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A Framework for Understanding the Vulnerabilities of New Money-Like Products[1]

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Abstract

New money-like products, such as tokenized money market funds (MMFs), money market exchange-traded funds (MMETFs), and stablecoins, could be transformative for finance. These products may offer significant benefits, but like other money-like assets, they also have certain vulnerabilities. We introduce a framework to analyze the vulnerabilities of new products by comparing their features to those that contribute to vulnerabilities in MMFs. Specifically, we examine the extent to which each product engages in liquidity transformation, is subject to threshold effects, serves as a money-like asset, poses contagion risks, and has reactive investors. Our framework is useful for assessing the potential effects of novel cash-like products on the overall resilience of the financial system and how such an assessment may change as these products' uses evolve.

Keywords: money market funds (MMFs), stablecoins, tokenized money market funds, money market exchange-traded funds (MMETFs), financial stability, liquidity transformation, private money-like assets, moneyness, contagion, reactive investors, thresholds

JEL Classification: E5, G1, G23

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[2] An earlier draft of this paper was presented at the Second Conference on Stablecoins and Tokenization, hosted by the Federal Reserve Banks of Boston and New York, on May 9, 2025.

1. Introduction

Money and money-like assets are central components of our financial system and economy. As such, the recent emergence of new types of nonbank money-like products, such as stablecoins, tokenized money market funds (MMFs), and money market exchange-traded funds (MMETFs), could be transformative for finance. These nonbank products may offer significant potential benefits, such as enhanced liquidity and higher returns for investors as well as reduced costs for a wide range of transactions, from everyday consumer purchases to large international deals. At the same time, like other money-like assets, such as uninsured deposits and MMFs, the new products can be susceptible to costly, disruptive runs and thus contribute to financial system vulnerabilities.

In this paper, we introduce a general framework for analyzing the vulnerabilities in novel money-like products. Our framework builds on the well-documented vulnerabilities in an older nonbank innovation with wide-ranging benefits and well-understood risks – MMFs – and the features that contribute to MMF vulnerabilities. To illustrate the utility of the framework, we focus on three promising novel money-like products and examine the extent to which each: (1) engages in liquidity transformation, or the conversion of illiquid assets into liquid liabilities; (2) is subject to threshold effects, which are sharp discontinuities in investors' expected payoffs amid stress; (3) serves as a private money-like asset, that is, the degree to which it has "moneyness" because it is perceived as safe and liquid; (4) poses contagion risks because problems in one product trigger runs on similar products; and (5) has a base of reactive investors who are more prone to run during periods of stress.

These features include structural attributes that arise directly from the core business model of a product or the legal framework that governs it, as well as other features reflecting how a product is perceived and used. Structural features, such as liquidity transformation and threshold effects, are unlikely to change significantly without changes to laws or rules. Non-structural features that reflect how a product is used or perceived are more malleable, more likely to evolve, and thus more difficult to predict. Notably, MMF vulnerabilities stem from the presence of *combinations* of these features, so a novel product with just one or two of them may not be particularly susceptible to runs.

Because our framework builds on the literature on MMF vulnerabilities, it is best suited for study of potential vulnerabilities arising from *store-of-value* functions of money-like products, that is, from their role as cash-like investments. Money-like products may also provide *payment* functions that facilitate transactions. Although the features we discuss would be less relevant for a product purely used for payments, in practice a product employed at very large scale would probably also have a significant store-of-value function for some users.

As reported in Table 1, using this framework, we find that features that contribute to vulnerabilities are present to varying extents in U.S. MMETFs, tokenized MMFs, and stablecoins. For example, although MMETFs may have the flexibility to redeem largely in-kind (which would reduce liquidity transformation), they currently redeem mostly or exclusively in cash, so their liquidity transformation is similar to that of MMFs. Threshold effects in MMETFs are smaller than those in MMFs, largely because ETFs use market pricing, which also probably diminishes their money-like status relative to most MMFs. MMETFs can increase contagion effects if ETF price discounts signal that MMF investors should redeem their shares. Finally, the reactivity of the MMETF investor base is probably less than that of MMFs because ETFs' fluctuating market prices are unlikely to attract institutional investors that can hold stable-NAV government MMFs.

Table 1. Features that Contribute to Vulnerabilities of Money-Like Products

Features that contribute to vulnerabilities	Description	Presence of these features (relative to those for comparable MMFs)*		
		MMETFs	Tokenized MMFs	Stablecoins
Structural features				
1. Liquidity Transformation	Transforming illiquid assets into liquid liabilities, which creates incentives for investors to redeem amid stress.	Similar	Similar	Uncertain
2. Threshold Effects	Discontinuous changes in the expected payoffs for investors when certain thresholds are reached.	Less	Similar	Less
Hybrid features				
3. Moneyness	Perceived as money-like: unquestionably safe and liquid during normal times, but a change in this perception can trigger runs.	Probably less	Less	Likely similar
4. Contagion Effects	An adverse shock on one product propagates stress to similar products.	Greater	Greater	Likely similar
Non-structural features				
5. Reactive Investors	Investors whose incentives, preferences, or resources make them quick to redeem or run during periods of stress.	Probably less	Uncertain	Similar

*Our assessments are based on comparisons of each product as it is currently structured to comparable MMFs. For example, we compare government MMETFs to government MMFs and prime MMETFs to prime MMFs.

We illustrate our framework by focusing on U.S. MMETFs, tokenized MMFs, and stablecoins because these products may grow rapidly in scale and scope and be offered to a wide range of investors, from households to large financial institutions.[3] Some other money-like products, such as specialized investment funds that offer cash-management options for a narrow set of investors – notably, tokenized private funds – could be analyzed using the framework we offer in this paper. However, to demonstrate the utility of our framework, we limit our examination to instruments that are more widely available and may have meaningful potential effects on aggregate financial vulnerabilities.[4]

[3] Although our framework can be applied to money-like products in any jurisdiction, our illustrative assessments focus on products offered in the United States.

[4] Some novel money-like products, such as tokenized deposits, are (or build on) deposits and other banking products. We focus on nonbank products in our analysis, although variations in our framework could be useful in assessing deposit-related products – for example, by comparing tokenized deposits to traditional deposits.

To be sure, the new products we examine are still evolving rapidly, and their nascency limits our ability to foresee the full range of possible uses and how they might affect financial stability. In particular, the structural features of these products may change if laws, regulations, or business models are altered, while non-structural features are likely to shift as products become more familiar in the marketplace, and both types of changes could affect our assessments of vulnerabilities considerably. Yet, even as products' features vary, the framework itself remains useful: By comparing the new products' features to those of MMFs, which have vulnerabilities that are extensively documented in both the academic and official-sector literatures, we can learn much about how new products may contribute to financial vulnerabilities as they evolve. Moreover, the analysis provides some key insights into what to watch for as products develop. For example, a pivotal issue for MMETFs is whether they can continue to redeem in cash, and a key issue for tokenized MMFs is whether transferring the token can effect a transfer of the underlying MMF, which would make this product more money-like.

Section 2 of this paper provides a brief introduction to each of the novel products we examine. Section 3 describes our framework for assessing how these products may contribute to financial vulnerabilities. Section 4 analyzes each product using our framework. Section 5 concludes.

2. Background on Money-Like Products

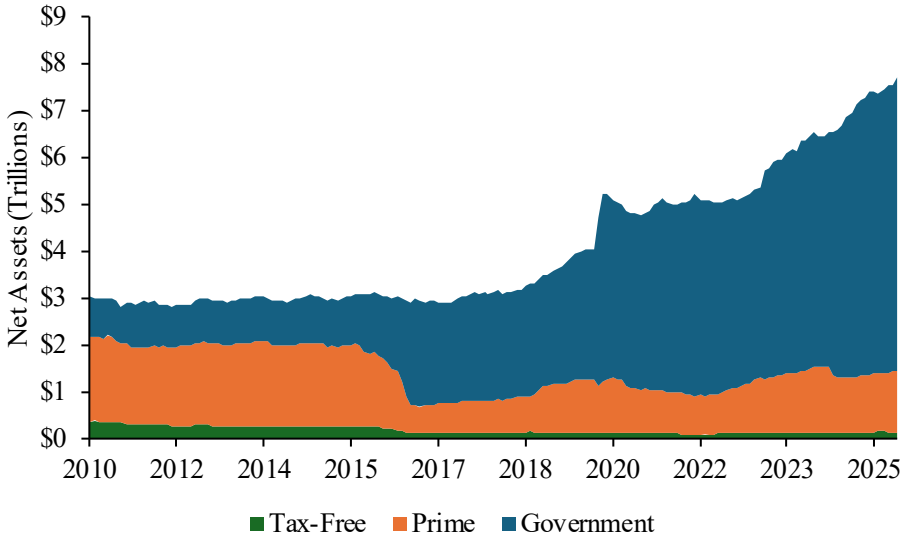
2.1. MMFs

MMFs are specialized open-end (mutual) funds that invest in short-term assets, maintain a stable – or nearly stable – share price, and are governed by Securities and Exchange Commission (SEC) Rule 2a-7. This rule has several provisions to limit MMF portfolio risks, including credit-quality and maturity requirements for individual securities that MMFs can hold, as well as fund-level average portfolio maturity limits and minimum-liquidity requirements.[5] When they were first approved by the SEC in 1972, MMFs were retail products that allowed investors to earn market rates of return on short-term debt instruments at a time when banks were paying less on deposits (Bouveret, Martin, and McCabe, 2022). Since then, MMFs have proven

[5] SEC Rule 2a-7 is available at https://www.ecfr.gov/current/title-17/chapter-II/part-270/section-270.2a-7.

highly successful; assets under management in U.S. MMFs were $7.7 trillion as of September 2025 (Figure 1), with funds catering to institutional investors representing over half the total.[6]

Figure 1. Net Assets in U.S. Money Market Funds



Source: SEC Form N-MFP.

