agents. We therefore study tokenization as a financial intermediation and distribution technology that places a programmable servicing layer around an existing financial claim.

Our paper addresses several interconnected questions centered on what is economically being tokenized and its implications for financial intermediation. Which intermediary functions move on-chain, and which remain within traditional frameworks? How is investor access structured, and how extensively are these products adopted and used on-chain? Does distributing the same claim across multiple blockchains broaden its potential reach while dispersing, and potentially fragmenting, ownership and activity across networks? What do investors pay, and how do management fees vary with investor clientele, product design, primary-market terms, and network deployment? Finally, how closely do product returns track the underlying asset?

We combine product-level data, on-chain activity, and smart-contract source code to examine these questions in two steps. First, we provide a market overview across eight non-stablecoin asset classes: U.S. Treasuries, non-U.S. government debt, credit, stocks, private equity and venture capital, active strategies, commodities, and real estate. We then use tokenized U.S. Treasury funds as the main empirical setting for studying the economics of tokenization. Treasuries are relatively standardized, their yields can be compared with an observable benchmark, and they are available across many blockchain networks. Therefore, they provide a useful setting to study the financial intermediation infrastructure surrounding a financial claim while holding the underlying economic exposure relatively simple.

The cross-asset evidence shows that tokenized markets differ substantially in scale, product breadth, sponsorship, transfer activity, investor access, fees, and institutional structure. Among on-chain distributed products, U.S. Treasuries account for the largest share of token value, whereas stocks and real estate exhibit greater product breadth relative to capital depth. Tokenization therefore does not result in a uniform market structure. Its organization continues to reflect the characteristics of the underlying assets, their issuers, and intended investors.

Our analysis of smart-contract source code shows that tokenization primarily changes how fund shares are issued, recorded, transferred, and canceled. Smart contracts also commonly include administrative and investor-eligibility controls. In contrast, we find little evidence in the contract source code that token contracts execute purchases or sales of the underlying Treasury securities or provide custody of those assets. Portfolio selection, fund accounting, and most valuation functions also remain with traditional service providers. Subscription and redemption are generally hybrid processes: shares are issued or canceled on-chain, while investor approval, cash transfer, valuation, reconciliation, and payment occur through separate systems. Tokenization therefore changes the transfer agent and distribution portions of the lifecycle more clearly than the underlying investment process.

Adoption is accompanied by growth in observable participation and use. As of May 2026, aggregate market value of tokenized Treasury products is $15.7 billion, reported holder addresses are approximately 62,000, and annual transfer volume reached $25.8 billion in 2025. Increasing minting and burning also indicate more two-sided primary-market activity. Most products reporting eligibility information nevertheless remain directed toward institutional investors, accredited investors, qualified purchasers, or professional investors, and minimum subscriptions vary substantially. Tokenization can make fund shares divisible and transferable on-chain but it does not imply unrestricted access.

Multichain deployment provides additional evidence on the organization of distribution. More than half of active Treasury products operate on multiple networks, and these products represent most of the market value. Treasury-fund market value and holder addresses have become more dispersed across blockchain networks as the market has expanded, but both remain concentrated on a small number of networks. In a regression framework, we find that prior multichain status is associated with greater minting activity,but not significantly faster growth in holder addresses or greater net token issuance. Multiple-network availability therefore extends a product's potential reach across blockchain ecosystems without necessarily resulting in broader participation or more capital raising. Our evidence on the dispersion of ownership and activity across networks raises the possibility of market fragmentation, although the available data do not establish whether it impairs secondary-market trading or liquidity.[1]

We next examine the costs borne by investors. Reported subscription and redemption fees are generally zero, and most products permit investors to enter and exit at least daily. The median annual management fee is 20 basis points.[2] Management fees, however, vary considerably and have not declined systematically across launch cohorts. Products restricted to institutional or sophisticated investors charge approximately 20 basis points more than products with reported retail access. Fees also differ across dominant launch networks, although these differences may reflect the issuers and products using each network as well as the costs of supporting it.[3]

Lower management fees are associated with a broader initial base of holder addresses and higher initial transfer and transaction activity, but not with the initial amount of capital raised at launch. We find that they are also associated with greater subsequent growth in holder addresses after controlling for initial participation. Fees therefore are more closely related to the breadth of observable participation and intensity of use than to the amount of capital invested. This pattern is consistent with fee setting that reflects investor targeting and anticipated product adoption.

Finally, the monthly median seven-day APY closely tracks the three-month Treasury yield but averages approximately 35 basis points below it. The average yield gap may reflect differences in portfolio holdings and fund expenses, although management fees are not significantly associated with APY spreads across products. Cross-sectional variation in

[1] Our data record token transfers and transaction counts but do not distinguish secondary-market trades from custodial, operational, or other token movements. We also lack platform-level trading data, including trades executed through decentralized exchanges such as Uniswap. Although such trades may generate transfers captured in our data, we cannot separately identify their execution prices, trading volumes, or associated liquidity. We therefore cannot assess whether dispersion across networks produces price differences or limits investors' ability to trade.

[2] Reported fund fees do not separately identify the costs of blockchain transactions, custody, compliance, system integration, or currency conversion. Such costs may be reflected in management fees, charged separately to investors, or absorbed by service providers.

[3] For example, supporting a particular blockchain may require specialized custody or integration with existing fund systems. Alternatively, a network may host several products from the same issuer with similar fee schedules. Differences across networks therefore need not reflect differences in blockchain operating costs alone.

the APY-Treasury yield spread is associated with income distribution, minimum investment requirements, and fund size. Spreads are higher for products that distribute income, require larger minimum investments, and hold more assets, but are not significantly associated with holder-address counts.

Taken together, our evidence suggests that tokenization functions as a financial intermediation and distribution technology rather than as a replacement for the conventional fund structure. Token contracts provide a programmable layer for ownership and servicing, while traditional institutions continue to create, manage, custody, value, and administer the underlying investment. The economics of providing this layer depend on investor clientele, product design, network infrastructure, customization, and expected use. Broader adoption may depend on whether the benefits of blockchain-based distribution and servicing justify the additional expenses of maintaining this infrastructure and the potential fragmentation across networks.

The paper makes three contributions. First, it systematically compares tokenized markets across asset classes, and shows that their organization continues to reflect the economic and institutional characteristics of the underlying assets. Second, it uses smart-contract source code to map the boundary between on-chain functionality and the off-chain processes supporting financial products. Third, it relates the design of tokenized Treasury funds to investor access, adoption, on-chain use, fees, network dispersion, and returns. Our analysis thereby connects the technological architecture of tokenized claims to the economic functions performed by financial intermediaries.

Our analysis relates first to research on blockchain contracting and financial-market design. Chiu and Koeppl (2019) examine distributed-ledger settlement, and Cong and He (2019) show how decentralized consensus and smart contracts alter contracting and intermediation. Lee et al. (2024) study the joint design of trading and tokenized settlement. Agur et al. (2025) organize the effects of tokenization around search, transaction, counterparty, and servicing frictions, while Agur and Copestake (2025) analyze broker incentives, interoperability, and market fragmentation. We provide empirical evidence on these mechanisms by identifying which intermediary functions appear in smart-contract code and relating product design to network deployment, fees, adoption, and use.

The paper also contributes to an emerging literature on tokenized real-world assets. Swinkels (2023) studies ownership and secondary-market liquidity in tokenized residential real estate. **?** examines the supply and liquidity of tokenized real estate, finding that its growth is stronger in areas with limited credit access and that liquidity benefits depend on platform buyback arrangements. Malinova and Park (2026) examine ownership rights, compliance, and market infrastructure in tokenized equities, while Cong et al. (2025) study their pricing and price discovery. Harvey et al. (2025) examine benchmark tracking and on-chain use of tokenized gold, and Cong et al. (2026) distinguish tokenization of liquid assets from tokenization of illiquid claims. **?** examine the operational structure and growth of tokenized money market funds, emphasizing their use as on-chain savings instruments and collateral and their links to stablecoins. Closely related, Lin et al. (2026) study the pricing, monetary-policy transmission, collateral use, and safe-haven properties of tokenized Treasury instruments. We instead use Treasury funds to study tokenization as an intermediary service: where it enters the fund lifecycle, how access and adoption vary across products and networks, what investors pay, and how product yields compare with the underlying benchmark.

2 Institutional Background

For purposes of this paper, a tokenized real-world asset is an asset or claim whose ownership and transfers are recorded on a shared digital ledger whose rules can be programmed. The relevant features are therefore not digital representation alone, but the extent to which ownership records are shared among market participants, transactions can be executed conditionally, and participants trust the integrity and legal effect of the ledger (Agur et al., 2025). These features can be implemented on public or private blockchains and through permissioned or permissionless access. Public blockchains are broadly observable and maintained by an open network, whereas private blockchains restrict participation in the ledger. Permissioned access instead means that approval is required to hold or transfer a particular token, even when the token is issued on a public blockchain.

For real-world assets, the token is generally linked to an asset, security, or contractual claim that exists outside the blockchain. The underlying exposure may be held by a fund, special-purpose vehicle, custodian, or other legal entity. Possession of a token does not by itself establish direct ownership of the referenced asset. This distinction separates tokenized real-world assets from crypto-native assets whose existence and transfer are defined entirely within a blockchain.

2.1 Tokenized claims and institutional architecture

Tokenized claims can be organized in several ways. A security may be issued directly on a distributed ledger, with the ledger serving as an authoritative ownership record. Alternatively, a token may represent an existing security or a beneficial interest held through a separate legal structure. In either case, the token contract specifies technical rules for issuance, balances, transfers, and cancellation, but the enforceable claim may continue to depend on off-chain agreements and institutions. Tokens with similar technical standards can therefore confer different redemption rights, income claims, voting rights, and protections in bankruptcy.

The traditional service-provider structure generally remains relevant. Asset managers select and trade portfolio assets; custodians safeguard them; administrators calculate net asset value and maintain fund records; brokers execute transactions; transfer agents maintain shareholder records and process changes in ownership; and paying agents distribute income and redemption proceeds. Tokenization can alter how these functions are coordinated without eliminating the underlying responsibilities. A smart contract may become part of the ownership ledger or automate an instruction, while a regulated entity retains authority over investor approval, valuation, custody, or payment.

Investor onboarding illustrates this division. Compliance checks typically involve verifying an investors identity and eligibility using information held outside the token contract. Once an investor is approved, however, a wallet address can be added to a registry or whitelist, and the contract can restrict issuance and transfers to approved addresses. A token traded on a public blockchain can thus remain permissioned at the asset level. Public visibility and technical transferability do not imply unrestricted access.

Issuance and redemption can likewise combine on-chain and off-chain processes. An investor may transmit cash through a bank or a separate digital-payment system, after which an authorized party issues tokens to the investor's wallet. At redemption, tokens may be canceled on-chain before proceeds are delivered through separate payment infrastructure. Portfolio valuation, approval, reconciliation, and the cash leg can remain off-chain even when the change in token supply is recorded on-chain. Whether tokenization delivers integrated settlement therefore depends on the design of both the asset and payment systems.

2.2 Economic functions and institutional constraints

Tokenization can affect financial intermediation through shared recordkeeping, programmability, and conditional settlement (**?**). A common ledger can reduce reconciliation across separate databases, while smart contracts can automate transfers, eligibility restrictions, and some servicing functions. These changes may reduce particular search, transaction, counterparty, or servicing frictions, but they need not eliminate the intermediaries that currently address those frictions (Cong and He, 2019; Agur et al., 2025). The economic effect depends on which functions migrate to the ledger and whether the new process replaces or supplements existing systems. Appendix D summarizes illustrative applications of conditional settlement, programmable operations, collateral mobility, and fractional distribution.

Settlement provides an important example. When both the asset and payment legs are available on compatible infrastructure, a smart contract can condition delivery on payment and execute the two legs together. This design can reduce settlement uncertainty and associated counterparty exposure. However, tokenized assets that settle against bank payments or other off-chain systems still require coordination across infrastructures, and changes in settlement design can alter information and liquidity-management incentives (Chiu and Koeppl, 2019; Lee et al., 2024). Government securities are especially relevant because they serve as investment assets, pricing benchmarks, and collateral, but broader use of their tokenized forms depends on legal certainty, suitable settlement assets, and integration with existing market infrastructure (Aldasoro et al., 2025).

Tokenization may also change distribution. Small token denominations can make fractional ownership technically feasible, and a common interface can allow the same claim to be held by different custodians or used in blockchain-based applications. These features can lower some operational barriers to serving additional investors. They do not remove securities-law restrictions, investor-eligibility requirements, or the cost of onboarding and servicing small accounts. The effect on access is therefore determined jointly by technical divisibility and product design.

Programmability can support new uses of the claim after issuance. Tokens may be transferred conditionally, pledged as collateral, or incorporated into applications that combine trading, lending, and settlement. Their usefulness in these applications depends on the legal rights attached to the token, the reliability of external data, custody arrangements, and the ability to move value across systems. A programmable claim that cannot be transferred to the relevant counterparties or settled against an acceptable payment asset may provide little additional functionality.

The same architecture can introduce new costs and risks. Issuers may need to maintain smart contracts, security controls, compliance services, blockchain connectivity, and specialized custody arrangements in addition to conventional fund infrastructure. Upgrade authority, private-key management, software vulnerabilities, and dependence on external data create operational and governance risks. The separation between an on-chain record and an off-chain asset also makes the treatment of custody, redemption, and insolvency central to the value of the tokenized claim (Carapella et al., 2023).

Finally, distribution across multiple blockchains presents a coordination problem. Supporting several networks may extend a product's reach to investors and applications operating in different ecosystems. At the same time, separate ledgers can divide ownership, activity, and liquidity, while bridges or other interoperability mechanisms introduce additional dependencies. Network effects may therefore concentrate infrastructure provision even as the same asset becomes available on more networks (Agur and Copestake, 2025).

These institutional features motivate the empirical analysis that follows. Tokenization can change issuance, ownership recordkeeping, transfer, settlement, and servicing without changing the underlying asset or eliminating traditional institutions. Whether tokenization broadens investor access, facilitates transactions, or lowers costs depends on the tokens design, restrictions on who can hold and transfer it, and the services still provided outside the blockchain.

3 Market Overview Across Asset Classes

We obtain asset-level data from the RWA.xyz to compare eight non-stablecoin asset classes: U.S. Treasuries, non-U.S. government debt, credit, stocks, private equity and venture capital, active strategies, commodities, and real estate. RWA.xyz classifies products according to their underlying economic exposure and requires the blockchain to play a core role in issuance, transfer, and settlement.[4] RWA.xyz reports that reference data such as fees and legal structure generally come from issuers and platforms, whereas supply, holder, and transfer measures are derived from blockchain data.[5]

[4] RWA.xyz, "Coverage and Eligibility," https://docs.rwa.xyz/methodology/coverage.
[5] RWA.xyz, "Data Sources," https://docs.rwa.xyz/methodology/data-sources.

