INTERNATIONAL MONETARY FUND

From Par to Pressure: Liquidity, Redemptions, and Fire Sales with a Systemic Stablecoin

Marco Gross and Richard Senner

WP/26/5

2026
JAN

WORKING PAPER

 WP/26/5

IMF Working Paper
Monetary and Capital Markets Department

From Par to Pressure: Liquidity, Redemptions, and Fire Sales with a Systemic Stablecoin

Prepared by Marco Gross and Richard Senner

Authorized for distribution by Marcello Miccoli
January 2026

ABSTRACT: Fiat-backed stablecoins are expanding, and their issuers may attain systemic relevance as reserve portfolios grow and as they may become increasingly intertwined with financial markets. This paper analyzes the resulting risks and the design choices that can mitigate them. A detailed financial-economics discussion forms the core of the paper. It is paired with a model that captures the feedback loop between a systemic stablecoin and financial markets: redemptions deplete reserves, may prompt asset sales, depress bond market prices, thereby erode a stablecoin issuer's solvency, and in turn trigger further redemptions. The model links design dials—capital and liquidity buffers, reserve composition, redemption gates, and others—to outcomes such as run frequency, fire sale intensity, and bond market volatility. The economics discussion and model analysis conclude that robust prudential design can substantially stabilize stablecoins and their surrounding market environment.

RECOMMENDED CITATION: Gross, M., and Senner, R. 2026. "From Par to Pressure: Liquidity, Redemptions, and Fire Sales with a Systemic Stablecoin." IMF Working Paper No. 26/5, International Monetary Fund, Washington DC.

JEL Classification:	E41, E42, E52
Keywords:	Stablecoins, systemic liquidity, global financial stability, sovereign-stablecoin nexus
Author's E-Mail Address:	mgross@imf.org, richard.senner@snb.ch

* In addition to this disclaimer, a second one pertains to one of the authors of this paper who is affiliated with the Swiss National Bank (SNB): The views, opinions, findings, and conclusions or recommendations expressed in this paper are strictly those of the authors. They do not necessarily reflect the views of the SNB. The SNB takes no responsibility for any errors or omissions in, or for the correctness of, the information contained in this paper.

WORKING PAPERS

From Par to Pressure: Liquidity, Redemptions, and Fire Sales with a Systemic Stablecoin

Prepared by Marco Gross and Richard Senner **

** Thanks to the participants of an IMF-internal seminar in December 2025 and specifically to Mahmoud Abouelmakarem, Ulrich Bindseil, Mario Catalan, Pornpinun Chantapacdepong, Alex Copestake, Sonja Davidovic, Kazuhiro Hiraki, Phakawa Jeasakul, Jakree Koosakul, Gian-Piero Lovicu, Yiran Li, Tommaso Mancini Griffoli, Carolina Melches, Marcello Miccoli, Kleopatra Nikolaou, John Ralyea, Edona Reshidi, André Reslow, Qiuyun Shang, Richard Stobo, Andrew David Usher, Jeanne Verrier, and Bo Zhao for useful discussions, inputs, comments, and suggestions. The codes associated with the model presented in this paper are accessible through the IMF webpage: https://www.imf.org/-/media/files/publications/wp/2026/datasets/wp265.zip

Contents

1. Introduction

Stablecoins (SCs) may have the potential to move from a niche crypto tool to a mainstream means to hold and move monetary value. This development applies specifically to SCs backed by financial assets closely tied to fiat currency, while unbacked and algorithmic designs keep proving inherently unviable (for the defining features of different forms of SCs see Annex 2). Fiat-backed SCs appear to be increasingly used for cross-border payment flows—not just crypto trading.[1] As issuers grow, they would hold more sizeable pools of financial assets (deposits, short-term sovereign bonds, reverse repo lending), increasing their footprint in financial markets. This raises questions and concerns about their resilience and interplay with markets, and hence the question of how to ensure their stability and that of the (global) financial system that it would be embedded in. Figure 1 collects some selected data to corroborate the relevance of SCs at present.