There are two main types of MMFs with distinct investment objectives. Government MMFs are generally limited to holding obligations of the U.S. Treasury, government agencies, and government-sponsored enterprises, as well as repurchase agreements backed by these obligations. Prime MMFs chiefly invest in privately issued short-term debt instruments, such as commercial paper (CP), negotiable certificates of deposit (NCDs), and floating-rate debt issued by private firms.[7]

Prime MMFs have proven to be significantly more vulnerable than government funds during stress events, largely because prime funds' assets tend to be less liquid and riskier than those of government funds. The relative illiquidity of prime fund portfolios increases their liquidity transformation, and the riskiness of prime MMF assets has pushed prime funds closer to key thresholds that can trigger runs during market stress. For example, for funds that round their net asset values (NAVs) to $1.00, losses that push NAVs down close to $0.995 put them in

[6] Sources: SEC Form N-MFP and Crane Data.

[7] A third type of MMFs, tax exempt funds, generally holds municipal securities. We focus here on government and prime MMFs because the novel money-like products that we analyze are generally analogous to either government or prime MMFs.

danger of "breaking the buck" and create strong incentives for investors to redeem. These dynamics contributed to large, disruptive runs on prime MMFs following the Lehman bankruptcy in September 2008 and again at the start of the Covid-19 pandemic in March 2020.

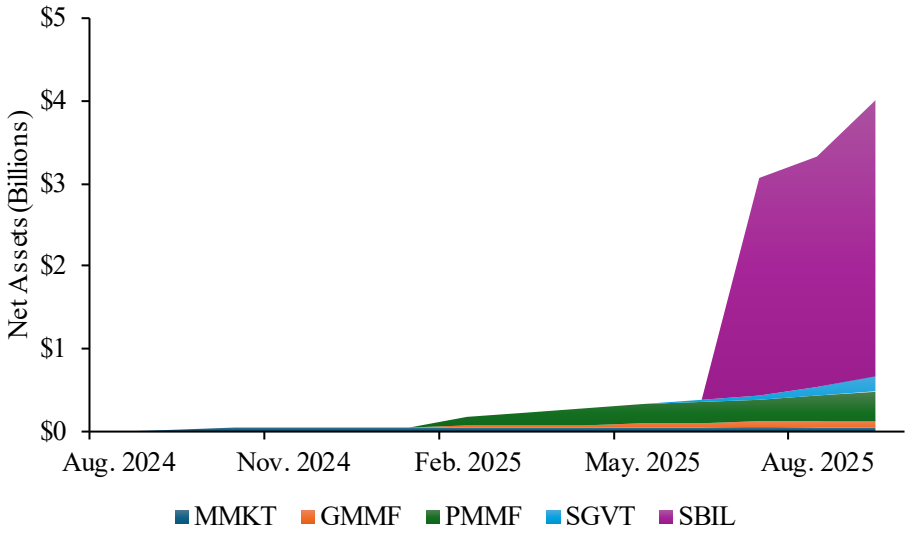
Because the vulnerabilities of government and prime MMFs differ, as we analyze novel money-like products, we compare them to their closest MMF analogues. For example, we compare government MMETFs to government MMFs, and stablecoins backed by reserves that prime MMFs might hold, such as CP, to prime MMFs.

2.2. MMETFs

First introduced in 2024, MMETFs are SEC-regulated funds that are both MMFs and ETFs. As MMFs, they must adhere to the risk-limiting provisions of SEC Rule 2a-7. Like other ETFs, an MMETF issues shares that investors can buy or sell on an exchange but transacts directly only with specified market makers ("authorized participants" or APs). Thus, in contrast to investors in MMFs, who buy or redeem shares in transactions with the fund itself, most investors in MMETFs buy or sell shares only in secondary markets. The ETF structure allows continuous transactions of fund shares during market hours, whereas transactions of MMF shares are typically conducted just once or a few times per day with the fund.

As of September 2025, net assets in MMETFs stood at about $4.0 billion (Figure 2).

Figure 2. Net Assets in Money Market Fund Exchange Traded Funds



Notes: MMKT is Texas Capital Government Money Market (MM) ETF; GMMF is iShares Government MMETF; PMMF is iShares Prime MM ETF; SGVT is Schwab Government MMETF, and SBIL is Simplify Government MMETF. Source: Bloomberg.

2.3. Tokenized MMFs

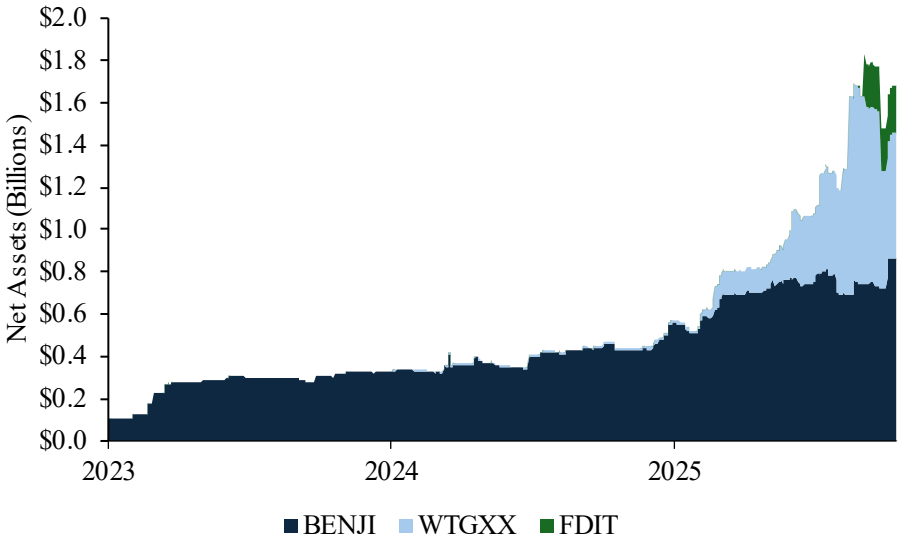
A tokenized MMF is a unique digital representation on a blockchain of shares in an MMF. The underlying MMF – the reference asset for the tokens – is a fund that, like other MMFs, complies with SEC Rule 2a-7. Although the tokenized MMF structure is still evolving, the tokens may offer investors some advantages over MMF shares, particularly if token transactions can effectuate transfers of ownership of the underlying MMF shares. If so, tokens might be used broadly as payment vehicles that offer low-cost, 24/7 instantaneous settlement and as collateral in financial transactions. First introduced in 2021, tokenized MMFs had net assets of almost $1.5 billion as of September 2025 (Figure 3).

The scope of tokenized financial assets is expanding rapidly and now includes tokenized cash-management vehicles that are similar in some respects to MMFs.[8] Net assets in these tokenized MMF-like vehicles now exceed $6 billion. Although our framework could be useful in assessing the vulnerabilities of these products, their idiosyncratic structures and opacity

[8] Examples include the BlackRock USD Institutional Digital Liquidity Fund (BUIDL) and Ondo Short-Term US Treasuries Fund.

(especially compared to registered investment companies like MMFs and MMETFs) make them more difficult to assess as a group.

Figure 3. Net Assets in Tokenized MMFs



Notes: BENJI (FOBXX) is Franklin OnChain U.S. Government Money Fund, WTGXX is WisdomTree Government Money Market Digital Fund, and FDIT is Fidelity Digital Interest Token. Source: rwa.xyz.

2.4. Stablecoins

First created in 2014, stablecoins are digital assets that are designed to maintain a relatively stable price per token, usually $1.00. The most popular type – and the focus of our analysis – is the reserve-backed stablecoin, which typically claims to back each issued token with traditional financial assets, such as U.S. Treasury securities and commercial paper.[9]

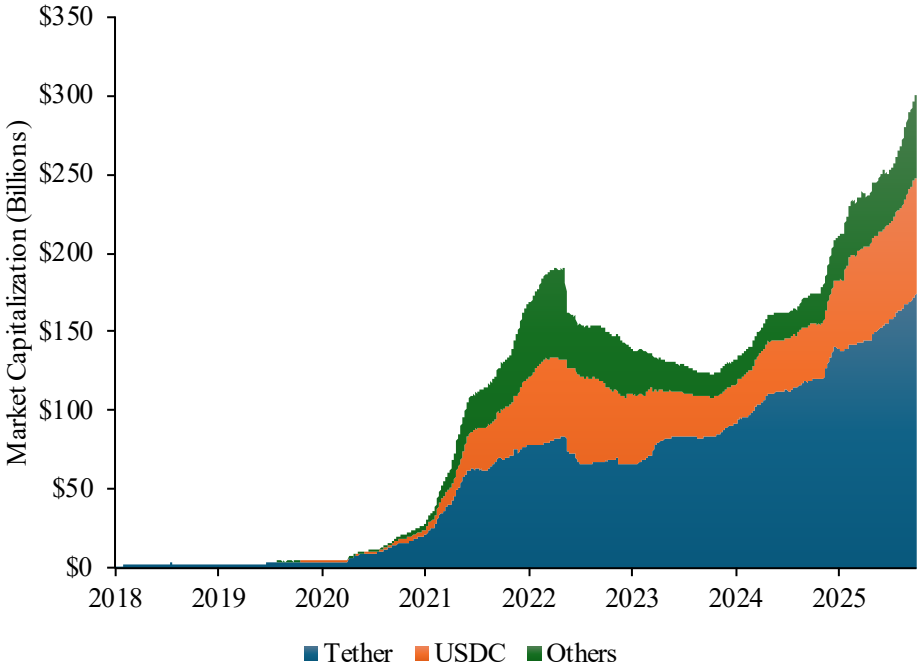
Stablecoins have grown very rapidly: Market capitalization reached about $300 billion in September 2025, up from just $5 billion in 2019 (Figure 4).[10] The stablecoin market is currently highly concentrated, with two stablecoins, Tether (USDT) and US Dollar Coin (USDC), comprising almost 90 percent of aggregate market capitalization.

[9] Other types of stablecoin arrangements include crypto-backed stablecoins, which are reportedly backed by crypto assets (such as bitcoins), and algorithmic stablecoins, which are unbacked but use computer algorithms to match supply and demand. Except where noted, our analysis is limited to reserve-backed stablecoins.

[10] Moreover, industry analysts have suggested that stablecoins could grow very substantially and reach $1.5 trillion or more within the next several years (see, for example, Citi Institute (2025)).