3.1 Forms of tokenization

RWA.xyz classifies tokenized products along two separate dimensions: tokenization type and sponsorship. Tokenization type describes how investors access and use the token. An on-chain distributed product can be delivered to an investor-controlled wallet and transferred between eligible wallets. An on-chain represented product records an investment position on a blockchain but does not provide the same wallet portability or peer-to-peer transferability; investor transactions generally continue to be processed through traditional intermediaries or the platform operating the product. BlackRock's BUIDL, for example, is on-chain distributed because qualified investors can hold and transfer its tokens between approved wallets. Fidelity's FDIT is on-chain represented because its blockchain record supplements the transfer agent's conventional ownership record.[6]

Sponsorship instead identifies who participates in creating the tokenized investment. Under the RWA.xyz classification, an issuer-sponsored product is tokenized with the participation of the issuer or investment vehicle associated with the claim represented by the token.[7] The sponsor may employ separate firms to provide tokenization, transfer-agency, custody, or

[6] The distinction concerns the token's distribution and transfer functions, not whether the entire investment process occurs on-chain. Both structures may retain traditional custodians, transfer agents, fund administrators, and legal ownership records. See RWA.xyz, "A New Framework for Tokenized Assets: Distributed & Represented," https://app.rwa.xyz/blog/a-new-framework-for-tokenized-assets-distributed-and-represented.

[7] RWA.xyz defines tokenization sponsorship type as whether a security is tokenized by or on behalf of its issuer or by an unaffiliated third party; see RWA.xyz, "Data Catalog," https://app.rwa.xyz/catalog. These categories are similar to, but not identical to, the taxonomy in the SEC staff's January 2026 *Statement on Tokenized Securities*. The SEC distinguishes securities tokenized by or on behalf of their issuers from securities tokenized by unaffiliated third parties. It further divides third-party-sponsored tokenized securities into custodial structures, in which the token represents an interest in an underlying security held in custody, and synthetic structures, in which the third party issues its own security providing economic exposure to a referenced security. Our empirical classifications follow the sponsorship fields reported by RWA.xyz and should not be interpreted as the classifications under the SEC framework. See https://www.sec.gov/newsroom/speeches-statements/corp-fin-statement-tokenized-securities-012826-statement-tokenized-securities.

other services.[8] In a third-party-sponsored structure, an unaffiliated firm creates a separate instrument linked to an existing security without participation by the issuer of that security.[9] The classification applies to the immediate legal or economic claim represented by the token rather than to the assets or securities underlying that claim.[10]

Panels A and B of Figure 1 show substantial differences in tokenization architecture across asset classes. Among products with reported tokenization types, 94.2% of Treasury products are classified as on-chain distributed, compared with 6.5% of credit products and 27.3% of stock products. Among products with reported sponsorship, 62.2% of Treasury products are issuer sponsored, whereas only 0.6% of stock products are issuer sponsored. Tokenized Treasury products therefore more commonly provide an on-chain distribution channel for interests issued by a fund or investment vehicle. Tokenized stocks more often consist of separate instruments created by third parties to provide exposure to securities issued by unaffiliated companies, while represented structures predominate in credit.

Panels C and D examine network deployment. Among Treasury products with reported network information, the average product operates on 3.3 blockchain networks, and 60.5% are available on more than one network. Both measures are the highest among the eight asset classes. This broad network deployment motivates our subsequent analysis of multichain adoption and potential market fragmentation.

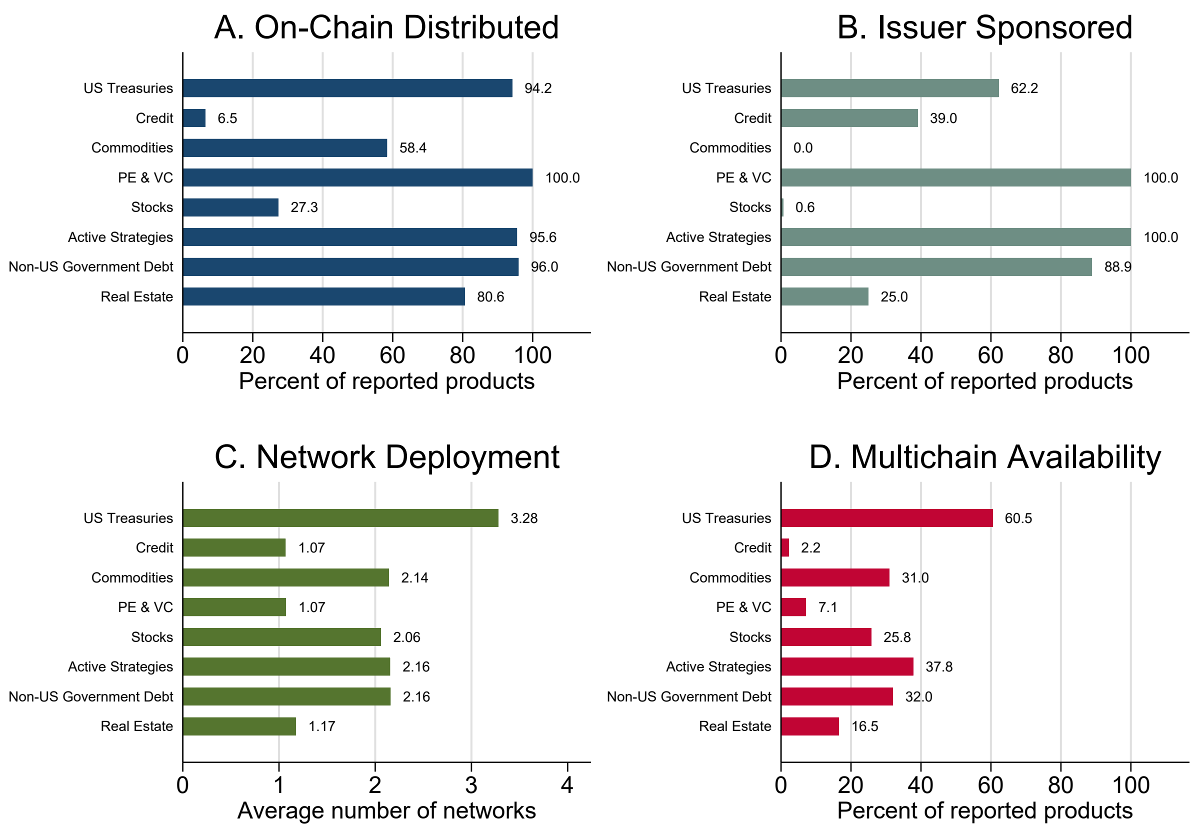
[8] For example, BlackRock sponsors and manages BUIDL, while Securitize provides tokenization and transfer-agent services; see Securitize, "BlackRock Launches Its First Tokenized Fund, BUIDL, on the Ethereum Network," https://investors.securitize.io/news/news-details/2024/BlackRock-Launches-Its-First-Tokenized-Fund-BUIDL-on-the-Ethereum-Network-03-20-2024/default.aspx. Fidelity sponsors the Fidelity Treasury Digital Fund. The transfer agent's conventional book-entry record remains the official ownership record, while ownership is also recorded secondarily on a public blockchain and reconciled with the official record; see https://www.sec.gov/Archives/edgar/data/917286/000113322825007435/R4.htm. Among stocks, Figure Technology Solutions sponsors FGRS, a tokenized series of its own common stock; see https://www.sec.gov/Archives/edgar/data/2064124/000162828026003672/exhibit42-blockchainsx1a.htm.

[9] For example, Tesla xStock (TSLAx) is a tracker certificate issued by Backed Assets (JE) Limited and designed to provide exposure to the price of Tesla stock; Tesla does not participate in its issuance. See Backed Assets, "Tesla xStock," https://assets.backed.fi/products/tesla-xstock.

[10] For example, BUIDL is issuer sponsored because the token represents a fund interest created with the participation of the fund and its manager, while Securitize acts as their tokenization and transfer-agent service provider. The Treasury securities held in the fund's portfolio are not the claims being tokenized; accordingly, participation by the U.S. Treasury is not relevant to the sponsorship classification.

Figure 1: Tokenization Forms Across Asset Classes

The figure compares tokenization architecture and network deployment across asset classes using RWA.xyz data. The sample includes products with reported inception dates on or before May 31, 2026. Panel A reports the share of products classified as on-chain distributed among those with reported tokenization type. Panel B reports the share classified as issuer sponsored among those with reported sponsorship type. Among products with reported network information, Panel C reports the average number of blockchain networks per product, and Panel D reports the share available on more than one network. Shares are expressed as percentages.



3.2 Market scale and development

We next examine how market size, product breadth, growth, and concentration differ across tokenization forms.

Table 1 reports market size and product breadth separately for on-chain distributed and on-chain represented products as of May 31, 2026. Panel A shows that U.S. Treasuries are the largest distributed asset class, accounting for 42.6% of distributed token value, followed by credit at 18.5% and commodities at 14.6%. Panel B shows a markedly different composition among represented products: credit accounts for 89.5% of represented token value, followed by commodities at 8.5%. Thus, distributed tokenization is spread across several asset classes, whereas represented value is heavily concentrated in credit.

Table 1: Market overview across tokenized asset classes

The table reports market size, growth, product counts, and concentration across eight asset classes. Panels A and B cover products classified as on-chain distributed and on-chain represented, respectively. Value is aggregate token value, in billions of U.S. dollars, at the latest observation on or before May 31, 2026. Market share is each asset class's percentage of aggregate token value within its panel. One-year growth is the percentage change from May 31, 2025; it is not reported when prior-year value is below $1 million to avoid large percentage changes from near-zero bases. Number of products counts products with reported inception dates on or before May 31, 2026. Largest-product share is the largest product's percentage of aggregate token value within each asset class and panel.

Asset class	Value (USD bn)	Market share	One-year growth	Number of products	Largest-product share
Panel A: On-chain distributed products					
US Treasuries	15.16	42.6%	126.0%	81	19.5%
Credit	6.57	18.5%	336.4%	102	21.1%
Commodities	5.20	14.6%	253.4%	66	52.1%
PE & VC	1.96	5.5%	557.9%	28	49.8%
Stocks	1.74	4.9%	514.6%	664	9.2%
Active Strategies	3.38	9.5%	-5.9%	43	53.2%
Non-US Government Debt	1.38	3.9%	208.9%	24	72.0%
Real Estate	0.20	0.6%	131.5%	83	33.9%
Panel B: On-chain represented products					
US Treasuries	0.17	0.5%	299.6%	5	82.9%
Credit	33.24	89.5%	166.5%	1,478	55.0%
Commodities	3.17	8.5%	–	47	70.4%
PE & VC	0.00	0.0%	–	0	–
Stocks	0.02	0.1%	–	1,765	7.2%
Active Strategies	0.28	0.8%	–	3	76.7%
Non-US Government Debt	0.00	0.0%	–	1	100.0%
Real Estate	0.28	0.8%	66.8%	40	9.8%

Growth is broad but uneven across the distributed categories. Private equity and venture capital, stocks, and credit exhibit the largest percentage increases, whereas distributed active strategies decline modestly. Growth is less widely measurable in the represented panel because several categories have missing or economically negligible prior-year values. Concentration also varies substantially. Within the distributed panel, the largest product represents 72.0% of non-U.S. government-debt value and 52.1% of commodity value, but only 19.5% of U.S. Treasury value. Within the represented panel, credit combines substantial aggregate value with a 55.0% largest-product share.

The number of products and the amount of capital describe different dimensions of market development. Figure 2 plots product counts against aggregate token value separately for the two forms of tokenization. Distributed stocks comprise 664 products but only $1.74 billion in value, while represented stocks comprise 1,765 products and less than $20 million in value. Represented credit, by contrast, combines 1,478 products with $33.2 billion in value. Distributed U.S. Treasuries comprise only 81 products but approximately $15.2 billion in value. Stocks and real estate therefore exhibit considerable product breadth relative to capital depth, whereas distributed Treasury products and represented credit have attracted substantially more capital per product.

3.3 Institutional and economic differences

On-chain activity also differs substantially across asset classes. Panel A of Figure 3 reports aggregate transfer volume over the four weeks ending May 30, 2026, divided by aggregate token value. The ratio is highest for stocks, at approximately 211%, followed by commodities and active strategies, at 120% and 82%, respectively. The corresponding ratios are approximately 77% for credit, 53% for private equity and venture capital, 33% for Treasury products, and 6% for real estate. These differences indicate substantial variation in the intensity with which tokens move across blockchain addresses.[11]

Panel B reports median positive minimum-subscription requirements. The median is

[11] Blockchain transfers may include operational, custodial, and cross-wallet movements and do not necessarily represent secondary-market trades.

Figure 2: Breadth and Depth of Tokenized Asset Markets

The figure compares product counts and aggregate token value across asset classes. Panels A and B cover products classified as on-chain distributed and on-chain represented, respectively. The horizontal axis reports the number of products. The vertical axis reports aggregate token value at the latest observation in our sample period ending in May 2026. Both axes use logarithmic scales. Asset-class and tokenization-type combinations with aggregate token value below $10 million are omitted.

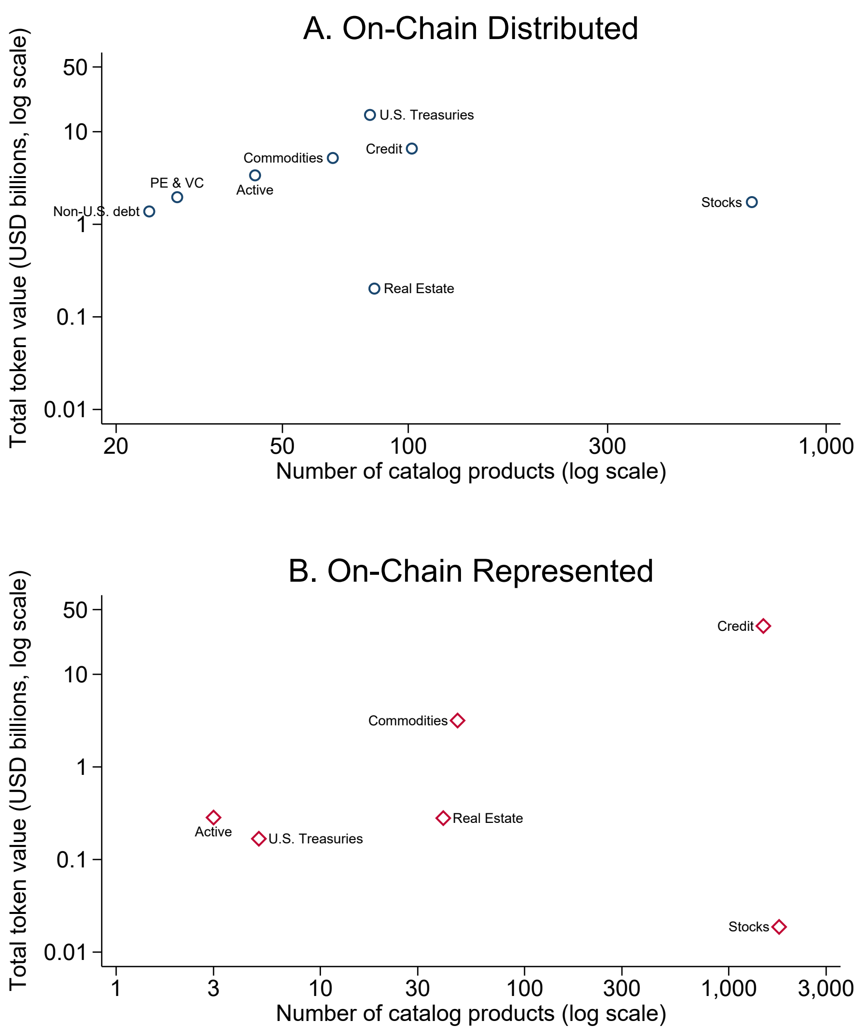


Figure 3: Activity, Access, and Investor Rights across Asset Classes

The figure compares on-chain activity, minimum subscription requirements, economic rights, and asset protections across asset classes. Panel A reports aggregate transfer volume for on-chain distributed products in four weeks proceeding the end of May 2026, divided by their aggregate token value at the end of May 2026. Panel B reports the median positive minimum subscription among products with reported values. Panel C reports the percentages of products classified as distributing income and providing redemption rights. Panel D reports the percentages classified as having segregated accounts and bankruptcy-remote holdings. Each percentage excludes products with missing information for the corresponding field.