Large-scale SCs would introduce a new conduit for liquidity pressure and runs to spill over into capital markets, especially sovereign bond markets. As fiat-backed coins would scale, their reserve portfolios link user redemptions to bond market liquidity and yields, creating liquidity dynamics and run risks similar to those facing money market funds (MMFs)—but operating 24/7/365, cross-border, and at near-instant speed. This would amplify classic concerns—first-mover advantage, fire sales, and dilution of remaining holders—while raising also new ones around market impact, digital currency substitution, and monetary sovereignty and transmission, if large foreign-denominated coins would take root. Regulation is nascent, evolving, and heterogeneous, and policy design choices (reserve quality, redemption frictions, backstops, disclosure) have yet to take shape.

SCs' potential for systemic importance can be examined through the lens of the Financial Stability Board's (FSB) criteria for identifying Global Systemically Important Banks (G-SIBs). The criteria include size, interconnectedness, substitutability, cross-jurisdictional activity, and complexity (BCBS, 2018; FSB, 2024a). Although SC issuers are not banks (or even if bank subsidiaries are established to issue SCs, they remain an activity that is separate from bank business), these criteria can be used to judge an SC issuer's characteristics. That is, SCs may reach considerable size, become deeply connected with the financial system through direct and indirect channels, and attain relevance regarding substitutability, if they become integral to payment activities. Their cross-border reach is inherent, and while their balance sheet structures may appear relatively simple, overall complexity may rise, e.g., if compounded by a diversity of entities involved and their integration with the crypto ecosystem or when bank subsidiary structures emerge.

Against this combined backdrop, this paper discusses the financial economics of a fiat-backed SC of a hypothetical systemic scale.[2] The conceptual discussion will place emphasis on interconnectedness with other financial market entities, forms of credit, market, and liquidity risk, and a run–fire-sale–market feedback that a systemic SC may cause, all with a domestic and global perspective. In addition, we discuss beyond-short-term cyclical and structural consequences such as changing sovereign debt maturity structure, a growing sovereign-stablecoin nexus, and digital currency substitution. The conceptual treatment will be supported by a simple, structural model of a systemic SC issuer that holds bonds and cash reserves, which serves to analyze how "design dials" map to outcomes. "Design dials" include, for example, liquidity requirements (including reserve

[1] Use cases appear to keep developing: Visa announced in April 2025 a cooperation with Stripe's Bridge which would allow SC-anchored Visa card payments, at any merchant locations where Visa payments are feasible. Bridge/Stripe offer the "stablecoin sandwich" scheme, a global settlement system for multinational firms. Finastra announced in August 2025 a collaboration with Circle, allowing banks to integrate USDC settlements for conducting cross-border payments. Swift announced in Sep-2025 that it plans to develop a shared digital ledger with a group of international banks to conduct real-time 24/7 cross-border payments. It will be useful to compile and analyze more data to understand the precise use cases of SCs.

[2] The discussions pertaining to the SC balance sheet structure and related risks—without the interplay with surrounding markets—applies to smaller size SCs as well, which one would not consider systemic.

levels, composition, and quality), redemption limits, and solvency requirements. Outcomes include redemption frequency and intensity, fire sale frequency and intensity, and bond market volatility and yield shifts.

The conceptual discussion, corroborated by the model-based simulation results, suggests how regulatory design features can support the resilience of a systemic SC and its market environment. The policy question we ask is: what prudential features make a systemic SC behave like a safe form of money (whether for payment flow or store-of-value purposes), to thereby support domestic and global financial stability? The design choices we consider and analyze with the model include:

- **Capital requirements** raise the SC issuer's asset–liability ratio above unity, thus lowering the likelihood of de-pegging, redemptions, fire sales, and adverse market feedback. This protection works on the likelihood and severity margin and makes solvency requirements a potent headline design choice. Asset-liability ratios above unity could be achieved by reinvesting bond interest income proceeds, to let the market value of the bond portfolio exceed liabilities.
- **Cash reserve requirements** in isolation would not alter the probability of redemptions much, but when they do occur, higher cash reserves absorb them first, so fewer bonds need to be sold, thus mitigating adverse market feedback. Further, a higher cash reserve share lowers the SC issuer's bond market footprint and thereby reduces fire sale-induced price impacts through this channel as well.
- **Redemption gates** reshape the temporal profile of outflows. This gives markets space to digest bond sales and policymakers time to possibly intervene. Moreover, staggered liquidations can imply that non-fundamentals-driven panic dynamics may be dampened, thereby possibly reducing adverse feedback for the SC issuer and the market. They may, however, also spur pre-emptive redemption dynamics, when investors anticipate the activation of gates and seek to redeem ahead of binding constraints.

Taken together, these findings point to a complementary role of such design choices: capital (excess assets) reduce the likelihood and severity of instability likely most potently, cash reserves further reduce the likelihood of bond sales and associated adverse market feedback, and redemption gates or similar measures help flatten the liquidity pressures if they were to occur.

The paper is structured as follows. Section 2 reviews the emerging literature on SCs. Section 3 provides the conceptual discussion of the financial economics of SCs. Section 4 presents the model and all counterfactual design simulations. Section 5 provides detailed design considerations. Section 6 concludes. Annex 1 compares SCs with MMFs, Annex 2 outlines alternative technical SC formats and their economic logics, and Annex 3 contains further model details.

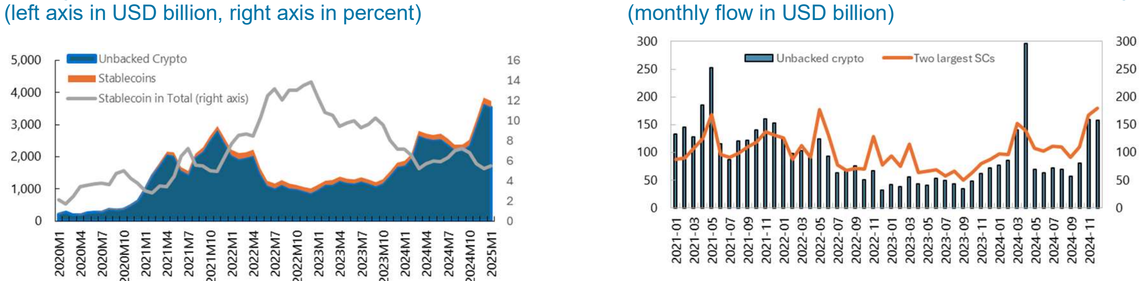
Figure 1. Stablecoin and Crypto Market Developments

Stablecoin shares in total crypto market size remain small.

[A] Crypto Market Size
(left axis in USD billion, right axis in percent)

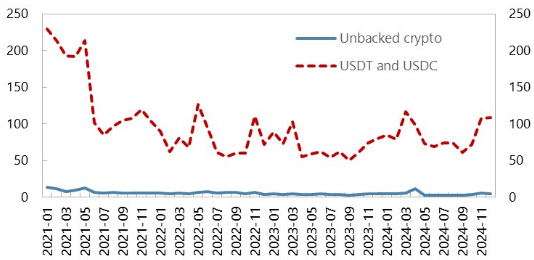
Despite the smaller holding share, cross-border stablecoin flows are at levels comparable to unbacked crypto.

[B] Cross-Border Flows of SCs and Unbacked Crypto
(monthly flow in USD billion)



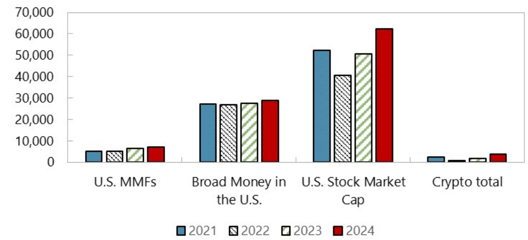
SCs exhibit a much higher implied velocity, indicating their use as transaction conduits rather than store of value.