The Guiding and Establishing National Innovation for U.S. Stablecoins (GENIUS) Act, signed into law in July 2025, establishes a new legal framework for "payment stablecoins."[11] This legislation sets forth many key elements of payment stablecoin design, although implementation details will be left to federal and state regulators, which must adopt regulations under the statute, and to industry participants. Moreover, because the GENIUS Act does not cover "non-payment stablecoins" such as crypto-backed and algorithmic stablecoins, stablecoin issuers may continue to provide a variety of business models. Since our objective is to provide a framework that can be applied broadly to money-like products, our discussion of stablecoins considers the characteristics of *current* stablecoins – that is, stablecoins as they exist in late 2025, prior to the adoption of rules under the GENIUS Act – as well as those of payment and non-payment stablecoins.

Figure 4. Market Capitalization of Stablecoins



Source: CoinGecko.

[11] See, S.1582 - 119th Congress (2025-2026): GENIUS Act." *Congress.gov*, Library of Congress, 18 July 2025, https://www.congress.gov/bill/119th-congress/senate-bill/1582.

3. A Framework for Analyzing Vulnerabilities

Our framework for assessing the vulnerabilities of novel money-like products builds on the well-documented vulnerabilities of MMFs arising from their *store-of-value* functions as cash-management vehicles. Academic research and official publications have highlighted several features that contribute to vulnerabilities in MMFs and other money-like products. These features include structural attributes that are inherent in a product's business model or the legal framework that governs it, as well as other more changeable, non-structural features that stem from how it is perceived and used. Notably, MMF vulnerabilities stem from the presence of *combinations* of the features we describe below, and a product with just one or two of the features may not be particularly susceptible to runs. We begin with a description of the features, which are also summarized in the first two columns of Table 1.

3.1. Liquidity transformation

Liquidity transformation is the transformation of illiquid assets into liquid liabilities. Diamond and Dybvig (1983) demonstrated how liquidity transformation in a theoretical setting can lead to bank runs, and both theoretical and empirical research has shown that liquidity transformation can make investment funds vulnerable (for example, Chen, Goldstein, and Jiang, 2010; Feroli, Kashyap, Schoenholtz, and Shin, 2014; Goldstein, Jiang, and Ng, 2017; Zeng, 2017). For most cash-management products, liquidity transformation is a structural feature because business models – and often legal mandates – require them to offer instant or daily liquidity to investors even though the products themselves are backed by less liquid assets. This can motivate investors to redeem an investment fund quickly in periods of stress, for two reasons. First, if a fund sells its most-liquid assets to meet cash redemptions, fast-redeeming investors have a first-mover advantage because they are more likely to get out before the fund depletes the liquid assets. Second, when market liquidity costs rise amid financial stress, a fund that does not charge a liquidity (or similar) fee for the costs resulting from cash redemptions is effectively subsidizing redemptions.

3.2. Threshold effects

Some products have business models or rules that can cause abrupt, discontinuous changes in the expected payoffs for investors when certain thresholds are reached.[12] One example is an unintended consequence of the stable NAVs that some MMFs and other short-term investment vehicles (such as some short-term investment funds and local government investment pools) maintain via rounding: When the underlying value of a share declines and no longer rounds up to $1.00, the share price can drop suddenly and discontinuously. As such, thresholds may motivate investors to redeem preemptively if they predict (or fear) that a threshold may be crossed (Cipriani, Martin, McCabe, and Parigi, 2014). Because threshold effects generally arise from key elements of a product's business model or the rules that govern it, they are generally structural features.

3.3. Moneyness

To be money-like, a financial product must be so safe and liquid that – at least in normal times – its price relative to a monetary system's unit of account is fixed and investors need not question their ability to purchase and dispose of it freely at par. This no-questions-asked (NQA) property is key to an asset's use for cash management (Holmstrom, 2015). Moneyness is a hybrid feature with both structural and non-structural elements. The prerequisites for moneyness are structural: Principal stability and liquidity are largely consequences of the rules and business models that govern a product. Nonstructural elements are also important, because money is a social convention, and a product's perceived moneyness may evolve over time as individuals and institutions come to see it as cash-like or not. Network externalities may contribute, too, since investors may be more willing to regard a product as cash-like if others do. Hence, usage as money can change quickly. For example, U.S. retail money market funds were less than 0.3

[12] Threshold effects are inherent in the structure or rules for a product and can have a direct impact on *all* of its investors. Other effects, such as rules that require individual investors to hold only highly rated vehicles (or thresholds in ratings criteria), may cause sudden shifts in demand among some users and contribute to the reactivity of investor bases and contagion effects, but in this framework, we do not consider them "threshold effects."

percent of M2 until 1978, but their usage shot up when short-term rates rose in the late 1970s, and they comprised 9 percent of M2 at the end of 1982.[13]

In part because moneyness arises from non-structural characteristics, it can be fragile, and if questions *are* asked about an asset's value, safety, or liquidity, investors may unload it quickly (Gorton, 2017). Even in the absence of other sources of vulnerability, investors who use an asset as money may dispose of it abruptly if they believe it no longer serves that function.

3.4. Contagion effects

When money-like products are similar or are sensitive to similar shocks, problems for one product can motivate investors to redeem other products. Contagion effects may stem from a combination of structural and non-structural factors. Strict rules on portfolio quality, a structural characteristic of some cash-management vehicles, can lead them to hold similar portfolios, so an adverse shock to one vehicle is likely to hurt others. Contagion risk may also arise from vehicles sharing similar investors, a non-structural factor. In addition, interconnections among money-like products that may have structural or non-structural causes can create channels for cross-product contagion, that is, channels by which strains for one product can cause stress for another, even absent new information regarding the latter. For example, declines in prices for MMETFs may be seen as a signal that MMF shares are mispriced. We describe these channels in more detail below.

Many potential spillovers that might be called "contagion" are outside the scope of our framework, which is designed to help assess the potential vulnerabilities of the money-like products themselves. Hence, broader spillover effects arising from the interconnections of money-like products with the markets for the reserves they hold, issuers in those markets, and investors are beyond the framework's scope – even though these linkages may be important for understanding systemic risk.

[13] M2 is a Federal Reserve monetary aggregate that includes currency, demand deposits, other liquid deposits (ATS and NOW accounts, share draft accounts, and savings deposits), small-denomination time deposits, and retail MMFs. *See*, Federal Reserve Money Stock Measures - H.6 Release, available at: https://www.federalreserve.gov/releases/h6/current/default.htm.

3.5. Reactive investor bases

Certain types of investors – particularly large and institutional investors – may be especially reactive to stress in a money-like vehicle. The presence of these investors in a vehicle is a non-structural characteristic that may contribute significantly to its vulnerability. For example, institutional investors historically have been quicker than retail investors to redeem when MMF risks become salient, so past runs on institutional MMFs have been more severe than those on retail funds.[14] The tendency of some types of investors to regard an asset as more money-like or to put it to uses that are appropriate only if it retains its money-like status can amplify their reactions if that status is questioned.

3.6. Other features

Some assessments of the potential vulnerabilities of products (and activities) consider other features, such as size and interconnectedness.[15] Indeed, all else equal, runs on larger, more interconnected products are likely to have more disruptive spillover effects than runs on smaller ones. For example, larger products tend to have bigger footprints in the markets in which they invest and may need to liquidate more assets to meet redemption requests.

Our framework does not explicitly incorporate size or interconnectedness for two reasons. First, as noted above, the framework is designed to help assess the potential vulnerabilities of money-like products themselves, not the possibility that stress among these products could spill over to other parts of the financial system. Second, the framework is intended to assess the *potential* for new money-like products – if they are more widely adopted – to contribute to vulnerabilities, not on their current impacts. The novel products we assess are still quite small compared to the MMF sector, which, with over $7.7 trillion in AUM, dwarfs the $300 billion market capitalization of stablecoins, the largest of the three novel products we analyze. To be sure, the two largest stablecoins are already large and interconnected enough to

[14] See discussion in section 4.5.1 below.

[15] See, for example, Dodd-Frank Wall Street Reform and Consumer Protection Act, Pub. L. No. 111-203, § 120, 124 Stat. 1376, 1402 (2010).

affect markets; for example, they hold about $137 billion in U.S. Treasury securities and $57 billion in Treasury repo, so a rapid liquidation of stablecoins could be disruptive.[16]

Finally, our framework does not separately incorporate the riskiness of a product's portfolio holdings (or reserve assets) other than the contributions of those assets' liquidity risk to liquidity transformation. This may be surprising: Prime MMFs, which hold assets with credit risk, are notably more vulnerable than government MMFs, for example. However, the riskiness of portfolio assets does not in itself contribute to vulnerabilities; equity mutual funds that hold risky but liquid assets historically have not proven to be susceptible to runs. Instead, the vulnerability of prime MMFs – which have notably less portfolio risk than equity mutual funds – reflects a combination of features not present in risky equity funds, and these features are the focus of our framework.

3.7. Combinations of features

The vulnerability of private money-like assets stems from the presence of *combinations* of the five features that we describe. While individual features can contribute to a product's vulnerability, a product with just one or two of the features may not be particularly susceptible to runs. For example, while liquidity transformation is common in equity and bond mutual funds, these funds have not demonstrated the susceptibility to industry-wide runs that have occurred in MMFs because other features – like threshold effects, moneyness, and highly reactive institutional investors – aren't significant factors for most equity and bond funds.

3.8. Applying the framework to *novel* products

Because the products we assess are novel, many may still be unfamiliar to most investors, which limits the extent to which the products *currently* exhibit some features that may make them vulnerable. For example, unfamiliar products are unlikely to achieve the NQA property of well-established cash equivalents, like MMFs, or to attract highly risk averse, highly reactive institutional investors. However, as new products become more commonplace, features that may contribute to vulnerabilities – particularly the non-structural attributes – are likely to evolve

[16] Even so, considerable growth in stablecoins would be needed before they could match MMFs' $2.7 trillion and $1.9 trillion in Treasury securities and Treasury repo holdings, respectively. Sources: USDC's and Tether's attestations of their reserve holdings, as of May 2025 and March 2025, respectively, and SEC Form N-MFP.

substantially. As such, we assess the *potential* for new products – as they are currently structured – to exhibit these features once they become a more familiar part of the financial landscape.