$1,000 for commodities and non-U.S. government debt, $5,000 for credit and stocks, $12,500 for Treasury products, $20,000 for private equity and venture capital, and $50,000 for real estate. Digital representation and fractional token denominations therefore do not necessarily produce low investment minimums or broad retail access.[12]

The economic and legal rights attached to tokens also vary across asset classes. Income distribution indicates whether product income is paid to investors rather than retained within the product, while redemption rights indicate whether holders can return their tokens through an established process in exchange for cash or another settlement asset. Account segregation means that assets supporting the product are maintained separately from the sponsor's own assets; bankruptcy remoteness means that the structure is designed to insulate those assets from claims by the sponsor's creditors.

Panel C of Figure 3 compares reported income-distribution and redemption rights. Income distribution varies considerably: 44.3% of reporting real-estate products distribute income, compared with 36.7% of Treasury products, 34.3% of stock products, and 8.9% of active strategies. Redemption rights are more widespread, ranging from 71.4% of reporting private-equity and venture-capital products to 100% of reporting U.S. and non-U.S. government-debt products.

Panel D shows similar variation in reported asset protections. Among products reporting the corresponding fields, 80.0% of stock products and 78.3% of credit products have segregated accounts, compared with 60.9% of Treasury products and 40.0% of private-equity and venture-capital products. Similarly, 94.5% of reporting stock products and 65.7% of reporting Treasury products are classified as bankruptcy remote, compared with only 24.0% of private-equity and venture-capital products. These differences indicate that tokens using

[12]Tokenization does not imply permissionless investor access either. Most products require know-your-customer (KYC) verification, through which investors establish their identities and, where applicable, their regulatory eligibility before subscribing or receiving tokens. A product may therefore operate on a public blockchain while remaining available only to verified investors and approved wallets. For example, BUIDL is issued on public blockchain networks, but participation is limited to qualified investors whose wallets have been approved through Securitize.

similar blockchain infrastructure can embody materially different cash-flow rights, redemption mechanisms, and protections against intermediary insolvency.[13]

Fee structures likewise remain asset-specific. RWA.xyz defines management fees as annual fees charged by the tokenized product, excluding fees associated with the underlying investment.[14] The median reported management fee is 20 basis points, or 0.20%, for U.S. Treasury products and 30 basis points, or 0.30%, for non-U.S. government debt. The raw median for real-estate products is substantially higher at 500 basis points, or 5%.[15] Private-equity and venture-capital products and active strategies, by contrast, more frequently employ performance-based compensation.

Overall, tokenization has not produced a uniform institutional or economic structure across asset classes. Investor access, economic and legal rights, and cost structure continue to reflect the underlying exposure and the issuer's business model. Tokenization changes the infrastructure through which investment claims are issued, recorded, and transferred, while much of the asset-specific management and servicing structure remains traditional or hybrid.

3.4 Why focus on U.S. Treasuries?

The comparisons above show that tokenized markets differ substantially in scale, architecture, investor access, and pricing. Tokenized U.S. Treasury products provide a particularly useful setting in which to examine the economics of tokenization because they constitute the largest category, operate across multiple networks, and hold relatively standardized underlying assets. The next section describes the data and variable construction procedures used in

[13] BUIDL illustrates an on-chain income distribution: income accrues daily and is paid to investor wallets as additional tokens. Tesla xStock illustrates redemption of a third-party-sponsored instrument: eligible holders may redeem the tracker certificate through Backed Assets. Account segregation and bankruptcy remoteness address a different question—whether the assets supporting a token remain protected if the sponsor or another intermediary becomes insolvent.

[14] See RWA.xyz, "Management Fee," https://app.rwa.xyz/catalog/reference/total_management_fee_bps.

[15] Many real-estate fee descriptions combine asset management with tokenization, structuring, offering, or project services. The comparison therefore reflects differences in both asset-management practices and reported fee definitions.

this analysis before examining which parts of the Treasury-fund lifecycle occur on-chain, who can access and use these products, the costs investors incur, and how their yields compare with Treasury benchmarks.

4 Data for Tokenized Treasury Funds

Our primary analysis focuses on tokenized U.S. Treasury products, including products backed by Treasury bills, notes, and bonds, as well as tokenized money market funds that invest primarily in U.S. government securities. We obtain data on tokenized Treasury funds from RWA.xyz through its API. The sample extends from September 2021 through May 2026. We retain products for which positive total asset value is observed at least once during the sample period, resulting in a sample of 79 products.[16] RWA.xyz data are reported at several levels. Product-level data contain cross-sectional information on issuers, regulatory frameworks, investor eligibility, fees, primary-market terms, fund structures, and service providers. The data also contain daily observations on valuation, token contracts, number of holder addresses, on-chain activity, and product performance.

A product may be represented by multiple token contracts and may operate on multiple blockchain networks. Therefore, we also construct a token-network-month panel by retaining the last reported valuation observation for each token contract and network within each month. We then aggregate total asset value across contracts and networks to construct a product-month panel. Unless otherwise indicated, the empirical analyses are conducted at the product-month level and include product-months with positive total asset value.

[16] The Treasury sample requires a positive total asset value and there differs slightly from the unfiltered Treasury sample in the cross-market analysis in Table 1.

4.1 Product characteristics and on-chain activity

We use the product data to construct measures of investor eligibility, management fees, minimum subscription requirements, subscription and redemption fees, and primary-market transaction frequencies. We classify investor eligibility separately along geographic and clientele dimensions. The geographic classification distinguishes products available to U.S. investors, non-U.S. investors, both groups, or products for which geographic eligibility is unspecified. The clientele classification distinguishes retail access from institutional or sophisticated access, where the latter category includes institutional investors, accredited investors, qualified purchasers, and professional investors. Appendix A provides the detailed classification rules.

Holder and on-chain activity measures are constructed from token-contract-level data. We aggregate reported holder counts across contracts belonging to the same product, so these counts represent address–contract relationships rather than necessarily distinct investors or beneficial owners. Daily minting, burning, transfer volume, and transaction counts are summed to the product-month level. Net token issuance equals minting minus burning.

4.2 Performance data

Performance information is available for only a subset of tokenized Treasury products in RWA.xyz data. Our principal performance measure is the seven-day annual percentage yield reported by RWA.xyz, which represents the annualized yield earned over the preceding seven days, net of reported fees.[17]

We restrict the analysis to products with sufficiently complete APY histories and aggregate the daily observations to monthly means. We also exclude product-months affected by incomplete or irregular reporting. These procedures yield 33 products. Appendix A

[17] We use reported APY rather than combining it with returns calculated from net asset value because NAV changes may not capture distributed income and therefore may not be comparable across product structures.

describes the coverage requirements and screening rules.

4.3 Summary statistics

Table 2 reports summary statistics for the tokenized U.S. Treasury products. The median management fee is 20 basis points, while the median minimum subscription is $1,000; however, the 75th percentile of the minimum subscription is $100,000, indicating substantial variation in investment requirements.[18] Product size is highly skewed: across product-month observations, mean total asset value is $125 million, compared with a median of only $5.2 million. Ownership and transaction activity are similarly concentrated, with mean values of 645 holder addresses and 2,743 monthly transactions, compared with medians of 16 addresses and two transactions. Finally, the mean (median) reported seven-day APY is 3.81% (3.76%).

5 The Economics of Tokenized Treasury Funds

We now turn to tokenized Treasury funds to examine what tokenization changes in the provision of a traditional investment product. Does tokenization move economically important intermediary functions on-chain, or does it primarily replace the fund-share ledger and distribution infrastructure? Does this infrastructure broaden investor access and generate uses beyond passive Treasury exposure? When the same claim is distributed across multiple blockchains, does broader reach come with greater dispersion of ownership and activity? Finally, what do investors pay for these products, and how closely do their returns track the underlying Treasury benchmark? We address these questions by combining smart-contract evidence with data on product terms, investor access, holder addresses, on-chain activity, fees, network deployment, and returns.

[18] These statistics include reported zero minimums. The cross-asset comparison in Figure 3 conditions on positive reported amounts.

Table 2: Summary Statistics

The table reports summary statistics for tokenized U.S. Treasury products. Panel A reports product-level characteristics. Management, subscription, and redemption fees are expressed in basis points, and minimum subscription in thousands of U.S. dollars. Panel B reports product-month observations with positive total asset value. Asset value and dollar-valued activity measures are expressed in millions of U.S. dollars. Holder counts measure reported address–contract relationships, not necessarily distinct investors. Net issuance equals minting minus burning. Panel C reports product-month yield observations that meet the performance-sample screening criteria. The spread between APY and the Treasury yield is expressed in basis points.

	N	Mean	P25	Median	P75	SD
Panel A: Product characteristics						
Management fee (bps)	64	24.72	10.00	20.00	40.00	20.15
Minimum subscription (USD thousands)	57	263.36	0.02	1.00	100.00	939.93
Subscription fee (bps)	65	3.23	0.00	0.00	0.00	14.24
Redemption fee (bps)	64	3.98	0.00	0.00	0.00	15.59
Panel B: Product-month size and activity						
Total asset value (USD millions)	1452	125.01	0.94	5.20	60.02	350.38
Holder addresses	1413	644.69	3.00	16.00	46.00	3462.80
Monthly mints (USD millions)	1452	31.78	0.00	0.02	5.90	139.24
Monthly burns (USD millions)	1452	21.58	0.00	0.00	3.42	107.13
Net issuance (USD millions)	1452	10.20	-0.00	0.00	0.76	82.75
Transfer volume (USD millions)	1452	38.27	0.00	0.00	3.11	210.39
Transactions	1452	2743.38	0.00	2.00	25.00	16378.70
Panel C: Yield performance						
Seven-day APY (%)	487	3.81	3.39	3.76	4.17	0.85
Three-month Treasury yield (%)	487	4.23	3.69	4.07	4.41	0.60
APY minus Treasury yield (bps)	487	-42.34	-57.46	-35.00	-16.53	57.57

5.1 Tokenized supply: Which part of the fund lifecycle is on-chain?

A traditional Treasury ETF separates secondary-market trading from primary creation and redemption. Investors trade ETF shares through brokers on an exchange, whereas authorized participants create or redeem large blocks of shares directly with the fund by delivering or receiving securities, cash, or both. This mechanism allows the supply of ETF shares to expand or contract with demand.[19]

This process depends on a broad set of service providers. RWA.xyz's data catalog for tokenized assets lists service providers with similar roles, including managers, sub-advisors, traditional brokers, traditional custodians, crypto custodians, crypto brokers, fund administrators, exchange agents, transfer agents, and paying agents.[20] These roles map closely to the traditional fund structure. Managers make portfolio decisions; custodians safeguard underlying assets; brokers execute trades; administrators calculate NAV and maintain records; and paying agents handle distributions or redemption proceeds. The transfer agent is especially central to tokenization because it maintains the official investor record and processes subscriptions, redemptions, and ownership transfers of fund shares.[21]

To identify where tokenization occurs, we divide the fund lifecycle into seven stages: investor onboarding, cash subscription, share issuance, ownership and transfers, portfolio management, income calculation and distribution, and redemption. We then examine a subset of tokenized Treasury funds whose smart-contract source code can be obtained from Sourcify or Blockscout. Our analysis covers 73 fund-token deployments for which we obtain the source code governing the token's functions, either directly from the token contract or from a separate implementation contract to which it delegates those functions. We classify the observable contract functions associated with each lifecycle stage, including issuance,

[19] See SEC, "Exchange-Traded Funds: A Small Entity Compliance Guide," https://www.sec.gov/investment/exchange-traded-funds-small-entity-compliance-guide; and Investment Company Institute, "ETF Basics and Structure: FAQs," https://www.ici.org/faqs/faqs_etfs.

[20] RWA.xyz, "Data Catalog," Service Providers section, https://app.rwa.xyz/catalog.

[21] RWA.xyz, "Transfer Agent," https://app.rwa.xyz/catalog/reference/transfer_agent.

transfers, administrative controls, eligibility restrictions, subscription and redemption interfaces, valuation and rebasing mechanisms, income distribution, custody, and portfolio management.[22]

This approach measures functionality observable in the collected smart-contract source code. It does not directly observe off-chain operations or functions implemented through separate contracts or service-provider infrastructure. Moreover, the lifecycle categories could overlap: the same contract may contain token-transfer functions, administrative controls, eligibility restrictions, and redemption-related functions. Generic functions can also serve more than one economic purpose. In particular, a mint function may be used both to issue shares following a new subscription and to distribute income as additional tokens. Figure 4 provides a conceptual summary of where the seven lifecycle stages generally occur, based on the smart-contract evidence discussed below.[23]

Table 3 shows that investor onboarding remains mostly off-chain. KYC, AML, investor-qualification checks, and subscription documentation generally take place outside the token contract. However, the result of this process is often enforced on-chain: 48 contracts contain whitelists, registries, transfer restrictions, or related eligibility controls.

Cash subscription also remains primarily off-chain or hybrid. Twenty contracts contain some form of fund entry or exit interface, but cash transfer and reconciliation may still occur off-chain or through separate payment infrastructure. Moreover, the combined entry/exit measure does not imply that every included contract implements both subscription and

[22]The detailed methodology is described in the Appendix.

[23]BUIDL illustrates this division of functions. Qualified investors subscribe through Securitize, and tokens can be transferred between pre-approved investors on supported blockchain networks. The fund's ownership record and approved transfers are therefore represented on-chain. At launch, income accrued daily and was distributed monthly as additional tokens; by October 2025, Securitize reported that dividends were being issued daily as new tokens. BlackRock's portfolio investment in cash, Treasury bills, and repurchase agreements, together with the associated custody and fund administration, remains within the conventional institutional structure. See Securitize, "BlackRock Launches Its First Tokenized Fund, BUIDL, on the Ethereum Network," https://investors.securitize.io/news/news-details/2024/BlackRock-Launches-Its-First-Tokenized-Fund-BUIDL-on-the-Ethereum-Network-03-20-2024/default.aspx; and Securitize, "Investor Presentation," October 2025, p. 22, https://www.sec.gov/Archives/edgar/data/2034269/000121390025102785/ea026272001ex99-2_cantor2.htm.

Figure 4: Tokenization Across the Treasury Fund Lifecycle

This figure presents a conceptual overview of where tokenized Treasury fund processes occur. Investor onboarding and portfolio management remain primarily off-chain; share issuance and ownership records operate predominantly on-chain; and cash subscription, income distribution, and redemption generally combine on-chain and off-chain processes.