[C] Implied Velocity (Cross-Border)
(percent; monthly cross-border flow over 2-month av. holdings)



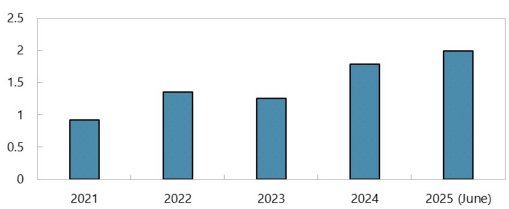
With a U.S. perspective, crypto total market shares start coming closer to U.S. MMFs.

[D] Crypto Balances in U.S. Perspective
(USD billion, end-year)



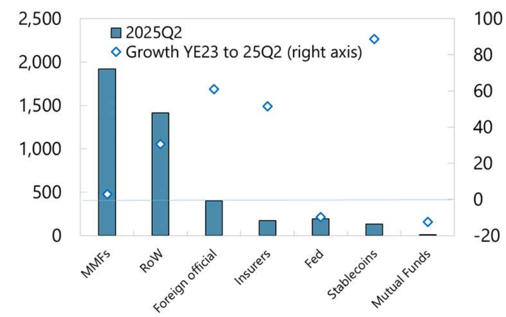
The largest stablecoin issuers' holding share in U.S. treasury bills is growing, at 1.7 percent by mid-2025.

[E] Largest Stablecoins' Treasury Bill Holdings in Total Treasury Bills
(percent, end-year)



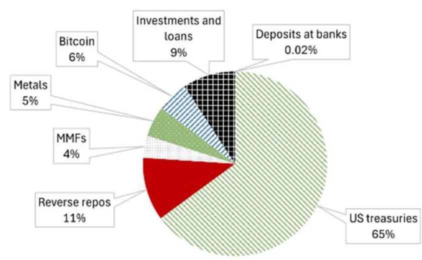
MMFs hold the most sizeable share of treasury bills, with SC issuers' holdings being small but growing fast.

[F] Holders of U.S. Treasury Bills
(USD billion on left axis, percent on right axis)



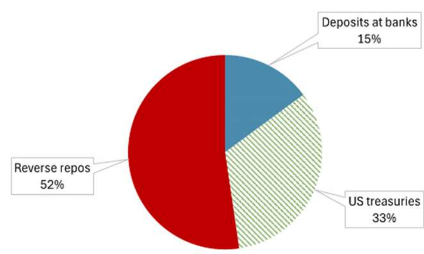
The largest SCs' asset composition comprises short-term bonds, reverse repo exposures, MMF holdings, and others.

[G] USDT's Asset Composition
(percent of total, end-June 2025)



The second largest SC holds short-term sovereign bonds, reverse repos, and a more sizeable share of deposits.

[H] USDC's Asset Composition
(percent of total, mid-September 2025)



Sources: Author calculations based on data from CoinGecko [A,C,D], Chainalysis and Reuter (2025) [B], Financial Stability Board [C], Federal Reserve Board [E,F], Bloomberg [D], Tether's USDT financial report [G], and Blackrock's USDC report [H]. The chart in panel F was also shown in IMF (2025), the Global Financial Stability Report (GFSR), see Fig. 1.20 therein.

Note: The SC market shares of the currently two largest SCs (USDT in [G] and USDC in [H]) are 64 and 22 percent, in mid-2025.

2. Literature

The emerging work on SCs highlights their growing economic relevance and potential risks. SCs lack the strictest form of a singleness of money characteristic as pertaining to central bank money, as values can deviate from par—potentially undermining their reliability as money (Garratt and Shin, 2023; BIS, 2025), especially for non-fiat-backed SCs such as algorithmic SCs (Senner and Chanson, 2022).[3] Parallels are drawn with 19th-century episodes of privately issued banknotes ("free banking" and "wildcat banking"), which were prone to runs and instability (Gorton and Zhang, 2023).[4] Overall, the literature views SCs as so-far payments-focused instruments, with regulation being under development, to support par convertibility and systemic resilience.