4. Analyzing Vulnerabilities in Money-Like Products

In this section, we illustrate the utility of our framework by examining the extent to which new money-like products exhibit each of the five features that have made MMFs vulnerable. To provide some context, we begin our analysis of each feature by reviewing how it affects MMFs. Appendix Table A-1 provides a summary of our analyses.

4.1. Liquidity transformation

4.1.1. Money market funds

Many MMFs – particularly prime funds – engage in significant liquidity transformation because they must offer redemptions in cash every day, but they hold private short-term debt instruments, including CP and NCDs, that have little or no secondary markets and become illiquid amid stress (Financial Stability Board, 2021).[17] The resulting first-mover advantage for redeeming MMF investors was evident in 2008, when funds that faced runs quickly sold their most liquid holdings and left non-redeeming investors holding claims on riskier portfolios (Strahan and Başak, 2015). Moreover, because most MMFs offer cash redemptions each day without any charge for resulting liquidity costs, investors have an incentive to redeem – and obtain underpriced liquidity – when market liquidity costs rise. One exception is institutional prime MMFs, which have been required since October 2024 to charge a scalable ("dynamic") liquidity fee to redeeming investors on days when net redemptions exceed 5 percent of the fund's assets.

[17] Thus, prime MMFs cannot necessarily rely on selling assets to meet redemptions. Indeed, SEC liquidity rules for MMFs are based on the maturities of the instruments they hold, not on the funds' ability to sell them in secondary markets. Liquidity transformation is less acute in government MMFs, which hold assets that are typically more liquid than those held by prime MMFs.

*4.1.2. **MMETFs.** Liquidity transformation is **similar** to that of MMFs.*

Two types of ETF redemption practices could, if used by MMETFs, reduce their liquidity transformation compared to that of MMFs.[18] First, many ETFs use only *in-kind* creations (purchases) and redemptions. In these transactions, the fund and an AP exchange fund shares for baskets of assets that approximately replicate the fund's portfolio holdings. When an AP redeems, it receives portfolio assets, not cash, for its shares, so redemptions do not deplete the ETF's liquidity or create incentives for investors to redeem before others do.[19] As such, liquidity transformation is diminished in ETFs that redeem in-kind (Financial Stability Board, 2017; Anadu, Kruttli, McCabe, and Osambela, 2020). Reduced liquidity transformation from in-kind redemptions could be especially beneficial for prime MMETFs, since prime MMFs hold less-liquid assets than government MMFs.

A second practice that could potentially reduce liquidity transformation for ETFs is the use of redemption fees by some ETFs – that is, they charge fees to APs that redeem in cash. In particular, fees can be used to offset liquidity costs arising from redemptions and balance the liquidity of funds' assets and their shares.

In reality, in-kind redemptions of some of the assets held by MMETFs would be challenging; "ownership" of repo, for example, cannot be easily transferred to a third party, such as an AP. Indeed, four of the five MMETFs introduced to date (unlike many other ETFs) transact in cash, rather than in-kind, and one redeems partially in kind.[20] Even partial

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[18] To be sure, most purchases and sales of MMETF shares likely will occur in secondary markets and have no direct effect on the fund itself. Hence, secondary markets for ETF shares offer investors liquidity that does not result from liquidity transformation. If an MMETF engages in liquidity transformation, it occurs because the liquidity it offers to APs that redeem its shares exceeds the liquidity of its portfolio assets.

[19] An AP also may choose not to engage with the ETF during turbulent times. Since AP transactions are important for minimizing tracking error between an ETF and the index it tracks, AP disengagement could result in large ETF price discounts to its NAV. While this may cause an ETF to function like a closed-end fund, it doesn't have obvious implications for financial stability.

[20] Texas Capital Government Money Market Fund notes that "Creation Units generally are issued and redeemed 'in-kind' for securities and partially in cash." See, https://fundsmanagement.texascapital.com/wp-content/uploads/2025/05/BG-Texas-Capital-Government-MM-ETF-MMKT-Pro.pdf. BlackRock's iShares Prime Money Market ETF and Government Money Market ETF both create and redeem shares (in transactions with APs) for cash, rather than in-kind; see, respectively, https://www.sec.gov/Archives/edgar/data/1761055/000119312525019990/d107669d497k.htm and https://www.sec.gov/Archives/edgar/data/1761055/000119312525018106/d766835d497.htm.

Schwab's Government Money Market ETF, SGVT, and Simplify's Government Money Market ETF, SBIL, also primarily interact with APs in cash (see, respectively,

redemptions in kind, where a portion of each redemption is in kind and the remainder is in cash, could reduce liquidity transformation. But the flexibility for MMETFs to rely on cash redemptions – and their tendency to do so – indicates that the vulnerabilities associated with liquidity transformation in these funds are likely similar to those for MMFs.

4.1.3. Tokenized MMFs. *Liquidity transformation is* ***similar*** *to that of MMFs.*

Since tokenized MMFs are digital representations of MMF shares, liquidity transformation for tokenized shares is similar to that in the underlying MMF. For example, when token investors wish to convert a token to an MMF share and redeem it, they – like any investors in an MMF – receive cash for MMF shares that are backed by assets that may be illiquid.[21]

4.1.4. Stablecoins. *Liquidity transformation relative to MMFs is* ***uncertain*** *– illiquid reserve assets in some stablecoins have increased liquidity transformation; GENIUS Act provisions will partially align portfolio liquidity requirements and redemption policies for payment stablecoins and MMFs, although uncertainty remains about forthcoming rules and how the industry will respond.*

Currently, stablecoin liquidity transformation is heightened by reserve assets that can be substantially less liquid than the assets that MMFs can hold under SEC Rule 2a-7. For example, Tether's most recent reserve report shows that it holds a material portion of its reserves in secured loans, Bitcoins, and "other investments" that could include risky assets.[22] USDC in 2023 was holding a substantial portion of its reserves in uninsured deposits in Silicon Valley

https://connect.rightprospectus.com/Schwab/TVT/808524581/SP?site=FundDocs and https://www.sec.gov/ix?doc=/Archives/edgar/data/1810747/000182912625008617/simplifyetf_497.htm#pro1_009). In March, Fidelity Investments announced plans for a MMETF that it expects will transact in cash (see, sec.gov/Archives/edgar/data/917286/000113322825002995/ftdf-efp15119_485apos.htm).

[21] From the perspective of an investor in tokenized MMF shares, most purchases and sales of tokens likely will occur in secondary markets and have no direct effect on the underlying tokenized MMF. Hence, secondary markets for tokens – like those for MMETF shares – offer investors liquidity that does not result from liquidity transformation. Nonetheless, as described above, tokenization does not change liquidity transformation in the MMF itself.

[22] As of June 2025, 20 percent Tether's reserves were comprised of secured loans (6.2 percent), bitcoins (5.5 percent), precious metals (5.4 percent), "Other Investments" (3.0 percent), and corporate bonds (0.01 percent). See, https://tether.to/en/transparency/?tab=reports.

Bank (SVB) when it failed.[23] Such investments, which could quickly become illiquid, would not be allowable for an MMF.

The GENIUS Act introduced restrictions for payment stablecoin reserves that help align the liquidity requirements for those reserves and MMF portfolios. However, important differences remain, and a comparison of reserve liquidity to that in MMF portfolios is mixed. On the one hand, some requirements for payment stablecoins are stricter even than rules for government MMFs. For example, the remaining maturities for Treasury securities held in payment stablecoin reserves cannot exceed 93 days, whereas Rule 2a-7 does not impose maturity restrictions on MMFs' individual Treasury holdings, although it does have limits on portfolio weighted average maturity that payment stablecoins do not face. On the other hand, payment stablecoins have some flexibility not available even to prime MMFs to hold deposits at any insured depository institution, regardless of its short-term liquidity risk profile, and to borrow cash in repo markets. The MMF-stablecoin comparison is also complicated because the GENIUS Act restrictions do not apply to non-payment stablecoins, which could continue to maintain less liquid reserves.

On the liability side of the balance sheet, the comparison of stablecoins to MMFs is also mixed. *Current* stablecoins' flexibility to use fees and other constraints on redemptions, which may mitigate their potential drain on cash, have probably reduced their liquidity transformation somewhat relative to MMFs. For example, Tether has a minimum redemption amount of $100,000 and charges a 0.10 percent redemption fee; Circle, which issues USDC, charges up to a 0.10 percent fee for redemptions exceeding $2 million; and both stablecoins reserve the right to suspend redemptions.[24] Going forward, while the GENIUS Act allows payment stablecoins issuers to maintain redemption fees (with prior notice), it does not provide for suspensions.

[23] Circle reported that $3.3 billion (or 8.3 percent) of its reserves were at SVB. See, https://www.cnbc.com/2023/03/11/crypto-firm-circle-reveals-3point3-bln-exposure-to-silicon-valley-bank.html.

[24] For Tether fees, see https://tether.to/en/fees/. USDC uses a tiered fee structure: redemptions between $2 million to $5 million incur a 0.03 percent fee; those between $5 and $15 million are assessed a 0.06 percent fee; and those over $15 million pay a 0.10 percent fee. See, https://help.circle.com/s/article/USDC-redemption-structure?language=en_US&category=Fees_and_Billing. Regarding suspensions, "Tether reserves the right to delay the redemption or withdrawal of Tether Tokens if such delay is necessitated by the illiquidity or unavailability or loss of any Reserves." See, https://tether.to/en/legal/. USDC states: "Note that in certain circumstances, including, but not limited to, a copy or fork of a USDC Supported Blockchain or the identification of a security issue with a USDC Supported Blockchain, Circle may be forced to suspend all activities relating to USDC." See, https://www.circle.com/legal/usdc-terms.

Similarly, MMFs generally cannot suspend redemptions unless they are closing.[25] One provision for limiting liquidity transformation in MMFs that is not available to stablecoins is the dynamic liquidity fee requirement for institutional prime MMFs.