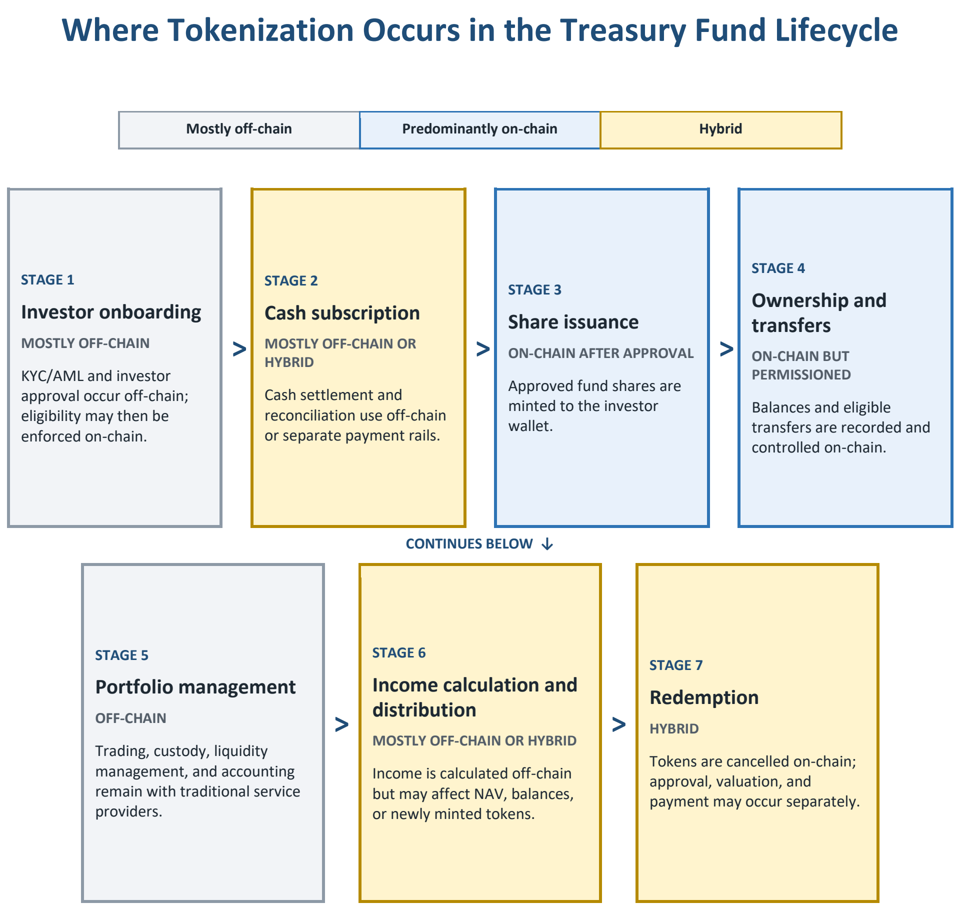


Table 3: Smart-contract evidence across the tokenized Treasury fund lifecycle

This table summarizes where the principal stages of a tokenized Treasury fund's lifecycle occur and the corresponding functionality observable in the collected smart-contract source code. The sample contains 73 fund-token deployments for which source code is available directly or through a resolved proxy implementation. Contract-feature categories may overlap, and a single function may serve multiple economic purposes.

Lifecycle stage	Location of process	Smart-contract evidence	Interpretation
Investor onboarding	Verification off-chain; eligibility may be enforced on-chain	Post-onboarding eligibility controls: 48 of 73 (65.8%)	KYC, AML, investor-qualification checks, and subscription documents generally remain off-chain. After approval, the contract may enforce the eligibility decision by restricting which wallets can hold or transfer shares. The 65.8% figure measures on-chain enforcement, not on-chain performance of investor onboarding.
Cash subscription	Mostly off-chain or hybrid	Subscription or redemption interfaces are included within 20 contracts (27.4%) with broader fund entry/exit mechanics.	Some contracts accept assets or expose deposit and payment functions, but cash settlement and reconciliation often occur off-chain or through separate payment infrastructure.
Share issuance	On-chain after approval	Token minting and issuance: 73 of 73 (100.0%)	Once a subscription is approved, fund shares can be minted and recorded as tokens. Investor approval, cash receipt, and authorization of the issuance generally remain with the transfer agent and other service providers.
Ownership and transfers	Predominantly on-chain but permissioned	Token ledger: 73 of 73 (100.0%); issuer or transfer-agent controls: 61 (83.6%); eligibility controls: 48 (65.8%).	Balances and approved transfers are recorded on-chain. Many contracts also allow authorized parties to pause, freeze, recover, or otherwise control tokens and to enforce off-chain eligibility decisions.
Portfolio management	Off-chain	Portfolio trading, legal custody, or liquidation: 0 of 73 (0.0%)	The token contracts do not themselves purchase, custody, or trade Treasury securities.
Income calculation and distribution	Mostly off-chain or hybrid	NAV, valuation, or rebasing: 8 of 73 (11.0%); generic token minting: 73 of 73 (100.0%); dedicated income-distribution functions: 0 of 73 (0.0%).	Income is generally calculated off-chain, but its economic effect may be delivered on-chain through NAV changes, rebasing, or additional tokens. Because generic minting is also used for share issuance, the contract code alone does not reveal whether a particular mint represents a subscription or an income distribution.
Redemption	Mixed	Burning or cancellation: 73 of 73 (100.0%); broader fund entry/exit interfaces: 20 of 73 (27.4%).	Tokens can be burned or canceled on-chain, but burning alone does not constitute a complete redemption. Approval, valuation, reconciliation, and payment may occur off-chain or through separate infrastructure.

redemption.[24]

Tokenization is most complete in share issuance and ownership records. All 73 contracts contain the minting and ledger functions needed to issue tokenized shares and record their ownership. These on-chain functions are nevertheless commonly permissioned: 61 contracts contain issuer or transfer-agent controls, while 48 contain eligibility or compliance controls. Accordingly, ownership records and approved transfers are on-chain, but authorized parties frequently retain the ability to pause, freeze, recover, or restrict tokens.

Portfolio management remains off-chain. We find no strong evidence that the token contracts themselves purchase, trade, or legally custody Treasury securities. Asset selection, trade execution, custody, liquidity management, and fund accounting therefore remain with traditional service providers.

Income calculation and distribution remain mostly off-chain or hybrid. Only eight contracts contain explicit NAV, valuation, exchange-rate, or rebasing mechanisms. Nevertheless, income can still be reflected on-chain without a dedicated distribution function. Some funds may distribute income by minting additional tokens, while others may incorporate it into NAV or use rebasing, which automatically adjusts the number of tokens held in investor wallets to reflect accrued income. All 73 contracts contain generic minting capability, but the source code alone generally cannot determine whether a particular mint represents a new subscription or an income distribution. Accordingly, the absence of dedicated income-distribution functions should not be interpreted as evidence that no fund distributes income through tokens. Rather, it indicates that income distribution is not separately identified as

[24]OUSG provides an example of a more integrated on-chain interface implemented through a separate smart contract used alongside the OUSG token contract. On Ethereum, eligible investors who have completed Ondo's onboarding process can use the OUSG Instant Manager to exchange USDC or PYUSD for OUSG tokens and to redeem OUSG for USDC. In an instant redemption, the OUSG transfer and USDC payment occur in the same blockchain transaction, although transaction limits apply. The exchange uses the fund's per-token value recorded on the blockchain, but that value is calculated off-chain from the underlying investments and updated after each business day. Subscriptions and redemptions outside the instant limits are processed separately through Ondo. See Ondo Finance, "OUSG Overview," https://docs.ondo.finance/qualified-access-products/ousg/overview; "Redeeming," https://docs.ondo.finance/qualified-access-products/ousg/redeeming; and "Technical," https://docs.ondo.finance/qualified-access-products/ousg/technical.

a distinct contract function.

Redemption is also a mixed process. Although all 73 contracts can burn or cancel tokens, burning alone is not equivalent to a complete redemption. It records the reduction in token supply but does not necessarily execute investor approval, valuation, cash settlement, or payment. As discussed earlier, twenty contracts provide broader fund entry or exit interfaces, but these functions may still operate alongside off-chain or separately implemented redemption procedures.

Overall, current tokenized Treasury funds primarily tokenize the transfer-agent portion of the fund lifecycle. Smart contracts record fund-share issuance, ownership, approved transfers, and cancellation, while frequently enforcing administrative and eligibility controls. Investor due diligence, cash settlement, portfolio management, legal custody, NAV calculation, income processing, and redemption payments remain largely off-chain or hybrid. Current tokenization practices focus primarily on the issuance and ownership records of fund shares, rather than on the underlying Treasury portfolio or the funds entire lifecycle.

5.2 Investor access, adoption, and on-chain use

5.2.1 Access

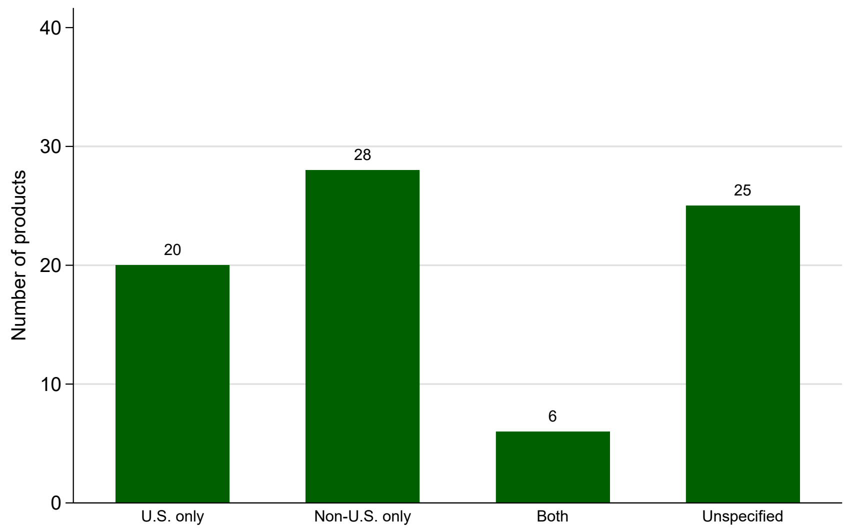
Figure 5 characterizes primary-market eligibility. In our sample, 20 products are classified as U.S. only, 28 as non-U.S. only, six as available to both groups, and 25 as unspecified. Separately, three products are classified as retail only, 36 as institutional/sophisticated only, eight as available to both groups, and 32 as unspecified. The institutional/sophisticated category includes institutional investors, accredited investors, qualified purchasers, and professional investors.[25] These classifications describe stated eligibility rather than the identities

[25] RWA.xyz uses jurisdiction-specific eligibility categories. Its U.S. Accredited Investor and U.S. Qualified Purchaser categories follow Rule 501(a) of Regulation D and Section 2(a)(51) of the Investment Company Act, respectively. Its Non-U.S. Professional Investor category aggregates formal categories across several non-U.S. regulatory regimes. These designations may include qualifying individuals as well as institutions. See RWA.xyz, "Eligible Investors," https://docs.rwa.xyz/frameworks/eligible-investors.

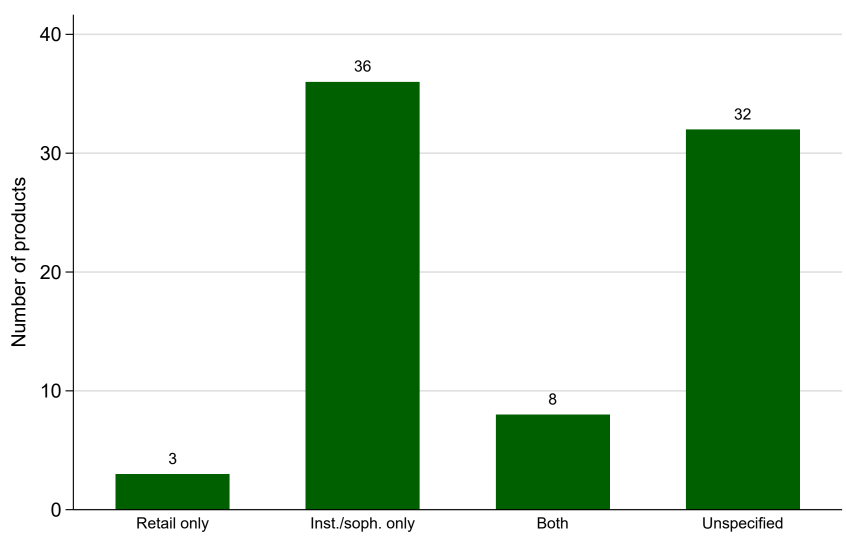
of realized token holders. Among products reporting investor type, primary-market access is therefore directed predominantly toward institutional investors.

Figure 5: Primary-Market Investor Access

Panel A reports the distribution of tokenized Treasury products by geographic investor eligibility. Panel B reports the distribution by retail and institutional/sophisticated investor eligibility. The institutional/sophisticated category includes institutional investors, accredited investors, qualified purchasers, and professional investors. These classifications describe eligibility to subscribe to the products, not the identities of actual token holders.



(a) Geographic access



(b) Retail and institutional/sophisticated access

Differences between U.S. and non-U.S. access arise because securities offerings are structured and distributed under jurisdiction-specific rules, not because of the blockchain on which the token is issued. A sponsor offering a fund to U.S. investors must register the offering or rely on an available exemption, while extending the same offering abroad may require compliance with other jurisdictions' marketing, disclosure, licensing, and distribution rules. Conversely, an offshore offering may exclude U.S. persons to avoid triggering additional U.S. registration and investment-company requirements. Geographic eligibility therefore reflects the sponsor's chosen distribution perimeter rather than necessarily the fund's domicile.[26] Offshore funds operating under different legal classifications can remain similarly restricted.[27]

Technical divisibility does not eliminate economic barriers to entry. Among the 57 products reporting a minimum subscription, the median is $1,000, but the mean is approximately $263,000 and the maximum is $5 million. Approximately 51% require $1,000 or less, while several impose substantially higher minimums. The distribution is shown in Figure C.1. Thus, tokenization can support small investment increments, but legal eligibility and product terms continue to determine access.

5.2.2 Adoption and on-chain use

The tokenized Treasury market expanded from approximately $105 million in December 2022 to $3.9 billion in December 2024, $9.4 billion in December 2025, and $15.7 billion by May 2026. Over the same period, reported holder addresses increased from 14 in September 2021 to approximately 62,000, while the number of active products increased from one to 77. Figure C.2 reports these series. Holder-address growth substantially outpaced product entry

[26] BUIDL, for example, is incorporated in the British Virgin Islands (BVI) but issues shares under Rule 506(c) and Section 3(c)(7) for its U.S. offering and permits transfers only to other pre-approved investors. See BlackRock USD Institutional Digital Liquidity Fund Ltd., SEC Form D, https://www.sec.gov/Archives/edgar/data/2013810/000201439024000001/xslFormDX01/primary_doc.xml; Securitize, "BlackRock Launches Its First Tokenized Fund, BUIDL, on the Ethereum Network," March 20, 2024, https://investors.securitize.io/news/news-details/2024/BlackRock-Launches-Its-First-Tokenized-Fund-BUIDL-on-the-Ethereum-Network-03-20-2024/default.aspx

[27] The Janus Henderson Anemoy Treasury Fund, for example, is a BVI-regulated professional fund offered to non-U.S. professional investors. See Centrifuge, "Janus Henderson Treasury Fund," https://app.centrifuge.io/pool/281474976710662.

during 2024 and much of 2025, but stabilized at approximately 62,000–64,000 addresses after late 2025 even as additional products entered. Product availability alone therefore does not mechanically generate a broader holder base.

Figure 6 separates primary issuance from subsequent token use. In 2025, products recorded $19.9 billion in mints and $15.0 billion in burns, producing net issuance of $4.9 billion. The growth of both series and the occurrence of negative-net-issuance months indicate increasingly two-sided primary-market activity rather than one-way accumulation.