At a systemic scale, SCs' growing use could weaken domestic monetary frameworks. This includes eroding the effectiveness of capital controls and exchange rate regulations, as observed for bitcoin and other crypto assets (Luckner et al., 2024; Auer et al., 2025), and challenging monetary sovereignty more generally (Bindseil and Senner, 2025; van 't Klooster et al., 2025). Impacts on other financial actors include changes in bank funding profiles (Bindseil and Senner, 2023; Coste, 2024) and creating risks for central banks, which could be called upon to uphold the at par promise during stress if market liquidity is insufficient (Aldasoro et al., 2023).

Design and regulation are contemplated for minimizing risks for issuers, users, and markets. Capital, liquidity, and disclosure requirements are discussed as a means to preserve SC and market stability (Liao et al., 2024; Bindseil, 2025; Cantú et al., 2025; Goel et al., 2025), with emphasis on the need for global coordination to prevent regulatory arbitrage (Arner et al., 2020). A "same-risk, same-regulation" approach is widely endorsed (e.g., FSB, 2023) but it is potentially not easy to apply to SCs with their specific technical design and risk characteristics (Aldasoro et al., 2025a). Nearly 70 percent of countries are developing regulatory frameworks for SCs at present (Illes et al., 2025).

Theoretical model work supports the case for prudential regulation. Capital buffers, liquidity buffers, reserve quality, and disclosure requirements are suggested to support peg stability and reduce the likelihood of SC runs (d'Avernas et al., 2023; Ahmed et al., 2025; Bertsch, 2025). Without such requirements, SC issuers have incentives to hold interest-bearing, more risky and less liquid bonds instead of cash; while capital and liquidity requirements would reduce default risk, dampen liquidity stress, and contain fire sales and hence adverse market feedback (Goel et al., 2025).

Empirical evidence documents the rising cross-border SC flows and their sensitivity to structural and cyclical macro-financial conditions. SC flows are concentrated in corridors involving countries with elevated inflation, FX volatility, and high remittance costs (Auer et al., 2025; Reuter, 2025), suggesting substitution for local currencies and traditional transfer channels when domestic conditions, whether structural or cyclical, imply a benefit of SC use. Higher policy rates reduce crypto activity, while tighter capital controls coincide with larger SC flows (Auer et al., 2025). SC holdings are inversely related to short-term interest rates and do not yet act as safe-haven assets during crypto stress; while MMFs, on the other hand, experience inflows when interest rates rise (Aldasoro and Doerr, 2023; Aldasoro et al., 2025b).

[3] SCs of all types frequently experience de-peg events, with fiat-backed SCs maintaining near-par stability and algorithmic variants exhibiting structural fragility (Kosse et al., 2023). Compared to MMFs, SCs—especially smaller ones—show larger and more frequent peg deviations and higher volatility (Oefele et al., 2024).

[4] The term *wildcat banking* refers to the fraudulent and unstable subset of the 19th-century U.S. free banking era, when banks operated in remote areas, issued poorly backed notes, and often impeded redemption—undermining public confidence in privately issued money. *Free banking* was a broader phenomenon, which in several U.S. states functioned under specific legal frameworks and maintained relatively stable convertibility. Useful entry points to a related literature include Dwyer (1996) for a distinction between wildcat and free banking, and Rolnick and Weber (1983) for a discussion of the stability of the 19th century free banking system.

The interaction between SCs and bond markets has recently begun to be examined and become measurable. SC in- and outflows have started to measurably affect short-term U.S. Treasury yields, with magnitudes comparable to small-scale quantitative easing; while outflows exert two-to-three times the yield-rising impact than yield-compressing inflows (Ahmed and Aldasoro, 2025). Relevant related evidence outside the SC domain shows that stronger demand for short-term sovereign debt lowers yields (Krishnamurthy and Vissing-Jorgensen, 2012) and, specifically, foreign sales and purchases of sovereign bonds let yields rise and fall, too (Ahmed and Rebucci, 2024). This corroborates that a systemic SC issuer with measurable footprint in bond markets would have the potential to influence market liquidity, prices, and thereby other entities' solvency and liquidity through common exposures.