On net, the degree of liquidity transformation in stablecoins compared to that in MMFs is uncertain. This assessment reflects the fact that the relative liquidity of MMF versus stablecoin assets and liabilities is mixed, the evolving legal landscape for payment stablecoins as regulators propose and adopt rules under the GENIUS Act, and the possibility that non-payment stablecoins will continue to operate without GENIUS Act restrictions.

4.2. Threshold effects

4.2.1 Money market funds

The MMF structure embeds several types of threshold effects that played key roles in the disruptive runs on MMFs in 2008 and 2020. For example, many MMFs maintain stable $1.00 share prices (NAVs) by rounding the per-share market values of their portfolios to the nearest cent. While this fosters MMFs' money-like status in normal times, if market values drop and a fund's NAV no longer rounds up to $1.00, the fund "breaks the buck" as its NAV drops discontinuously. One fund breaking the buck in 2008 contributed to a full-scale run on the prime MMF sector (McCabe, 2010).

In addition, U.S. MMF rules in effect from 2016 to 2023 allowed the funds to impose gates or fees on redemptions if their "weekly liquid assets" fell below 30 percent of assets. When MMFs' weekly liquid assets fell to near 30 percent in March 2020, investors accelerated redemptions to avoid suddenly facing gates or fees (Li, Li, Macchiavelli, and Zhou, 2021). Finally, the closure and liquidation of a distressed MMF can impose very large liquidity costs on investors who do not redeem before the closure, as investors in a closed fund may not only suffer capital losses but also lose access to their money for a prolonged period.[26]

[25] Like other mutual funds, MMFs can only suspend redemptions in limited circumstances specified under the Investment Company Act of 1940.

[26] For example, after its closure in September 2008, the Reserve Primary Fund took several *years* to complete the distribution of its assets to shareholders (McCabe, Cipriani, Holscher, and Martin, 2013).

*4.2.2. **MMETFs.** Threshold effects are **less** than those of MMFs.*

The ETF model substantially mitigates a couple of threshold effects associated with MMFs. First, because ETFs trade at market-based share prices, they do not have the threshold effects associated with the stable, rounded NAVs of MMFs. Second, the option for investors to liquidate shares in the secondary market may be an important "safety valve" that MMFs do not offer. While the closure of an MMF may lock up investors' cash for an extended period, even if an MMETF closes and no longer accepts redemptions, investors may still be able to sell shares in secondary markets to third parties.

*4.2.3. **Tokenized MMFs.** Threshold effects are **similar** to those of MMFs.*

Threshold effects for tokenized MMFs are similar to those of MMFs because the tokens probably pass through key threshold effects in the underlying MMF. Importantly, if underlying MMF shares have stable, rounded NAVs, the threshold effects of the fund "breaking the buck" would also affect the tokens. Moreover, if tokens can be used in ways that MMF shares cannot, such as for collateral in financial transactions, the tokens may amplify disruptions caused by breaking the buck. (In contrast, the MMETF structure appears to be incompatible with a stable NAV in the underlying MMF and hence would not be susceptible to a discontinuous price drop caused by breaking the buck.)

One way in which tokenized MMFs may reduce threshold effects is if tokens can still be sold to third parties in the event that the underlying MMF closes and no longer offers redemptions.

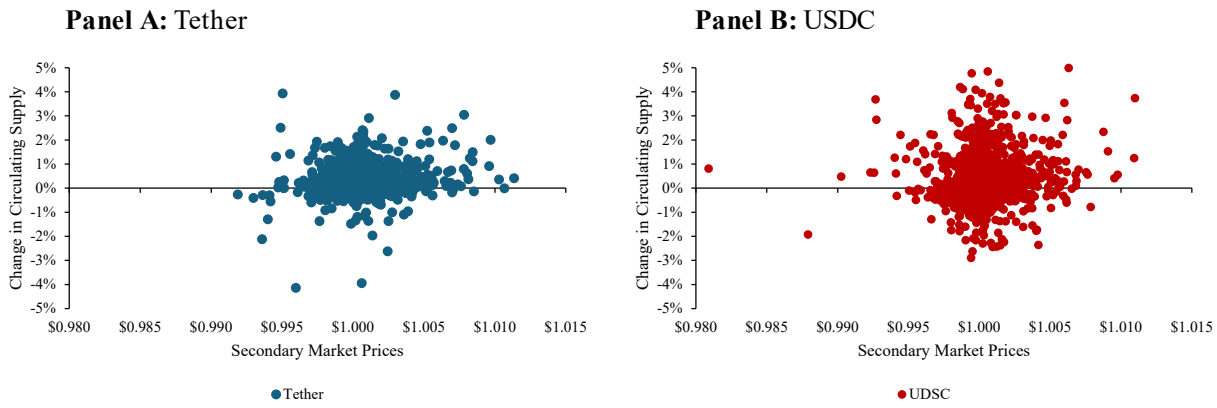
*4.2.4. **Stablecoins.** Threshold effects are **less** than those of MMFs.*

Stablecoins, like MMETFs, have less pronounced threshold effects than MMFs. Because stablecoins currently trade in relatively liquid secondary markets with regularly fluctuating prices, they avoid the thresholds associated with stable, rounded NAVs and may offer some liquidity even in the case of a stablecoin's demise. GENIUS Act provisions, including requirements regarding reserve composition and capital, may strengthen expectations that issuers will maintain payment stablecoin convertibility at a fixed price, but their impact on threshold effects may be muted if secondary markets remain important and liquid.

To be sure, a stablecoin's secondary market price provides information about the functioning and solvency of the stablecoin, and investors could respond to a significant deviation in a stablecoin's price from $1.00 by rushing to redeem it. However, in our framework, such redemptions would be a consequence of threats to a stablecoin's moneyness, rather than a specific threshold effect. Moreover, Figure 5 panels A and B indicate that market prices for Tether and USDC deviate regularly from $1.00 and show no evidence of any threshold effects on redemptions, at least during non-stress periods.

One potentially important threshold for investors in *current* stablecoins is an issuer's decision to suspend redemptions (that is, buybacks of stablecoins directly from investors). A suspension abruptly curtails a stablecoin's primary market liquidity, may lead investors to reassess its moneyness, and may cause a drop in its secondary market price.[27] However, going forward, because the GENIUS Act does not provide payment stablecoin issuers the option of suspending redemptions, it may reduce the significance of this potential threshold effect for payment stablecoins.[28]

Figure 5. Change in Circulating Supply and Market Prices for Tether and USDC



Notes: Data shown are at a daily frequency, from May 2020 through May 2025. The SVB episode is excluded from the analysis. Sources: CoinGecko; authors' calculations.

[27] After SVB's failure in March 2023, Coinbase, which partners with Circle on USDC operations, announced that it was "temporarily pausing" USDC redemptions while banks were closed over the weekend, and USDC's secondary-market price briefly fell to $0.88. See, https://www.coindesk.com/business/2023/03/11/coinbase-pauses-conversions-between-usdc-and-us-dollars-as-banking-crisis-roils-crypto. This price quickly rebounded when Coinbase allowed redemptions to resume following the FDIC's decision to guarantee all SVB deposits on March 13. See, https://www.fdic.gov/news/press-releases/2023/pr23019.html.

[28] The GENIUS Act does allow State and federal regulators to impose limitations on redemptions.

4.3. Moneyness

4.3.1. Money market funds

Sponsors of MMFs have long positioned these funds as money-like products. For example, from their origins in the 1970s, MMFs sought to replicate attributes of bank deposits, such as maintaining a stable value (often a $1.00 share price) and offering check-writing services. MMF shares are a component of the Federal Reserve's money-stock measures and – supported by SEC guidance – are considered cash equivalents. The success of this model has established MMF shares as private money-like assets, but it has also contributed to their vulnerabilities amid stress if investors begin to question their ability to serve as money (see, for example, Gorton, Lewellen, and Metrick, 2012; Gorton, 2017).

Government MMFs are probably more widely viewed as money-like than prime funds, especially since 2016, when SEC rules required prime MMFs sold to institutional investors to have floating NAVs (Baghai, Giannetti, and Jager, 2022). In addition, rules implemented in 2023 require institutional prime funds to charge liquidity fees on days when redemptions are large. In contrast, institutional government MMFs can still have stable NAVs and are not required to have liquidity fees.

*4.3.2. **MMETFs.** Moneyness is **probably less** than that of MMFs.*

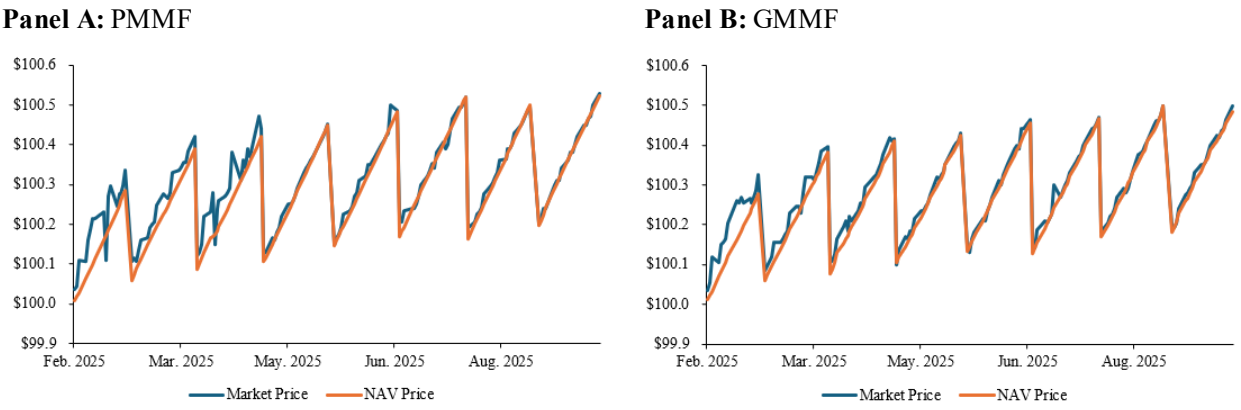
Three properties of MMETFs affect their moneyness in offsetting ways, but, on net, they are probably less money-like than MMFs.