Annual transfer volume increased from $1.6 billion in 2023 to $25.8 billion in 2025, while transaction counts rose from approximately 26,000 to 2.4 million. Market growth was therefore accompanied by greater observable use of token-transfer and blockchain-settlement infrastructure.[28]

5.3 Multichain distribution and potential fragmentation

Having documented aggregate adoption and activity, we next examine how distribution across blockchain networks relates to participation and use. Multichain issuance can extend a product's potential distribution to investors, custodians, and applications operating in different blockchain ecosystems, but it can also fragment ownership and activity across separate ledgers. By May 2026, the 77 active products were deployed across 22 networks; 41 products had positive value on more than one network and accounted for 92.3% of aggregate market value.[29] Multichain deployment is therefore economically important, although deployment alone does not establish broader realized participation or fragmentation.

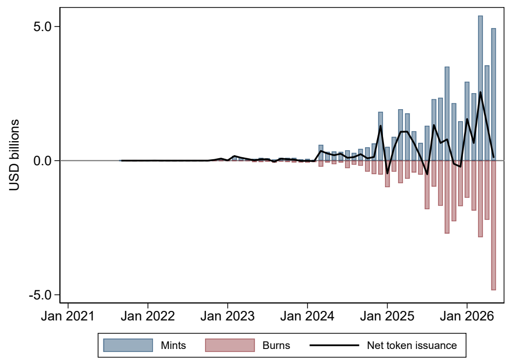
Panel A of Figure 7 reports Herfindahl indices for the network distributions of total asset value, holder addresses, and transfer volume. The index is the sum of squared network

[28] However, it is important to note that wallet addresses do not map one-for-one to beneficial investors, and transfers may include operational, custodial, or cross-wallet movements rather than secondary-market trades.

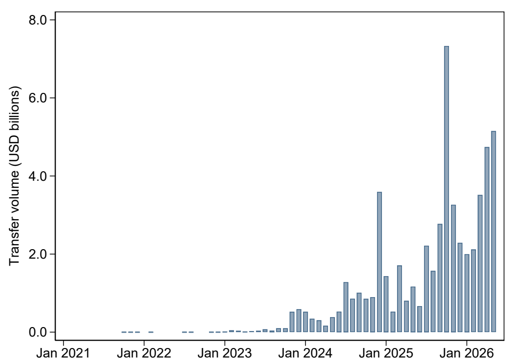
[29] Our sample contains 79 products in total, 2 of which were no longer active in May 2026, leaving 77 active products at the end of the sample.

Figure 6: On-Chain Issuance and Transfer Activity

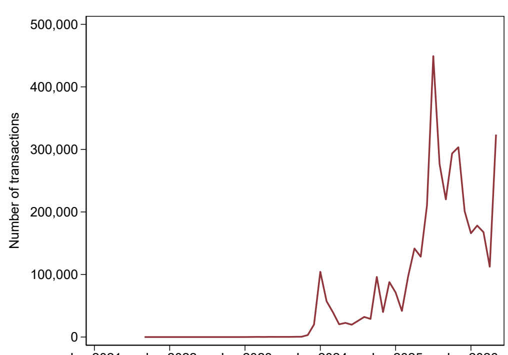
The figure reports monthly on-chain activity for tokenized U.S. Treasury products from September 2021 through May 2026. Panel A reports minting, burning, and net issuance, defined as the dollar value of tokens minted minus the dollar value burned. Burning is plotted below zero for presentation, although the underlying values are positive. Panel B reports transfer volume, and Panel C reports recorded transaction counts. Dollar amounts are expressed in billions.



(a) Token issuance



(b) Transfer volume



(c) Transaction count

shares, so higher values indicate greater concentration; its inverse can be interpreted as the number of equally sized, or effective, networks. The market value and holder addresses became less concentrated as the market expanded. By May 2026, the Herfindahl indices were 0.343 for total asset value, 0.327 for reported holder addresses, and 0.411 for transfer volume. These values are equivalent to approximately 2.9, 3.1, and 2.4 equally sized networks, respectively. Transfer-volume concentration followed a substantially more volatile path than the concentration of value or holder addresses.

Panel B asks whether market value is located in contracts with limited observable participation. The share of total asset value (TAV) by token contracts reporting five or fewer holder addresses rose from generally less than 10% through 2023 to 33.5% in May 2026; among contracts with reported activity data, those with zero transfer volume and zero transactions accounted for 10.1% of total asset value..[30] The network-level snapshot in Figure C.3 illustrates why the holder measure must be interpreted cautiously: some networks contain economically significant value but only a few reported addresses, consistent with institutional positions or omnibus custody.

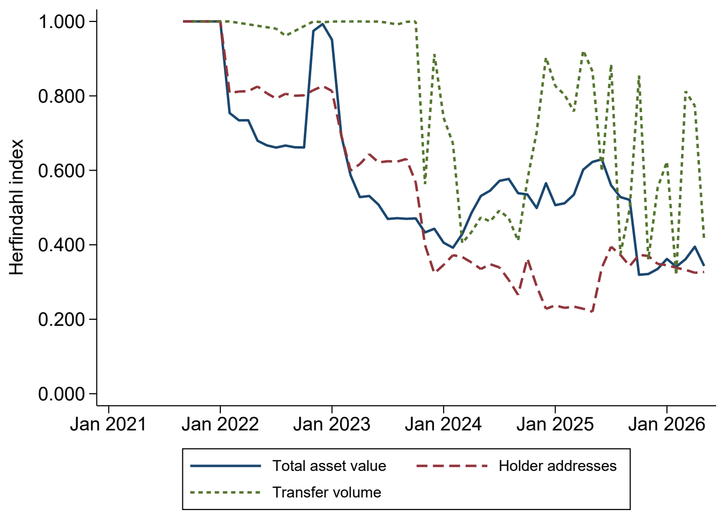
Table 4 examines whether prior multichain deployment is associated with subsequent product-month activity after controlling for product characteristics, age, scale, and month fixed effects. Prior multichain status is not significantly associated with holder-address growth, transfer turnover, or transaction counts. It is positively associated with mint volume and gross primary-market activity, but not with burn volume or net issuance. Multichain products therefore exhibit greater gross issuance activity without significantly faster growth in reported holder participation or net capital formation. Because network deployment is chosen by issuers and may reflect unobserved product characteristics or anticipated demand, these estimates should be interpreted as descriptive associations.

Appendix Table E.1 reports cross-sectional correlates of the decision to deploy across

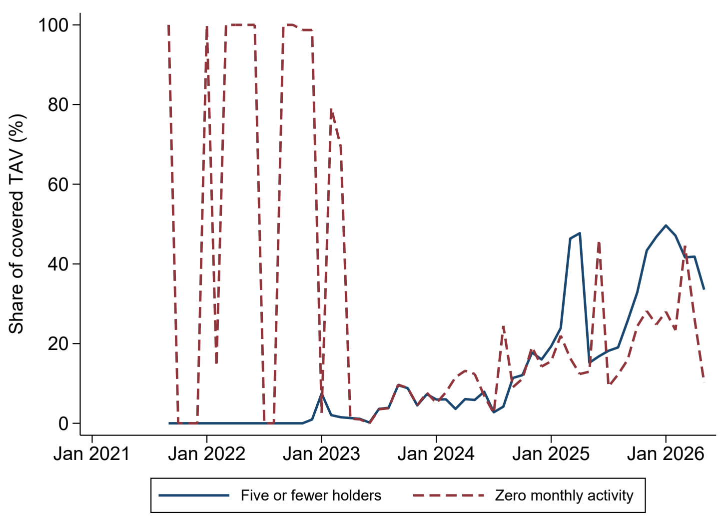
[30] Using thresholds of one and ten holder addresses instead of five, low-holder contracts accounted for 5.4% and 52.9% of TAV, respectively.

Figure 7: Network Fragmentation and On-Chain Participation

Panel A reports monthly Herfindahl indices for the distribution of total asset value, reported holder addresses, and transfer volume across blockchain networks. An index of one indicates concentration on a single network; lower values indicate greater dispersion. Panel B reports the share of total asset value held in token contracts with five or fewer reported holder addresses and the share held in contracts reporting both zero transfer volume and zero transactions during the month. Each share is calculated among contracts with reported values for the relevant measures.



(a) Network Concentration over Time



(b) Low Participation Value over Time

Table 4: Multichain Deployment and On-Chain Activity

This table examines whether multichain deployment is associated with subsequent on-chain activity. A product is multichain in month $t-1$ if it has reported positive total asset value on at least two blockchain networks by the end of the preceding month. Panel A reports product-month regressions of holder-address growth, transfer turnover, and transaction counts. Column (1) estimates holder-address growth by OLS and controls for lagged holder addresses. Column (2) estimates transfer turnover, defined as monthly transfer volume divided by lagged total asset value, by OLS. Column (3) estimates monthly transaction counts by Poisson pseudo-maximum likelihood (PPML). All dependent variables are winsorized at the 1st and 99th percentiles. The regressions control for management fees, minimum subscription, geographic and investor access, income-distribution status, open-ended status, tokenization type, product age, and lagged total asset value. All specifications include month fixed effects, and standard errors are clustered by product. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Holder Growth and Transfer Activity

	(1) Holder-address growth	(2) Transfer turnover	(3) Transaction count
Multichain by preceding month	0.027	0.372	0.596
	(0.030)	(0.270)	(0.654)
Management fee (per 10 bps)	-0.018**	-0.118	-1.216***
	(0.008)	(0.083)	(0.294)
ln(1 + minimum subscription)	0.005	-0.005	-0.541***
	(0.004)	(0.023)	(0.140)
U.S.-only access	0.023	-0.065	3.630***
	(0.028)	(0.165)	(1.361)
Geographic access unspecified	-0.054*	0.094	0.900**
	(0.030)	(0.261)	(0.389)
Institutional/sophisticated-only access	-0.080*	0.509	8.803**
	(0.046)	(0.355)	(4.065)
Investor access unspecified	-0.095**	0.723**	10.977***
	(0.045)	(0.285)	(4.194)
Distributes income	-0.041	-0.198	-2.327
	(0.040)	(0.191)	(1.445)
Open-ended product	0.071*	0.396*	5.618***
	(0.041)	(0.214)	(1.051)
Open-ended status unspecified	-0.121***	-0.793**	-1.654
	(0.039)	(0.305)	(1.170)
On-chain distributed	-0.027	-0.564	-4.322***
	(0.046)	(0.493)	(1.483)
Months since first positive TAV	-0.005***	-0.005	0.143**
	(0.001)	(0.012)	(0.070)
ln(Lagged holder addresses)	-0.014*		
	(0.008)		
ln(Lagged TAV)	-0.011***	-0.060*	0.360***
	(0.004)	(0.033)	(0.068)
N	943	949	937
Estimator	OLS	OLS	PPML
Month FE	Yes	Yes	Yes
Clustered SE	Product	Product	Product

Table 4: Multichain Deployment and On-Chain Activity (continued)

Panel B reports product-month regressions of mint volume, burn volume, gross primary-market activity, and net issuance. Columns (1)–(3) estimate mint volume, burn volume, and gross primary-market activity by PPML; gross activity is defined as mints plus burns. Column (4) estimates net issuance, defined as mints minus burns, by OLS. All dependent variables are winsorized at the 1st and 99th percentiles. Dollar outcomes are expressed in millions. The multichain measure, product controls, month fixed effects, and clustered standard errors are defined as in Panel A.

Panel B: Primary-Market Activity

	(1) Mints	(2) Burns	(3) Gross primary activity	(4) Net issuance
Multichain by preceding month	0.986***	0.473	0.745***	9.288
	(0.197)	(0.388)	(0.270)	(5.712)
Management fee (per 10 bps)	0.002	-0.020	-0.007	2.189
	(0.130)	(0.135)	(0.130)	(1.818)
ln(1 + minimum subscription)	0.099*	0.032	0.073	1.881***
	(0.054)	(0.056)	(0.055)	(0.660)
U.S.-only access	0.507	0.451	0.483	4.048
	(0.551)	(0.594)	(0.557)	(6.488)
Geographic access unspecified	-0.147	-0.756*	-0.310	-4.881
	(0.494)	(0.388)	(0.430)	(5.305)
Institutional/sophisticated-only access	-0.856	-0.191	-0.579	2.077
	(0.704)	(0.751)	(0.711)	(13.086)
Investor access unspecified	-0.001	0.079	0.056	15.613
	(0.551)	(0.556)	(0.524)	(13.475)
Distributes income	0.046	-0.241	-0.031	-1.856
	(0.299)	(0.330)	(0.294)	(7.342)
Open-ended product	-0.579***	-0.611***	-0.601***	6.665
	(0.178)	(0.193)	(0.167)	(7.263)
Open-ended status unspecified	-3.276***	-2.212*	-2.654**	-5.211
	(1.136)	(1.325)	(1.170)	(9.075)
On-chain distributed	-0.448	-0.869*	-0.461	0.861
	(0.585)	(0.464)	(0.517)	(9.977)
Months since first positive TAV	-0.032	-0.026	-0.030	0.594
	(0.022)	(0.029)	(0.024)	(0.379)
ln(Lagged TAV)	0.635***	0.851***	0.716***	1.568**
	(0.107)	(0.164)	(0.119)	(0.590)
N	949	949	949	949
Estimator	PPML	PPML	PPML	OLS
Month FE	Yes	Yes	Yes	Yes
Clustered SE	Product	Product	Product	Product

networks. On-chain-distributed products are more likely to become multichain, whereas products restricted to institutional or sophisticated investors are less likely to do so. Higher management and subscription fees are also negatively associated with multichain deployment, while initial product size is not significant.

Taken together, the results document dispersion across blockchain ecosystems. Multichain deployment provides access to a broader set of blockchain ecosystems and is associated with greater gross primary-market activity, but the availability of additional networks does not by itself imply broader realized participation or greater net capital formation.

5.4 Investor costs and product fees

We next examine what investors pay to enter, hold, and exit tokenized Treasury products. The reported terms measure the price of the fund product rather than the incremental cost of tokenization: they do not separately identify blockchain transaction fees, custody charges, compliance costs, intermediary fees, or currency conversion.

Management fees and product characteristics Management fees are the principal recurring charge. As tokenization technology matures and more providers enter, greater competition and lower implementation costs could reduce the fees charged to investors. We therefore examine whether products launched more recently charge lower management fees. Figure 8 shows no systematic decline across launch cohorts; the median is 40 basis points in both 2025Q2 and 2025Q3, the two quarters with the most launches.[31] Thus, product entry has not been accompanied by systematically lower fees among newer products. One possible explanation is that providers compete through differentiated services, including investor onboarding, custody arrangements, and support for particular blockchain networks, rather than primarily through lower prices. Such customization may limit the extent to

[31] The data on management fees are available for 64 products and are observed from current product information rather than historically at launch. Fee coverage is incomplete in some cohorts, and 2026Q2 is only partially observed.

which tokenized funds are close substitutes. By contrast, direct primary-market charges are usually zero. Panel A of Table 2 shows median subscription and redemption fees of zero, with at least 90% of reporting products charging no fee for either transaction. Nearly all reporting products also permit subscriptions and redemptions at least daily.

Figure 8: Management Fees of Newly launched Tokenized Treasury Products

The bars report the number of products launched in each quarter. Circles represent the management fees of individual newly launched products, and diamonds represent the quarterly median. Management fees are measured in basis points. The sample extends through May 2026.

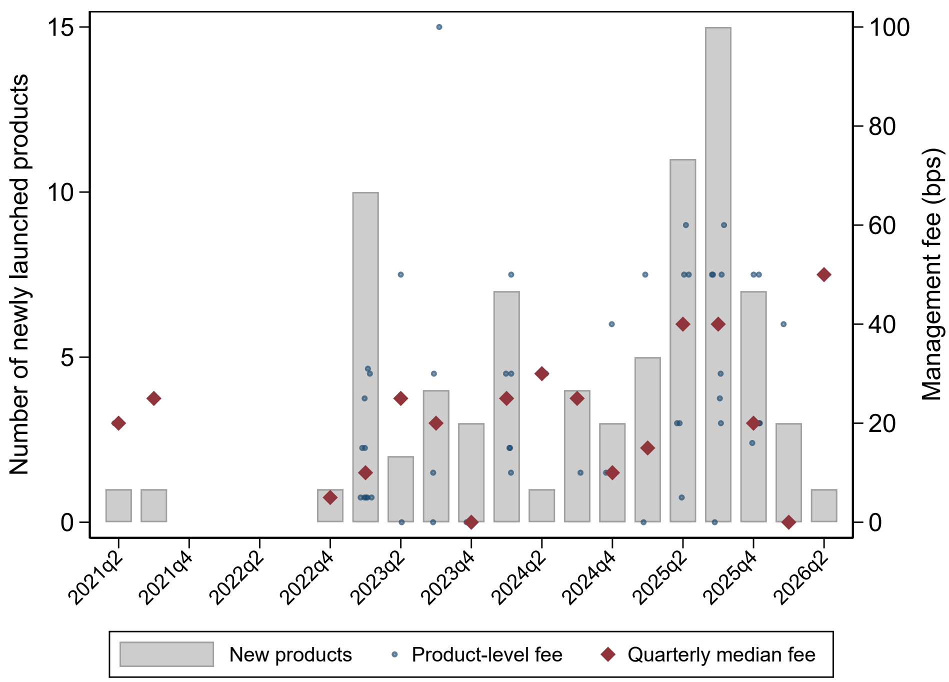


Table 5 relates management fees to launch timing, investor access, product structure, primary-market terms, and network deployment. Consistent with Figure 8, more recent launch dates are not associated with lower fees. Products restricted to institutional or sophisticated investors charge approximately 20 basis points more than products with reported retail access, although the remaining access coefficients are not significant. Management fees differ across dominant launch networks. These differences may reflect network operating costs as well as differences in the issuers and products using each network.

The regressions also show that products reported as distributing income charge approxi-

Table 5: Cross-Sectional Correlates of Management Fees

This table reports cross-sectional OLS regressions of annual management fees, measured in basis points, on product characteristics. Column (1) examines launch timing, measured relative to the product's first daily observation with positive total asset value. Columns (2)–(4) examine investor access, product structure, and primary-market terms, respectively. Column (5) classifies each product according to its dominant launch network, defined as the network containing the largest share of product total asset value on the product's last observed date during event days 0–29. Ethereum is the omitted category, and less frequently observed dominant networks are combined as Other. Column (5) also includes an indicator for whether the product appeared on multiple networks at any point during its first 30 days. Sample sizes vary with the availability of the relevant product characteristics. Heteroskedasticity-robust standard errors are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1) Launch timing	(2) Investor access	(3) Product structure	(4) Primary-market terms	(5) Launch networks
Quarters since 2021Q1	0.779	0.522	0.260	0.489	0.360
	(0.539)	(0.798)	(0.639)	(0.622)	(0.547)
U.S.-only access		10.175			
		(7.332)			
Geographic access unspecified		-3.234			
		(5.653)			
Institutional/sophisticated-only access		20.398**			
		(9.830)			
Investor access unspecified		10.441			
		(11.002)			
Distributes income			-8.295*		
			(4.428)		
Income distribution unspecified			-26.707		
			(17.171)		
Open-ended product			8.853		
			(6.262)		
Open-ended status unspecified			2.965		
			(14.003)		
On-chain distributed			-28.127		
			(18.908)		
ln(1 + minimum subscription)				0.113	
				(0.652)	
Subscription fee (bps)				-1.569***	
				(0.257)	
Redemption fee (bps)				0.280**	
				(0.123)	
Other dominant network					-19.323***
					(5.734)
Stellar					-18.219***
					(5.357)
Avalanche					15.027***
					(5.491)
Solana					15.552
					(15.942)
XDC					-19.250***
					(4.507)
Multichain during first 30 days					-7.825
					(4.785)
N	64	64	64	46	64
Adj. R^2	0.015	0.133	0.131	-0.026	0.261
Robust SE	Yes	Yes	Yes	Yes	Yes

mately eight basis points less, although the estimate is only marginally significant, and that management fees are negatively associated with subscription fees and positively associated with redemption fees.[32]

Management fees and initial product uptake Issuers may tailor product design and management fees to anticipated investor demand, including investors' preferred blockchain networks and intended uses of tokenized shares.[33] We use initial holder participation, capital raised, and on-chain activity as proxies for the demand these products attract. These measures capture the breadth of participation, the scale of investment, and early token use. We examine how management fees vary across these dimensions of initial uptake.

Table 6 relates management fees to outcomes measured from the product's first positive-TAV reporting date, defined as event day 0. A one-log-point increase in holder addresses on event day 0 is associated with a 3.5-basis-point lower fee, statistically significant at the 10% level. Using the last reported holder count during the first seven days, the corresponding estimate is 5.0 basis points and is statistically significant at the 1% level. Fees are also negatively associated with initial transfer volume and transaction counts. By contrast, initial total asset value, minting, and burning are not significantly associated with fees. Lower-fee products therefore tend to attract broader initial address-level participation and greater early transfer and transaction activity, but not more initial capital.

This pattern is consistent with differences in product positioning: products targeting broad participation may compete through lower fees, whereas those serving a smaller or more specialized clientele may sustain higher fees.

Management fees and subsequent product activity Table 7 examines event days 30180 while conditioning on the corresponding initial outcome. A ten-basis-point higher

[32] However, it is important to note that these fees are mostly zero.

[33] For example, a product designed for a small number of large investors seeking on-chain yield or collateral may offer different services and charge different fees from one targeting broad participation.

Table 6: Management Fees and Initial Product Uptake and Activity

This table reports cross-sectional OLS regressions relating management fees to measures of initial product uptake and activity. The dependent variable in every column is the annual management fee, measured in basis points. Column (1) uses the logarithm of holder addresses reported on event day 0, defined as the product's first positive-TAV reporting date. Column (2) uses the logarithm of the last holder-address count reported during event days 0–6. Column (3) uses the logarithm of total asset value on event day 29. Columns (4)–(7) use cumulative mints, burns, transfer volume, and transactions during event days 0–29; dollar-denominated activity is measured in millions before applying the $\ln(1 + x)$ transformation. Each specification includes controls for launch timing, geographic and investor access, the minimum subscription requirement, income-distribution and open-ended status, and whether the product is classified as on-chain distributed. All columns use the same sample of products with complete information. Robust standard errors are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	Dependent variable: Management fee (bps)						
	(1) Day-0 holder addresses	(2) Seven-day holder addresses	(3) Initial TAV	(4) Initial mints	(5) Initial burns	(6) Initial transfers	(7) Initial transactions
ln(Day-0 holder addresses)	-3.459*						
	(1.970)						
ln(Seven-day holder addresses)		-5.022***					
		(1.798)					
ln(TAV on event day 29)			-1.054				
			(0.763)				
ln(1 + initial mints, USD millions)				-1.984			
				(1.598)			
ln(1 + initial burns, USD millions)					-6.659		
					(4.424)		
ln(1 + initial transfer volume, USD millions)						-5.083***	
						(1.252)	
ln(1 + initial transactions)							-3.094***
							(1.033)
N	52	52	52	52	52	52	52
Adj. R^2	0.159	0.208	0.164	0.149	0.147	0.260	0.245
Product controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Robust SE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

fee is associated with a 0.423-log-point, or approximately 35%, reduction in subsequent holder-address growth, although the estimate is statistically significant only at the 10% level. The coefficient on total-asset-value growth is also negative but statistically insignificant. The evidence for subsequent on-chain activity is mixed. Higher fees are not significantly associated with subsequent minting or transfer volume. They are negatively associated with burning and transaction counts, however. A ten-basis-point higher fee is associated with approximately 50% less subsequent burn volume. The association with transaction counts is also negative and statistically significant.

Table 7: Management Fees and Subsequent Product Outcomes

This table examines the association between management fees and product outcomes following the initial launch period. Launch is defined as the first daily observation with positive total asset value. Column (1) reports an OLS regression of holder-address growth from the last reported value during event days 0–6 to event day 180. Column (2) reports an OLS regression of total-asset-value growth from event day 29 to event day 180. Columns (3)–(6) report PPML regressions of cumulative minting, burning, transfer volume, and transaction counts over event days 30–180. Dollar-denominated PPML outcomes are expressed in millions. Management fees are measured in units of ten basis points. Each specification includes controls for launch timing, geographic and investor access, the minimum subscription requirement, income-distribution and open-ended status, whether the product is classified as on-chain distributed, and the corresponding initial outcome. All columns use the same sample of 47 products. Heteroskedasticity-robust standard errors are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1) Holder growth	(2) TAV growth	(3) Subsequent mints	(4) Subsequent burns	(5) Subsequent transfers	(6) Subsequent transactions
Management fee (per 10 bps)	-0.423*	-0.493	-0.365	-0.684**	0.344	-5.879***
	(0.214)	(0.312)	(0.265)	(0.324)	(0.600)	(2.179)
N	47	47	47	47	47	47
Estimator	OLS	OLS	PPML	PPML	PPML	PPML
Initial-outcome control	Yes	Yes	Yes	Yes	Yes	Yes
Product controls	Yes	Yes	Yes	Yes	Yes	Yes
Robust SE	Yes	Yes	Yes	Yes	Yes	Yes

Overall, the results provide suggestive evidence that higher fees are associated with slower growth in address-level participation and lower subsequent transaction activity, but little evidence of a systematic relationship with capital growth, minting, or transfer volume.

5.5 Return performance of tokenized Treasury funds

We next examine the yields offered by tokenized Treasury products. Because these products invest primarily in short-term U.S. government securities, their yields should respond to changes in short-term Treasury rates. At the same time, differences in portfolio composition, product expenses, liquidity management, and distribution policies may cause the yields offered by individual products to differ from the Treasury benchmark.

5.5.1 Tracking the Treasury yield

Figure 9 compares the monthly median seven-day APY with the three-month constant-maturity Treasury yield from January 2024 through May 2026.[34] The two series have a correlation of 0.962, but the median APY is below the benchmark in 28 of 29 months and by approximately 35 basis points on average. The gap may reflect management fees, operating expenses, cash holdings, and differences in portfolio composition relative to the Treasury benchmark.

Despite the common Treasury exposure, yields vary meaningfully across products. The monthly interquartile range averages approximately 41 basis points. At the product level, the median correlation with the Treasury yield is approximately 0.85 among products with at least six usable months, and 19 of 29 correlations exceed 0.8.

5.5.2 Cross-sectional differences in product yields

Table 8 reports Fama–MacBeth regressions of the product APY minus the three-month Treasury yield. Management fees and investor-access categories are not significantly associated with this spread. More recent products offer modestly lower spreads: a one-quarter-later launch is associated with a 2.3-basis-point reduction, significant at the 10% level.

Several product characteristics are significantly associated with cross-sectional differences

[34] We obtain the Treasury yield from FRED (Board of Governors of the Federal Reserve System (US), 2026).

Figure 9: Tokenized Treasury APYs and the Three-Month Treasury Yield

The figure compares the monthly median seven-day APY reported by tokenized U.S. Treasury products with the three-month constant-maturity Treasury yield from FRED. The shaded region represents the cross-sectional interquartile range of product APYs. A product-month is included when at least 15 valid daily APY observations are available, and the figure reports only months containing at least five usable products. Yields are expressed as annualized percentages. The sample shown extends from January 2024 through May 2026.

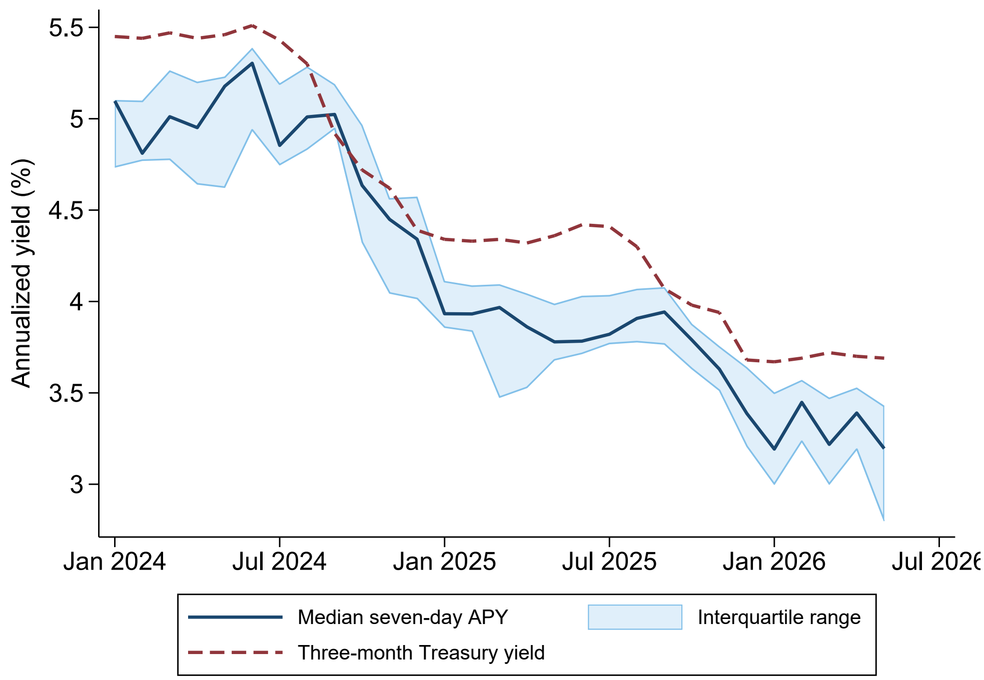


Table 8: Cross-Sectional Correlates of Tokenized Treasury APY Spreads

This table reports Fama–MacBeth estimates from monthly cross-sectional regressions of the reported seven-day APY spread, defined as the product's seven-day APY minus the three-month Treasury yield. The specifications examine management costs, product vintage, investor access, product structure, investor terms, product scale, and on-chain adoption and deployment. Launch timing is measured in quarters since 2021Q1; a higher value therefore denotes a more recently launched product. Indicator coefficients are measured relative to products outside the indicated category, including the separately reported unspecified-access groups where applicable. Each specification includes months containing at least eight products with complete information and sufficient within-month variation in its explanatory variables. Reported coefficients are averages of the monthly cross-sectional estimates. Standard errors, shown in parentheses, are calculated using the Newey–West procedure with three monthly lags. The number of observations and included months varies across specifications because of differences in data availability and within-month variation. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1) Management cost	(2) Launch timing	(3) Investor access	(4) Product structure	(5) Investor terms	(6) Product scale	(7) Adoption and deployment
Management fee (per 10 bps)	-0.028						
	(0.019)						
Quarters since 2021Q1		-0.023*					
		(0.013)					
U.S.-only access			0.025				
			(0.085)				
Geographic access unspecified			-0.026				
			(0.039)				
Institutional/sophisticated-only access			-0.148				
			(0.087)				
Investor access unspecified			-0.117				
			(0.092)				
Distributes income				0.235***			
				(0.057)			
Open-ended product				0.018			
				(0.077)			
ln(1 + minimum subscription)					0.024***		
					(0.006)		
Instant redemption					-0.019		
					(0.036)		
ln(Total asset value)						0.027***	
						(0.008)	
ln(Holder addresses)							-0.000
							(0.015)
ln(Token contracts)							0.240***
							(0.040)
Observations	438	438	438	386	418	414	410
Fama–MacBeth months	24	24	24	18	24	21	21
Average R^2	0.071	0.117	0.203	0.098	0.194	0.096	0.282
Minimum products per month	8	8	8	8	8	8	8
Newey–West lags	3	3	3	3	3	3	3

in APY spreads. Products reported as distributing income have spreads approximately 23.5 basis points higher, and a one-log-point increase in the minimum subscription is associated with a 2.4-basis-point higher spread. Open-ended status and instant redemption are not significant. Larger products also offer higher spreads: a one-log-point increase in value is associated with approximately 2.7 basis points.