First, the market-based pricing of MMETFs likely *reduces* their moneyness relative to that of government MMFs and retail prime MMFs, which maintain stable, rounded NAVs. As shown in Figure 6, share prices of MMETFs fluctuate routinely, both for the APs that transact directly with MMETFs (at NAV prices) and – more importantly for "moneyness" – for the investors who buy and sell shares in secondary markets.[29] Clearly, these prices are more volatile than the $1.00 share prices that most government MMFs and retail prime MMFs maintain. Even compared to the floating NAVs of institutional prime MMFs, the secondary-market prices of

[29] Figure A-1 in the Appendix shows analogous charts for MMKT, the Texas Capital Government Money Market ETF, SGVT, Schwab Government MMETF, and SBIL, Simplify Government MMETF.

prime MMETFs appear to be more volatile, in part because these market prices deviate from the funds' NAVs, whereas MMFs use their NAVs as prices for all transactions with investors.

Figure 6. Selected MMETFs' Market and NAV Prices



Notes: PMMF is iShares Prime Money Market ETF; and GMMF is iShares Government Money Market ETF.
Source: Bloomberg.

A second property of MMETFs, their intraday liquidity, may *increase* their moneyness relative to that of *some* MMFs, but relative moneyness varies for different MMFs. Investors can buy and sell ETF shares in secondary markets whenever markets are open. In contrast, intraday liquidity varies for MMFs: Some can only be purchased or redeemed once per day, but others offer hourly redemptions and sales, and some also offer same-day settlement, so intraday trading for ETFs may not enhance moneyness relative to those MMFs.

A third property of MMETFs that may *increase* their moneyness relative to that of MMFs is transferability. MMF transactions are conducted exclusively through the fund or its distributors and transfer agents; investors cannot transfer shares to third parties. ETF shares, in contrast, are routinely purchased and sold in secondary-market transactions with third parties. This transferability facilitates the moneyness of MMETFs, which might serve money-like functions that MMFs do not have. For example, MMETFs could, in principle, be used to satisfy margin requirements, although this particular benefit may be limited by sizable haircuts for ETFs pledged as margin.[30]

[30] For example, according to CME Group, short-term government ETFs currently face haircuts of roughly 3 percent, which is high for a cash-management product (see, https://www.cmegroup.com/solutions/clearing/financial-and-collateral-management/acceptable-collateral.html).

On net, given the observed volatility of MMETF share prices, the somewhat mixed relative improvement in intraday liquidity for MMETFs, and the apparent limitations on their use for margin, these products are likely to be less money-like than MMFs.

4.3.3. Tokenized MMFs. *Moneyness is* ***less*** *than that of MMFs but has the potential to be greater than that of MMFs.*

The relative moneyness of tokenized MMFs depends largely on whether tokenized MMF transactions can be used to transfer ownership of the underlying MMF shares. At present, such transfers are logistically cumbersome despite blockchain technology facilitating instantaneous token transfer.[31] However, if tokenized MMF transactions can be used to transfer ownership of the underlying MMF shares, the tokens could become more money-like than the underlying MMF shares. Tokens could offer payment and liquidity options unavailable to shareholders in MMFs (or MMETFs), such as low-cost, round-the-clock payments with instantaneous settlement, a function that would facilitate service as medium of exchange. In addition, tokenized MMF shares could potentially serve as collateral in both traditional finance and digital asset trading.[32]

In the absence of mechanisms for transferring ownership of the underlying MMF shares, tokenized MMFs would remain less money-like than MMFs, as token prices may deviate from those of the underlying MMF. Hence, their prices are less stable than those of MMFs, particularly those of government MMFs and retail prime funds, which have stable, rounded NAVs.

4.3.4. Stablecoins. *Moneyness is* ***likely similar*** *to that of MMFs.*

Like other novel money-like products, stablecoins have properties that could both increase and reduce their moneyness relative to that of MMFs. The moneyness of *current* stablecoins is diminished somewhat by their fluctuating secondary market prices, their flexibility

[31] Currently, tokenized MMFs must first be redeemed with the issuer and then reissued to the new holder. However, in a February 2025 statement, SEC Commissioner Hester Pierce, who leads the SEC's Crypto Task Force, noted that one priority for the Task Force is to "work [on regulatory challenges related to transfers] with market participants interested in tokenizing securities . . . to modernize traditional financial markets." See, https://www.sec.gov/newsroom/speeches-statements/peirce-journey-begins-020425.

[32] To the extent that tokenized MMFs take on these money-like roles, they also may extend the reach of MMFs in the financial system and amplify the disruptive impact of MMF vulnerabilities in a stress event.

to suspend (gate) redemptions, and the absence of a legal framework.[33] At the same time, investors can purchase or liquidate stablecoins 24/7 with instantaneous settlement, which boosts moneyness.

The GENIUS Act will likely increase payment stablecoin moneyness by putting in place a legal framework for these products, imposing risk-mitigating requirements for reserve assets and capital, curtailing flexibility to suspend redemptions, and perhaps reducing volatility of their secondary market prices. In addition, GENIUS Act provisions likely will bolster payment stablecoins' liquidity, expand their payment functions, and foster their use as collateral in financial transactions – all of which should bolster moneyness.[34]

To be sure, current stablecoins are already used for a broad range of money-like functions within the digital asset ecosystem, and their moneyness there appears to be evolving quickly. Issuers are investing in tools and partnering with payment processors to facilitate use of stablecoins to make retail payments.[35] Notably, stablecoins are used as the clearing asset and a medium of exchange for decentralized finance (DeFi) platforms.[36] On DeFi exchanges and other crypto venues, the money-like functions of stablecoins appear to accord them a NQA status among participants. Indeed, perceived threats to this NQA status, such as concerns about USDC's exposure to SVB in March 2023, have led to sharp investor reactions consistent with a reassessment of stablecoin moneyness. Figure 7 shows that following Circle's March 10 announcement that USDC had a $3.3 billion (8 percent of assets) exposure to SVB, the price of USDC briefly plummeted and investors redeemed it aggressively.

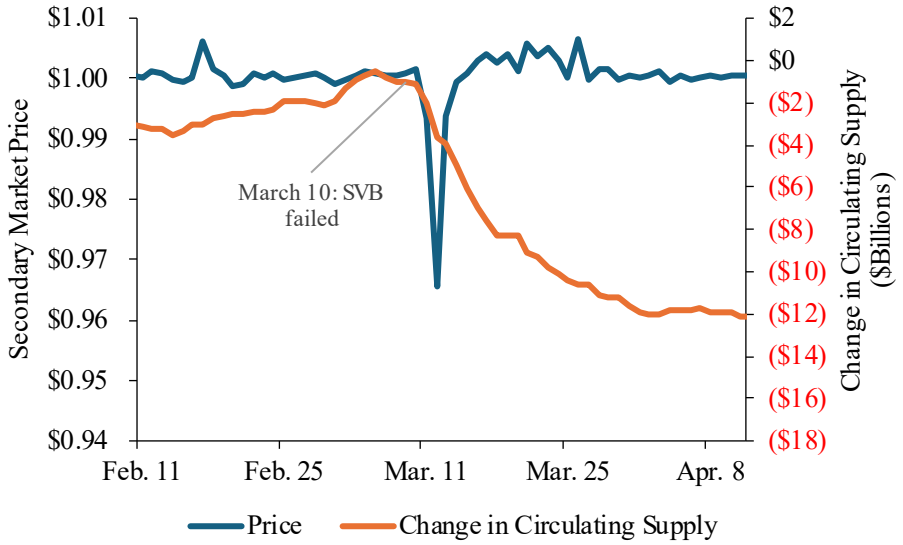
[33] As noted above, MMFs can only suspend redemptions in limited circumstances specified under the Investment Company Act of 1940.

[34] See, for example, "Acting Chairman Pham Launches Tokenized Collateral and Stablecoins Initiative," Commodity Futures Trading Commission Release Number 9130-25, September 23, at https://www.cftc.gov/PressRoom/PressReleases/9130-25.

[35] See, for example, the recently announced partnerships between Coinbase and Shopify (https://www.coinbase.com/blog/coinbase-and-shopify-bring-usdc-payments-on-base-to-millions-of-merchants-worldwide) and Stripe and Shopify (https://stripe.com/newsroom/news/shopify-stripe-stablecoin-payments), both of which will allow consumers to pay with USDC.

[36] For example, in 2024, roughly two-thirds of stablecoins transactions were for DeFi- and trading-related activities (Das, 2025).

Figure 7. USDC's Circulating Supply and Market Prices around March 2023



Notes: Data shown are at a daily frequency and do not show that USDC's price fell to an *intraday* low of $0.88 on March 11, 2023. Source: CoinGecko.

4.4. Contagion effects

4.4.1. Money market funds.

Vulnerabilities in MMFs are exacerbated by contagion risks that stem from the similarities of their portfolios. MMF regulations require the funds to hold only the obligations of the U.S. government and firms and municipal issuers in the highest tiers of investment-grade credit quality, and ratings-agency guidelines reinforce the effects of regulations. Since there are relatively few firms with such ratings that also issue short-term instruments, MMFs tend to hold obligations of the same issuers, and the funds' portfolios have a high degree of similarity (Financial Stability Oversight Council, 2012). Hence, stress in one MMF may rapidly erode the moneyness of other MMFs.

During the 2008 run on prime MMFs, redemptions surged after one fund announced that it had broken the buck (McCabe, 2010; Schmidt, Timmerman, and Wermers, 2016). In addition, substantial portfolio overlaps and large market footprints – combined with the very limited capacity of short-term funding markets to absorb secondary-market sales – imply that when MMFs are subject to a common liquidity shock they are likely to face acute challenges in disposing of their assets to meet redemptions (Baes, Bouveret, and Schaanning, 2021).

Cross-product contagion effects. The interconnections among novel money-like products create additional channels for *cross-product* contagion – that is, channels by which strains for one product can cause stress for another, even absent new information regarding the latter. As an example, we note below that declines in market prices for MMETFs and tokenized MMFs may signal mispricing of MMF shares and prompt redemptions (this risk is likely more salient for prime MMFs, as they tend to be more vulnerable than government MMFs).