Holder addresses are unrelated to the spread, whereas the number of token contracts is positively associated with it: a one-log-point increase corresponds to approximately 24 basis points. This coefficient may capture product-family differences, deployment strategies, or the operational complexity of supporting multiple contracts rather than a return benefit from multichain issuance. Overall, the significant associations are concentrated among product structure, minimum investment, scale, and deployment; management fees and holder participation are not significantly related to APY spreads.

6 Conclusion

This paper examines asset tokenization as a reorganization of financial intermediation. Evidence across asset classes shows that tokenized markets differ substantially in scale, product breadth, sponsorship, activity, investor access, fees, and institutional structure. Tokenization has not produced a common market architecture across asset classes. Instead, the organization of each market continues to reflect the liquidity, ownership rights, servicing requirements, and investor clientele associated with the underlying asset.

Tokenized U.S. Treasury funds provide a particularly useful setting for identifying more precisely which aspects of financial intermediation and the fund lifecycle change under tokenization. Smart contracts move share issuance, ownership recordkeeping, permissioned transfer, and cancellation on-chain, while also supporting eligibility and administrative decisions. However, portfolio selection, trade execution, legal custody, fund accounting, and most valuation functions remain within the traditional framework. Subscriptions and redemptions are typically hybrid processes in which the token movement occurs on-chain but approval, cash transfer, reconciliation, and payment rely on separate systems. Tokenization therefore shifts parts of the transfer-agent and distribution functions more clearly than it displaces the institutions that produce and manage the underlying investment.

Market expansion has been accompanied by substantial growth in holder addresses, transfers, and primary-market activity. This pattern suggests that adoption extends beyond the creation of additional products, although address-level data cannot identify beneficial investors or their motives. Legal eligibility and minimum-subscription requirements also impact adoption. Multichain availability broadens a product's potential reach across blockchain ecosystems and is associated with greater gross primary-market activity, but not with significantly faster holder growth or greater net issuance. It also fragments ownership and activity across separate ledgers.

Our fee and return evidence further illustrates the interaction between the on-chain and off-chain economics. Subscription and redemption fees are generally zero, but management fees vary widely and have not declined systematically. Lower management fees are associated with broader initial participation, higher initial activity, and subsequent holder growth, but not with more capital raised at launch. Yields on tokenized products closely track short-term Treasury rates while remaining below the benchmark on average. Tokenization changes the distribution and potential uses of Treasury exposure more clearly than it changes the source of investment returns. Because the data do not separately identify tokenization-specific costs, management fees reflect the price of the overall fund product rather than a direct measure of the cost of tokenization.

Our findings suggest that the economic significance of tokenization depends less on digital representation od assets itself than on which intermediary functions migrate to shared, programmable infrastructure. In the Treasury-fund market, this infrastructure largely complements rather than replaces traditional systems. Its potential value arises from broader distribution, programmable ownership, and interoperabiltity with on-chain applications, while its costs reflect compliance, custody, product customization, and support for multiple networks. Further evidence on investor motives, tokenization-specific servicing costs, and secondary-market liquidity is needed to determine when tokenization produces gains in access and efficiency.

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Appendix

A Additional Details on Data Construction

A.1 Smart-Contract Analysis Methodology

Here we provide more details on the procedure used to classify smart-contract features for tokenized Treasury and debt-reference products. The purpose of the analysis is to identify which parts of the fund lifecycle are represented in contract code.

We begin with token contract addresses for tokenized Treasury funds. For addresses on EVM-compatible networks, we download verified source code and ABI metadata from public verification providers, including Sourcify, Blockscout, and Etherscan-compatible APIs. When a token is implemented through a proxy, we attempt to identify and download the corresponding implementation contract. We then analyze the proxy and implementation contracts jointly as one effective deployment. This treatment is important because many tokenized funds use upgradeable proxy designs: the token address may contain limited details, while the economically relevant functions are defined in the implementation contract.

The source-collection step produced 193 downloaded contract bundles, including token contracts and implementation contracts. The main statistics in the paper use the 73 deployments for which implementation coverage is complete or direct. Deployments for which only a proxy contract is available are excluded from the main summary because the proxy alone does not reveal the operative token logic.

The classifier is rule-based. It searches verified ABI function names, Solidity or Vyper declarations, and selected source-code patterns. ABI function names receive the greatest weight because they identify externally callable functions. Source-text matches are used mainly to identify architecture or internal mechanisms, such as proxy patterns, internal minting or burning, compliance-service references, and transfer-restriction modules. We group the detected features into consolidated categories: core token ledger, admin/control layer, compliance/eligibility layer, on-chain fund entry/exit mechanics, NAV/valuation/rebasing, explicit income distribution, and portfolio trading/custody/liquidation evidence.

We apply a strict definition of ERC-4626. A deployment is classified as having full ERC-4626 asset-share conversion only if the verified ABI includes the core ERC-4626 functions: `asset`, `totalAssets`, `convertToShares`, `convertToAssets`, `deposit`, `mint`, `withdraw`, and `redeem`. Contracts with custom deposit or redemption functions are not classified as full ERC-4626 unless the full interface is present. The broader category of on-chain fund entry/exit mechanics captures both standardized ERC-4626 designs and custom subscription or redemption designs, including functions such as `deposit`, `redeem`, `withdraw`, `previewRedeem`, `asset`, and custom asset-payment or deposit-asset accounting functions.

We make two rule refinements to avoid over-interpreting function names. First, Securitize contracts expose `SECURITIZE_SWAP` as a public constant service identifier. Solidity automatically generates a view getter for public constants, which appears in the ABI as `securitize_swap`. We exclude this getter from the portfolio-trading classification because it is not an asset-swap or portfolio-trading function. Second, deposit-asset accounting functions such as `depositAssetsList`, `isSupportedDepositAsset`, `totalDepositAssets`, and `convertToDepositAssets` are classified as asset/payment or fund entry/exit mechanics rather than custody. These functions indicate that a contract can track supported deposit assets or convert shares into deposit-asset amounts. They do not establish legal custody of Treasury securities or other portfolio assets.

The post-onboarding eligibility-control measure reported in Table 3 identifies a deployment when the contract contains at least one of the following features: a whitelist, a blacklist, an identity registry, an external compliance service, or a transfer restriction. This broader measure captures on-chain enforcement of an eligibility decision, including restrictions applied when tokens are transferred; it does not imply that the contract performs KYC, AML, or investor-qualification checks.

A detected feature means that the contract contains code consistent with a particular capability. It does not imply that the corresponding legal or operational process is fully on-chain. For example, a mint function indicates that token supply can be increased on-chain, but it does not prove that investor cash was received on-chain or that a subscription was approved by the contract. A compliance-service hook indicates that transfers may depend on a compliance module, but it does not reveal the underlying KYC records or legal eligibility determinations. A NAV or oracle function indicates that the contract may store or consume a valuation input, but it does not show that the full NAV calculation is performed on-chain.

The methodology has several limitations. It is a static analysis of verified source code and ABI metadata. It does not execute contracts, reconstruct transaction histories, or evaluate runtime behavior. The classifier relies on function names, declarations, and selected source-text patterns rather than a full Solidity abstract syntax tree or formal call graph. Source coverage is incomplete for some deployments, especially where proxy implementation contracts are unavailable. Many fund processes also depend on external contracts, off-chain service providers, legal agreements, and administrator records that are not visible in the token contract itself.

Consequently, absence of evidence in the token contract should not be interpreted as evidence that the activity does not occur. It means only that the activity is not evidenced in the analyzed token or implementation code. The results are best read as a map of where tokenization appears in the smart-contract layer, rather than as a complete account of the legal or operational structure of each fund.

A.2 Product characteristics and panel construction

We construct the empirical asset universe from the RWA.xyz asset-valuation data. We exclude observations without a recognized token identifier and observations assigned to an unknown blockchain network. A product enters the asset master file if it has positive total asset value on at least one date during the sample period. We then merge the RWA.xyz product reference files using the unique product identifier, `asset_id`. These files provide information on product classification, fees, fund structure, holder rights, issuer identity, primary-market terms, regulatory jurisdiction, and service providers.

Because a product may be represented by multiple token contracts on one or more blockchain networks, we first construct the valuation panel at the product–token–network–month level. For each token contract and network, we retain the last available daily valuation observation within the month. We then sum total asset value across token contracts and networks belonging to the same product to obtain the product-month panel. Product-month observations without positive total asset value are excluded from the empirical panel.

Investor eligibility is classified separately along geographic and clientele dimensions. We search the primary-market investor descriptions for references to U.S. investors and to non-U.S., offshore, or global investors. Products are classified as U.S. only, non-U.S. only, available to both groups, or unspecified. We separately identify references to retail, institutional, accredited, qualified-purchaser, and professional investors. Accredited investors, qualified purchasers, and professional investors are included in the institutional/sophisticated category. Products are consequently classified as retail only, institutional/sophisticated only, available to both groups, or unspecified. A product can therefore have separate geographic and clientele classifications without imposing a hierarchy between these two dimensions.

Management, subscription, and redemption fees are converted to numeric variables measured in basis points, while minimum subscription requirements are measured in U.S. dollars. Subscription and redemption frequencies are standardized into common categories, including instant, daily, U.S. banking daily, intraday during market hours, and weekly. Missing fee information is retained as missing and is not treated as a reported zero.

Holder information is initially reported at the product–token–date level. Within each product, token contract, and month, we retain the last nonmissing holder count and then sum across the product's token contracts. If no contract reports holder information in a particular product-month, the product-level value remains missing rather than being set equal to zero. Because an address may hold more than one token contract, the resulting measure represents address–contract relationships rather than necessarily unique investors or beneficial owners.

We aggregate daily minting, burning, transfer volume, and transaction counts across token contracts and networks to the product-month level. Net token issuance is defined as dollar minting minus dollar burning. A product-month absent from the on-chain activity data remains missing. Within a product-day represented in the activity data, however, a missing event field is treated as no reported event for that activity measure. Transfer volume represents movements between blockchain addresses and may include custodial, operational, or cross-wallet transfers in addition to secondary-market transactions.

A.3 Performance-sample construction

RWA.xyz provides daily seven-day APYs for a subset of the tokenized Treasury products. We retain products for which the seven-day APY is reported on at least 80% of the dates on which the product appears in the performance data. Thirty-three products satisfy this requirement.

We construct a monthly performance measure from the daily observations. Daily APYs greater than 25% in absolute value are treated as reporting anomalies and set to missing.

Reported zero APYs are retained when calculating the monthly mean. Deleting only the zero observations would mechanically increase the calculated yield for products that report a mixture of zero and positive APYs. We therefore retain the zeros initially and evaluate the reporting quality of the product-month as a whole. The monthly seven-day APY is the arithmetic mean of the remaining daily observations.

We exclude three types of product-months with potentially irregular reporting. First, we exclude a product's initial month when APY coverage is less than 90% of the calendar month and more than half of its reported daily APYs are zero. Second, we classify a month as stale when all of its reported APYs are zero. For products that RWA.xyz explicitly identifies as not distributing income and for which the distribution-frequency field is blank, we apply an additional stale-reporting diagnostic. Specifically, we classify a month as stale when more than half of its daily APYs are zero and RWA.xyz's reported value of a hypothetical $10,000 investment is unchanged from the immediately preceding calendar month. Products whose distribution status cannot be determined from the reported information are left unclassified and are not subjected to this additional diagnostic. We impose this restriction because distributed income may be paid separately rather than reflected in the hypothetical-investment value. Third, we examine the month immediately following a stale-reporting month. We exclude this subsequent month when more than 25% of its reported APYs remain zero. We also exclude it when it contains an original daily APY greater than 25% in absolute value or when its monthly mean APY exceeds 15%, as these patterns may reflect a delayed update following the stale period.

A product-month enters the final performance sample when it passes these reporting-quality screens and contains at least 15 usable daily APY observations. All product-months remain in the constructed dataset for auditing. Monthly APY measures are set to missing for months excluded by the reporting-quality screens. Months that fail only the 15-day requirement retain their monthly APY measures and diagnostic variables but are identified as having insufficient coverage and excluded from the empirical analysis.

B Variables Used in the Regressions

Table B.1: Definitions of Variables Used in the Regression Analyses

Variable	Definition
Management fees and transaction costs	
Management fee	Annual management fee, in basis points.
Subscription fee	Primary-market subscription fee, in basis points.
Redemption fee	Primary-market redemption fee, in basis points.
Product characteristics and controls	
First positive-TAV reporting date	First daily observation on which the product has positive reported total asset value; used as event day 0 in the initial and subsequent outcome regressions.
Launch timing	Number of quarters between 2021Q1 and the product's first positive-TAV reporting date.
Management fee (10-bps units)	Annual management fee divided by ten; a one-unit difference represents ten basis points.
U.S.-only access	Indicator equal to one when primary-market access is explicitly restricted to U.S. investors.
Geographic access unspecified	Indicator equal to one when geographic investor eligibility is unspecified.
Institutional/sophisticated-only access	Indicator equal to one when access is restricted to institutional, accredited, qualified-purchaser, or professional investors.
Investor access unspecified	Indicator equal to one when retail or institutional investor eligibility is unspecified.
Log minimum subscription	Natural logarithm of one plus the minimum primary-market subscription amount, measured in U.S. dollars.
Distributes income	Indicator equal to one when RWA.xyz explicitly reports that the product distributes investment income.
Income distribution unspecified	Indicator equal to one when income-distribution status is unspecified.
Open-ended product	Indicator equal to one when the product is reported as open-ended.
Open-ended status unspecified	Indicator equal to one when open-ended status is unspecified.
On-chain distributed	Indicator equal to one when at least one token/network deployment associated with the product is classified by RWA.xyz as on-chain distributed, and zero when its deployments are classified as on-chain represented.
Dominant launch network	Mutually exclusive category identifying the network with the largest share of product total asset value on the product's last observed date during event days 0–29. The five most common dominant networks among products with nonmissing management fees are reported separately, and the remaining networks are combined as Other. Ethereum is the omitted regression category.
Multichain during first 30 days	Indicator equal to one when the product appears with positive total asset value on more than one network at any point during event days 0–29.
Multichain-deployment outcomes	