We contrast these cross-product contagion effects with broader spillover effects, such as links among money-like products, the markets for reserves they hold, and other money-like products that hold those reserves. Although a range of potential spillovers may be important in the transmission of financial stress, they are largely outside the scope of our framework.

*4.4.2. **MMETFs.** Contagion effects are **greater** than those of MMFs.*

Since MMETFs are subject to the rules that govern MMFs, these ETFs are also likely to be susceptible to the contagion effects that arise in MMFs because of the similarity of their portfolios.

As noted above, MMETFs may exacerbate *cross-product* contagion effects in MMFs during episodes of stress by providing secondary-market pricing information that MMF investors could see as a signal to redeem because their shares may be overvalued. This is a concern both for MMFs that maintain stable NAVs and for those that have floating NAVs. Substantial declines in the market prices of government or prime MMETFs could indicate that the market values of the portfolios of stable-value MMFs holding similar assets have fallen below their rounded $1.00 NAVs. That may prompt investors in those MMFs to redeem, even absent new information about specific MMFs or their portfolio holdings.

Even among investors in floating-NAV (institutional) prime MMFs, ETF prices can be informative, because real-time valuation of prime funds' portfolio assets – especially private debt instruments like CP and NCDs – is hampered by a lack of secondary-market prices (Financial Stability Board, 2021). Hence, a drop in the market price of a prime MMETF relative to its NAV may be seen as evidence that valuations for MMF portfolio assets – which are used to compute

NAVs – are inflated. That could lead prime MMF investors to redeem quickly because their funds' floating NAVs are too high.[37]

*4.4.3. **Tokenized MMFs.** Contagion effects are **greater** than those of MMFs.*

Contagion effects in tokenized MMFs are likely to be similar to those in MMETFs. The MMFs that underlie tokens – like MMETFs – are governed by MMF rules and hence are also subject to the contagion effects that arise from the similarity of MMF portfolios. Moreover, MMF tokens may exacerbate cross-product contagion effects in MMFs in the same way that MMETFs do: Declines in prices for MMF tokens could provide destabilizing signals to investors in MMFs. In addition, the transfer of tokenized MMFs shares for less than NAV may create an arbitrage opportunity (buy cheap tokens, convert them to MMF shares, redeem them for NAV) that would add redemption pressure on the underlying MMF.

*4.4.4. **Stablecoins.** Contagion effects are **likely similar** to those of MMFs.*

The stablecoin industry currently exhibits substantial heterogeneity – for instance, even among reserve-backed stablecoins, the composition of reserves varies considerably. This heterogeneity likely dampens contagion risks. To be sure, stress at one stablecoin issuer still *can* spill over to others, even if their reserve compositions and business models differ significantly. For example, the collapse of TerraUSD, an algorithmic stablecoin, led to redemptions at Tether, a reserve-backed stablecoin (see, for example, Yip, 2022; De Blasis, Galati, Webb, and Webb, 2023). Even so, these correlated outflows have been far less severe and damaging than the broad contagion-driven runs on MMFs, which threatened virtually the entire institutional prime MMF sector before official-sector interventions.

Notwithstanding the dampening effects of heterogeneity on contagion effects, the current concentration of the stablecoin industry means that problems at one large issuer may put a substantial share of the sector's assets at risk.[38]

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[37] On ETF market prices and staleness of NAVs, see, for example, Aramonte and Avalos, 2020.

[38] In addition, the interconnections between stablecoins and other money-like products that arise because stablecoins hold these products – particularly MMFs – as reserve assets may amplify cross-product spillovers. As noted above, these types of spillover effects, while potentially very important for understanding broader financial vulnerabilities, are outside the scope of the framework we present.

The legal framework created by the GENIUS Act is likely to bring about some standardization of payment stablecoins that could – even as it dampens many risks – make them more similar to one another. Hence, contagion risks in payment stablecoins may increase and become more like those of their MMF counterparts.

4.5. Reactive investor bases

4.5.1. Money market funds

Historically, institutional investors have proven to be highly reactive to stress in MMFs – much more so than retail investors. Redemptions from institutional MMFs during the runs in September 2008 and March 2020 far exceeded those from retail funds, and MMF redemptions amid the European debt crisis in 2011 came overwhelmingly from institutional MMFs (Baba, McCauley, and Ramaswamy, 2009; President's Working Group (PWG), 2010 and 2020; McCabe, 2010; Chernenko and Sunderam, 2014; Schmidt, Timmerman, and Wermers, 2016; Cipriani and La Spada, 2024).

Greater reactivity among institutional investors may arise because they have more resources to monitor MMFs for problems and face stronger incentives to avoid losses, since losses may expose institutional investors with fiduciary responsibilities to legal liability and jeopardize careers of professional cash managers (McCabe, 2010). Even among institutional investors, the largest were particularly prone to run in March 2020 (Avalos and Xia, 2021). Moreover, institutional investors may be more likely to see MMF shares as safe and money-like relative to deposits (which for large institutions are mostly uninsured), so these investors may react especially badly to developments that erode MMFs' money-like status. The greater risk that institutional investors pose for MMFs led the SEC in 2014 and in 2023 to adopt substantially more stringent reform measures for institutional MMFs than for retail funds.[39] (To be sure, evidence from March 2020 suggests that retail investors may be becoming more run prone; see, PWG, 2020 and Anadu, Levin, Lu, Malfroy-Camine, and Oefele, 2025.)

[39] The SEC in 2014 required that institutional prime funds have floating NAVs, while retail funds could continue to maintain stable, rounded $1.00 share prices. In 2023, the SEC adopted a requirement that institutional prime MMFs charge liquidity fees on days when they have large redemptions, but retail prime funds are exempt from this mandate.

*4.5.2. **MMETFs.** Investor reactivity is **probably less** than that of MMFs.*

As government MMETFs have floating prices, they are less likely to attract highly risk-averse institutional investors that currently hold stable-NAV government MMFs.

It is possible that the intraday liquidity of prime MMETFs will be attractive to some institutional investors who currently hold floating NAV prime MMFs, which could make the investor base for prime MMETFs more like that of institutional prime MMFs. That said, reactive investors may pose lower risk to an MMETF than such investors in an MMF, as most investor ETF transactions will be in the secondary market.[40]

*4.5.3. **Tokenized MMFs.** Investor reactivity is **uncertain** – it may be greater or less than that of MMF investors.*

Much like MMETFs, tokenized MMFs have features that could enhance or diminish their use by highly risk-averse reactive investors. For example, market-based prices are likely to reduce investor reactivity, whereas 24/7 liquidity probably increases it. Notably, at present, institutional investors represent a large share of the ownership of tokenized MMFs.[41] Some potential uses of MMF tokens, particularly as margin, would probably increase investor reactivity.

Tokenized MMF investor reactivity – like reactivity among MMETF investors – would only indirectly affect underlying MMFs. Sales of MMF tokens do not directly pressure the MMF to sell assets, but rapid conversion of tokens to MMF shares and liquidation of the shares could amplify stress in the same way that other MMF redemptions can.

The potential use of MMF tokens for margin and collateral could, amid stress events, have an additional benefit related to investor reactivity. Amid the market turmoil in March 2020, a large share of the redemptions from euro-denominated MMFs appear to have been triggered by investors raising cash to meet margin calls (Ghio, Rousová, Salakhova, and Villegas Bauer,

[40] Because MMETF investors other than APs do not transact directly with the fund, investor reactivity is likely less consequential for these ETFs than it is for MMFs. The main concern is that investors rapidly selling MMETF shares would cause steep discounts (of market prices to NAV) that could prompt redemptions by APs, and, as discussed in section 4.4.2, redemptions from MMFs.

[41] According to Crane Data, as of September 2025, FOBXX (BENJI), a government institutional fund, was the largest tokenized MMF, followed by WTGXX, a government retail fund, and FYHXX (FDIT), a government institutional fund.

2023). If these investors had been able to post MMF tokens as margin, they would have had no need to redeem MMF shares to meet margin calls; instead, they could have posted more tokens. More broadly, if MMF tokens can perform cash-like functions that MMF shares cannot, investors may face fewer pressures to redeem MMFs for cash in episodes of stress. This benefit would be more significant for tokenized prime MMFs than for tokenized government funds (since the illiquidity of some prime MMF assets leaves them more susceptible to redemptions), although tokenization of prime funds also raises concerns about amplifying prime MMFs' greater vulnerabilities.

4.5.4. Stablecoins. *Investor reactivity is* ***similar*** *to that of MMF investors.*

Investors' loss of confidence in some stablecoins – including reserve-backed and other stablecoins (such as TerraUSD, which collapsed in May 2022) – has led to rapid liquidations that suggest that stablecoin investors can be quite reactive.[42] Moreover, Anadu, Azar, Cipriani, Eisenbach, Huang, Landoni, La Spada, Macchiavelli, Malfroy-Camine, and Wang (2023) document flight-to-safety dynamics in stablecoins that are like those in MMFs: During periods of crypto-market stress, investors tend to redeem from riskier stablecoins into those they perceive as less risky.[43]

As noted above, GENIUS Act provisions are likely to bolster the moneyness of payment stablecoins, including by putting in place a legal framework with requirements for reserve assets and capital, increased transparency, a constraint on issuers' ability to suspend redemptions, and expanded payment functions. In turn, greater moneyness is likely to boost demand for payment stablecoins by reactive investors.

5. Conclusion: Looking Ahead

The novel products we examine continue to evolve, so both their benefits for investors and their future effects on financial stability remain highly uncertain. In addition, the extent to

[42] As Figure 7 above demonstrates, news of USDC's exposure to SVB in March 2023 caused rapid redemptions, suggesting reactive investors. In addition, research on the TerraUSD collapse in general suggests investors being quite reactive. See, for example, Anadu et. al (2023), Liu et. al (2023), Azar et. al (2024) and Watsky et. al (2024). In addition, Adams and Ibert (2022) describe high reactivity during the collapse of the stablecoin IRON on the Polygon blockchain in mid-June 2021.