Table B.1 – continued

Variable	Definition
Ever multichain	Indicator equal to one when the product reports positive total asset value on at least two distinct networks at any time through the end of the valuation sample.
Yield-performance variables	
Reported seven-day APY	Monthly mean of usable daily seven-day APYs after applying the performance-sample cleaning rules, expressed as an annualized percentage.
Three-month Treasury yield	Monthly three-month constant-maturity Treasury yield, expressed as an annualized percentage.
APY spread	Reported seven-day APY minus the three-month Treasury yield, measured in percentage points.
Instant redemption	Indicator equal to one when redemption frequency is reported as instant and zero when another redemption frequency is reported; left missing when redemption frequency is unspecified.
Log total asset value	Natural logarithm of the product's monthly total asset value.
Log holder addresses	Natural logarithm of the monthly holder-address count aggregated across the product's reporting token contracts.
Log token contracts	Natural logarithm of the number of token contracts contributing positive reported holder counts for the product-month.
Initial product outcomes	
Day-0 holder addresses	Natural logarithm of the holder-address count reported on the product's first positive-TAV reporting date.
Seven-day holder addresses	Natural logarithm of the last reported holder-address count during event days 0–6 after the first positive-TAV reporting date.
Initial total asset value	Natural logarithm of total asset value on event day 29.
Initial mints	Natural logarithm of one plus cumulative token mints, measured in USD millions, during event days 0–29.
Initial burns	Natural logarithm of one plus cumulative token burns, measured in USD millions, during event days 0–29.
Initial transfer volume	Natural logarithm of one plus cumulative dollar transfer volume, measured in USD millions, during event days 0–29.
Initial transactions	Natural logarithm of one plus cumulative on-chain transactions during event days 0–29.
Subsequent product outcomes	
Subsequent holder growth	Change in log reported holder addresses from the last reported value during event days 0–6 to event day 180.
Subsequent TAV growth	Change in log total asset value from event day 29 to event day 180.
Subsequent mints	Cumulative token mints during event days 30–180, entered in USD millions in the PPML regression.
Subsequent burns	Cumulative token burns during event days 30–180, entered in USD millions in the PPML regression.
Subsequent transfer volume	Cumulative dollar transfer volume during event days 30–180, entered in USD millions in the PPML regression.
Subsequent transactions	Cumulative on-chain transactions during event days 30–180, estimated in levels by PPML.
Product-month on-chain activity	

Table B.1 – continued

Variable	Definition
Lagged multichain status	Indicator equal to one if the product had appeared with positive total asset value on more than one network by the end of the preceding month.
Product age	Number of months since the product's first positive-TAV reporting date.
Lagged log holder addresses	Natural logarithm of the holder-address count reported for the product in the preceding month.
Lagged log total asset value	Natural logarithm of the product's total asset value in the preceding month.
Monthly holder-address growth	Monthly change in the logarithm of reported holder addresses; winsorized at the 1st and 99th percentiles for estimation.
Transfer turnover	Monthly transfer volume divided by lagged total asset value; winsorized at the 1st and 99th percentiles for estimation.
Monthly transactions	Number of on-chain transactions reported during the month; winsorized at the 1st and 99th percentiles for estimation.
Monthly mints	Dollar value of token mints reported during the month, expressed in millions and winsorized at the 1st and 99th percentiles for estimation.
Monthly burns	Dollar value of token burns reported during the month, expressed in millions and winsorized at the 1st and 99th percentiles for estimation.
Gross primary-market activity	Sum of monthly token mints and burns, expressed in USD millions and winsorized at the 1st and 99th percentiles for estimation.
Net issuance	Monthly token mints minus monthly token burns, expressed in USD millions and winsorized at the 1st and 99th percentiles for estimation.

C Additional Figures

Figure C.1: Distribution of Minimum Subscription Requirements

This figure plots the empirical cumulative distribution of product-level minimum subscription requirements. The sample includes 57 tokenized U.S. Treasury products with nonmissing information. The horizontal axis uses a logarithmic scale after adding one to each value so that products reporting a zero minimum remain in the sample. The vertical dashed line denotes the sample median of $1,000.

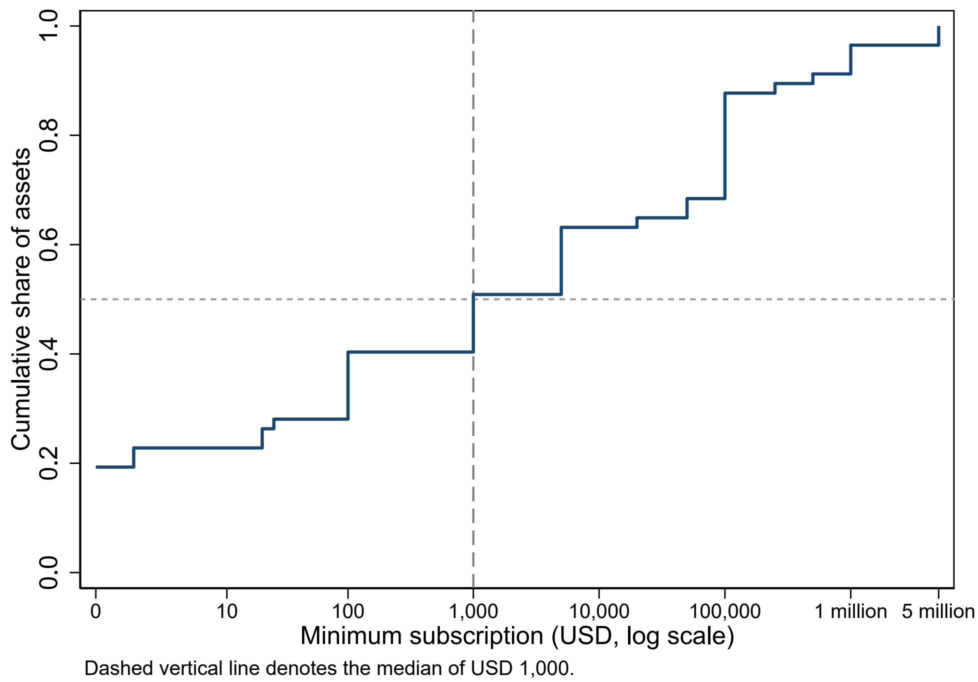
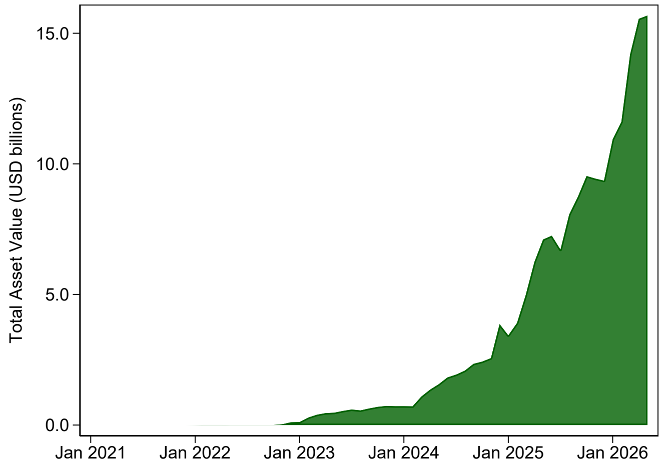
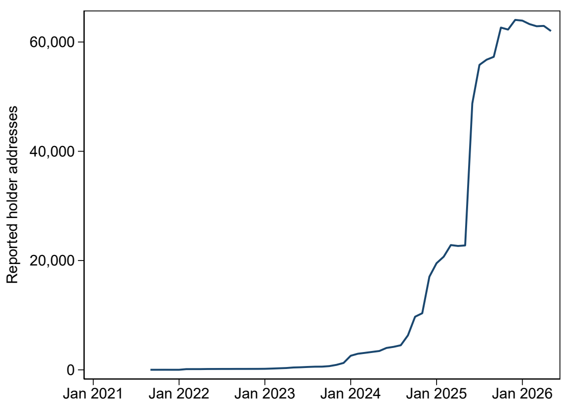


Figure C.2: Tokenized Treasury Market Growth

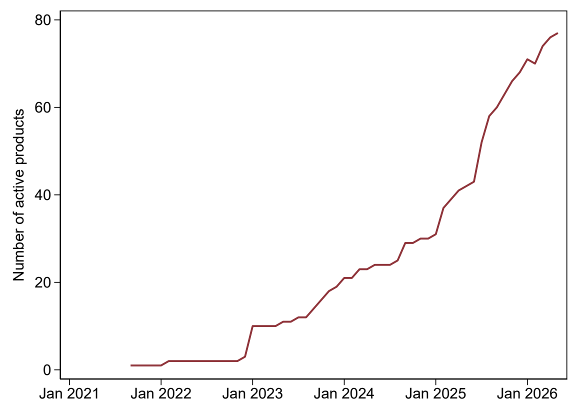
This figure reports the growth of the tokenized U.S. Treasury market. Panel A plots aggregate total asset value. Panel B plots the aggregate number of reported holder addresses, and Panel C plots the number of products with positive total asset value. The sample covers September 2021 through May 2026. Holder addresses are summed across token contracts.



(a) Total asset value



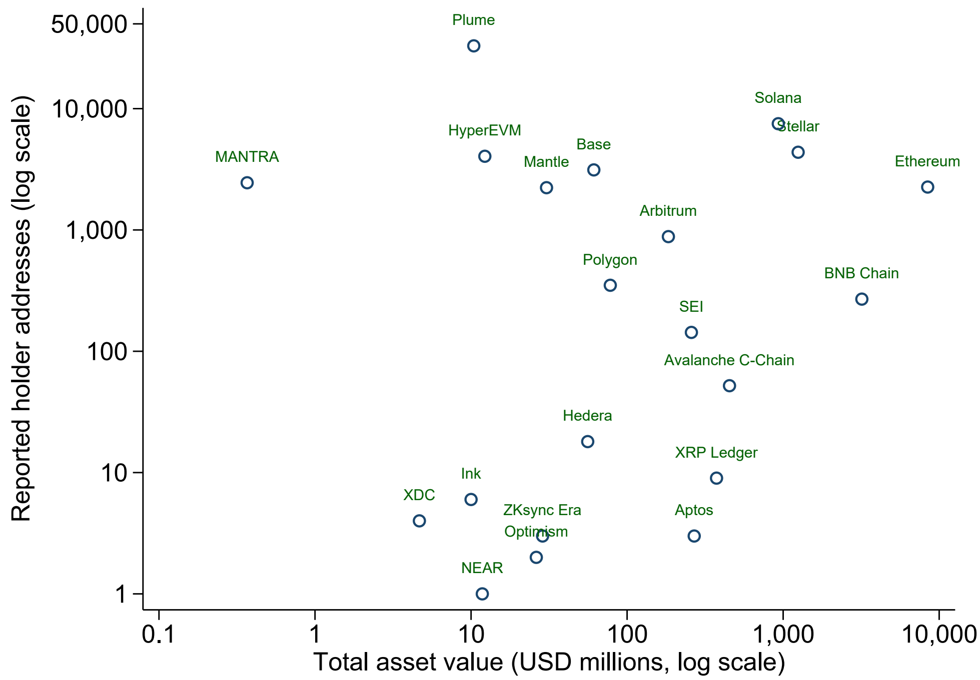
(b) Number of holder addresses



(c) Number of active products

Figure C.3: Network Total Asset Value and Holder Addresses in May 2026

Each point represents a blockchain network. The horizontal axis reports the total asset value of tokenized Treasury contracts deployed on the network, and the vertical axis reports the sum of their reported holder addresses. Both axes use logarithmic scales. The figure includes networks with positive total asset value and positive reported holder counts.



D Illustrative Applications of Asset Tokenization

Table D.1: Illustrative Applications of Asset Tokenization

The table presents selected applications of tokenization to settlement, programmable operations, collateral use, and fractional investment. The examples are illustrative and do not establish broad adoption or independently verified efficiency gains.

Mechanism	Example	Institutional relevance
Conditional settlement	European Investment Bank's Project Venus (European Investment Bank, 2022)	A digital bond was issued, recorded, and settled on private blockchain systems on the same day. The transaction shows that digital systems can shorten issuance and payment processing while banks, custodians, and the existing legal structure of the bond remain in place.
Programmable operations	Project Pine (Bank for International Settlements Innovation Hub and Federal Reserve Bank of New York, New York Innovation Center, 2025)	The project tested whether preset computer rules could automate central-bank operations such as exchanging reserves for collateral and buying or selling assets. It was an experimental prototype rather than a live monetary-policy system.
Collateral mobility	Digital Asset–DTCC pilot (Digital Asset and Depository Trust & Clearing Corporation, 2024)	The pilot tested whether tokenized U.S. Treasury collateral could be posted, moved, returned, or transferred to a secured party following a counterparty default more quickly across participating institutions. Custodians and legal agreements still determined who owned the assets and who could take control if a borrower defaulted.
Fractional private-fund distribution	ADDX–Partners Group fund units (ADDX, 2021)	ADDX offered tokenized private-equity fund units to international accredited investors with a minimum investment of \$10,000, compared with the \$100,000 or more that ADDX described as typical for private-equity funds. Tokenization lowered the investment size but did not remove investor-eligibility requirements.
Fractional real-estate distribution	RealX investment tokens (Real Estate Exponential Company Limited, 2026)	RealX gives investors a fractional interest in the income from three residential properties in Bangkok. Investors can receive rental income and proceeds from eventual property sales, while the properties and their management remain off-chain and the offering remains subject to Thai securities regulation.
Commodity collateral	Santander agricultural commodity tokens (Banco Santander, 2022)	In an Argentine pilot, tokens linked to stored soybeans, corn, and wheat were accepted as collateral for bank loans. Their usefulness depends on verifying that the grain exists and ensuring that the collateral can be enforced if the borrower defaults.

E Additional Regression Results

Table E.1: Cross-Sectional Correlates of Multichain Deployment

This table reports linear probability regressions of multichain deployment on product characteristics. The dependent variable equals one if a tokenized Treasury product reports positive total asset value on at least two blockchain networks at any point through May 2026. Column (1) examines launch timing; Column (2) adds total asset value at the end of the initial 30-day window; Columns (3) and (4) examine investor access and product structure, respectively; and Column (5) examines management fees and primary-market investor terms. Launch timing is measured in quarters since 2021Q1. Initial total asset value is expressed as $\ln(x)$, while minimum subscription is expressed as $\ln(1 + x)$. Management fees are measured in units of ten basis points. The estimates are descriptive associations and do not identify the causal determinants of multichain deployment. Heteroskedasticity-robust standard errors are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1) Launch timing	(2) Initial size	(3) Investor access	(4) Product structure	(5) Fees and investor terms
Quarters since 2021Q1	-0.026*	-0.022	-0.015	-0.045**	-0.013
	(0.013)	(0.014)	(0.020)	(0.018)	(0.019)
ln(TAV on event day 29)		0.009			
		(0.013)			
U.S.-only access			-0.175		
			(0.191)		
Geographic access unspecified			-0.179		
			(0.136)		
Institutional/sophisticated-only access			-0.357**		
			(0.169)		
Investor access unspecified			-0.305		
			(0.204)		
Distributes income				-0.005	
				(0.116)	
Income distribution unspecified				0.515***	
				(0.106)	
Open-ended product				0.083	
				(0.135)	
Open-ended status unspecified				-0.191	
				(0.268)	
On-chain distributed				0.653***	
				(0.215)	
Management fee (10 bps)					-0.105***
					(0.027)
ln(1 + minimum subscription)					0.025
					(0.015)
Subscription fee (bps)					-0.049***
					(0.011)
Redemption fee (bps)					-0.005
					(0.006)
N	79	78	79	79	46
Adj. R^2	0.041	0.027	0.065	0.258	0.252
Robust SE	Yes	Yes	Yes	Yes	Yes