[43] Oefele, Baur, and Smales (2024) also find similar flight-to-safety dynamics in stablecoins during the regional banking crisis in March 2023.

which they exhibit features that contribute to vulnerabilities will change, and forecasts of non-structural features are especially challenging. Notwithstanding this shifting landscape, our framework should continue to provide a systematic approach to assessing their potential vulnerabilities. Moreover, the framework can be extended to other new products, such as tokenized private funds, and even – perhaps with some modifications – to tokenized bank deposits.[44]

Although our analysis does not provide a ranking of vulnerabilities in the novel products we assess, it does provide insights about what to watch as products develop:

MMETFs. While they are still quite new, MMETFs combine two familiar products, MMFs and ETFs, both of which are subject to well-established legal frameworks. A key question in assessing vulnerabilities in MMETFs, relative to those in MMFs, is whether the ETFs redeem in-kind, because in-kind redemptions diminish liquidity transformation and could reduce vulnerabilities substantially.[45] In addition, it is useful to note that if MMETFs that redeem at least partly in kind were to *replace* MMFs, the net effect likely would be a reduction in aggregate vulnerabilities – but as long as MMFs remain sizable, the cross-product contagion effects of MMETFs likely add to vulnerabilities.

Tokenized MMFs. A pivotal issue for MMF tokens is transferability, because the benefits and money-like uses of MMF tokens could expand very significantly if movement of tokens could broadly effect the transfer of MMF share ownership without any prearrangements between the fund and those who are moving the tokens. If so, a key financial stability concern would be that greater use of tokens throughout the financial system – for example, as collateral and for margin – would amplify the repercussions of existing vulnerabilities in MMFs. Because prime funds are more vulnerable, another important issue for tokenized MMFs is whether the

[44] Tokenized bank deposits (TBDs) are digital representations of a bank's existing deposit liabilities on a private or public blockchain. Our framework is designed for assessing vulnerabilities in nonbank money-like products backed by portfolio or "reserve" assets, whereas TBDs are just one part of a bank's liabilities, which complicates assessments of TBDs. One approach to using our framework would be to compare TBD features to those of traditional deposits, particularly uninsured deposits, rather than to MMFs. For example, TBDs, like other deposits, are a key component of banks' liquidity transformation activities and would have threshold effects like those of other deposits. Tokenization could make TBDs more money-like than traditional deposits because they would be easily transferable on a 24/7 basis with instant settlement. Proceeding in this manner, we could use the framework to provide a useful comparison of the vulnerabilities of TBDs and traditional deposits.

[45] However, as noted above, in-kind redemptions are challenging for MMFs, in part because of their heavy use of repo, which cannot be easily transferred to new owners. The MMETFs introduced so far mostly use cash redemptions.

underlying fund is a prime or government MMF; amplifying prime MMFs' vulnerabilities is far more concerning. (That said, even government MMFs have some susceptibilities, in part because of their perceived moneyness, threshold effects, and reactive investors.)

Stablecoins. Stablecoins are already growing rapidly, and GENIUS Act provisions are likely to cause significant shifts in the stablecoin sector and could accelerate its expansion. Our framework suggests some developments to watch as the sector changes. Key questions include the extent to which investors use non-payment stablecoins and how they evolve, whether institutional investors adopt payment and non-payment stablecoins as cash-management vehicles, and the liquidity and credit risks in reserve assets held by both types of stablecoins. That said, some questions that may be relevant to financial stability are outside the scope of our framework, such as the use of payment stablecoins in the payments system and the linkages between stablecoins and depository institutions.

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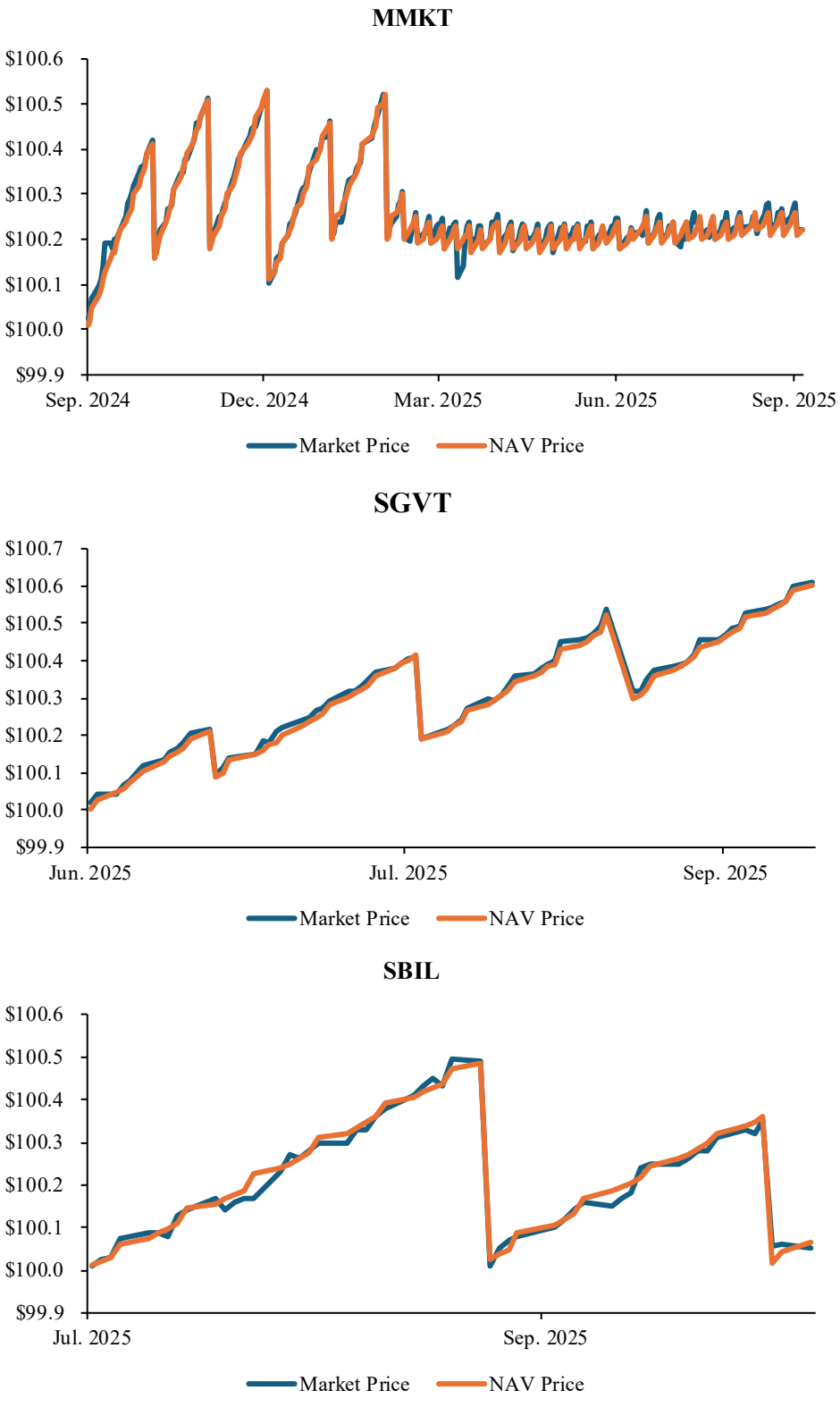
Appendix

Table A-1. Summary of comparisons of features of money-like products to those of MMFs

	MMETFs	Tokenized MMFs	Stablecoins (SCs)*
Liquidity Transformation (LT)	**Similar to MMFs** • In-kind redemptions *could* reduce LT • But all MMETFs currently use cash redemptions	**Similar to MMFs** • LT is similar to that of underlying MMFs	**Uncertain** • Illiquid reserve assets boost LT while redemption fees and suspension options reduce LT • GENIUS Act broadly aligns payment SC asset and redemption policies with MMFs
Threshold Effects	**Less than MMFs** • Trade at market-based prices (not a stable NAV) • Secondary market is a liquidity safety valve	**Similar to MMFs** • Pass through key threshold effects of underlying MMFs • Secondary market could be a liquidity safety valve	**Less than MMFs** • Most trades are in secondary markets with regularly fluctuating prices • Redemption suspensions are a threshold now although GENIUS Act reduces flexibility for suspensions in payment SCs
Moneyness	**Probably less than MMFs** • Market pricing reduces moneyness • Intraday liquidity, transferability may increase it somewhat	**Less than MMFs** • Market pricing of tokens reduces moneyness • If tokens could be used to transfer MMF ownership, they'd be *more* money-like	**Likely similar to MMFs** • Market pricing likely reduces moneyness • Absence of legal framework likely reduces moneyness in current SCs and for non-payment SCs, but GENIUS Act introduces such a framework for payment SCs
Contagion Effects	**Greater than MMFs** • Falling prices may be signal for MMF investors to redeem (cross-product contagion)	**Greater than MMFs** • Falling prices may be signal for MMF investors to redeem (cross-product contagion)	**Likely similar to MMFs** • Heterogeneity in SCs likely reduces contagion effects, although high concentration may contribute to transmission of stress • GENIUS Act standardization may increase similarity of payment SCs and boost contagion effects
Reactive Investors	**Probably less than MMFs** • Government MMETF floating NAVs unlikely to attract reactive investors • Intraday liquidity of prime MMETFs may attract some reactive investors	**Uncertain** • Fluctuating prices for government MMF tokens unlikely to attract reactive investors • Enhanced liquidity of prime MMF tokens may attract reactive investors • Ability to post tokens as collateral may reduce reactivity	**Similar to MMFs** • Fluctuating prices and absence of legal framework are likely unattractive to reactive investors • GENIUS Act standardization and protections for payment SCs are likely to make them more attractive

* For the purposes of illustrating our framework, our high-level assessment covers current, GENIUS Act payment, and non-payment stablecoins, although the degree to which they have features that may contribute to vulnerabilities varies considerably.

Figure A-1: Market and NAV Prices for Other MMETFs



Notes: MMKT is Texas Capital Government Money Market ETF, SGVT is Schwab Government Money Market ETF, and SBIL is Simplify Government Money Market ETF. Source: Bloomberg