Beyond the SC literature, a rich body of work on fire sales and price-mediated contagion can offer relevant insights. Models show how correlated sales across financial institutions can amplify shocks, and how solvency and liquidity requirements may mitigate them (Shleifer and Vishny, 2011; Duarte and Eisenbach, 2015; Greenwood et al., 2015; Cont and Schaanning, 2017; Bindseil and Lanari, 2022). Empirical studies document that forced bond sales depress prices (Ellul et al., 2011), mutual funds' correlated sales trigger contagion even without leverage (Cetorelli et al., 2016) and overlapping bond portfolios propagate stress across financial sector entities (Barucca et al., 2021; Cacciola et al., 2014/24). These mechanisms are relevant for SCs, which share structural features with investment funds and MMFs, and imply that more of the existing fire sale and contagion models may be fruitfully applied to the analysis of SCs in the future.

The findings from the literature on currency substitution can be "transported" to digital currency take-over scenarios, as implied by SCs. The vast literature on currency substitution discusses the potential benefits and costs of currency substitution, pointing to context-specificity and dependency on a country's economic conditions, institutional strength, and the role of financial and trade relationships (Eichengreen and Mathieson, 2000; Frankel, 2000; Hartmann and Issing, 2002). The benefits of currency substitution may include (1) more stable inflation and lower interest rates; and (2) reducing currency risk and associated costs for businesses and investors, promoting trade and domestic and foreign investment. The potential downside factors include (1) loss of monetary sovereignty and hence the ability to conduct effective countercyclical domestic monetary policy; (2) the loss of seigniorage revenue for the sovereign; (3) higher risks of banking system instabilities if local banks are unable to access emergency liquidity in times of stress; and (4) the inability to adjust the exchange rate which can lead to competitiveness issues if the anchor currency appreciates significantly.[5]

Our contribution to the literature is twofold. First, we provide a detailed discussion of the financial economics of SCs, regarding direct and indirect linkages to other market participants and identifying the sources of risk, amplification, and systemic vulnerability—including how endogenous fire sales and price-mediated contagion may arise, which is still missing in the literature. Second, we develop a new simulation-based model that captures these mechanisms and supports the analysis of design choices, with two-way feedback between an SC issuer and the markets it invests in. The two-way feedback of a systemic SC issuer with the market, the explicit run dynamics in the model, and quantifying the effects of specific design choices, distinguish our model from the literature, while generally tying in with the literature streams on the role of regulation, their model-based support, and the fire sale and contagion methodologies. Our work further relates to the general discussion of financial stability implications of SCs in Adrian et al. (2025) and the related elements of effective policies for crypto assets (IMF, 2023).

[5] Useful entry point references that further cover such aspects include, for example, Yeyati and Sturzenegger (2002) and Salvatore et al. (2003). Specifically on the potential benefits of currency substitution, see also Gulde and others (2004).

3. The Economics of Stablecoins

3.1 The Financial Economics of Stablecoins

A fiat-backed SC arrangement is linked to the financial system via direct exposures and common holdings of sovereign bonds. While SCs may be used primarily for payment purposes, their growing adoption would also necessitate an expansion of the issuers' balance sheets, due to intermediate SC holdings; while additional direct store-of-value holding motives may also become relevant. The consequence of such holdings is directly reflected in a stock-holding focused balance sheet schematic as depicted in Figure 2.[6]

The interconnections imply various basic forms of credit, market, and liquidity risk. SCs' assets so far typically include cash reserves at banks and MMFs, sovereign bonds, and reverse repo lending to banks and NBFIs (incl. MMFs), creating direct asset-liability links across sectors (Fig. 1 [H-G] and Fig. 2). The sovereign bond market is the primary common exposure, which also banks and NBFIs are invested in. It may be the source of indirect contagion, as SC redemptions can trigger bond sales that depress prices, erode valuations across holders, and amplify solvency and liquidity pressures system-wide. A summary of the primary forms of credit, market, liquidity, and interconnectedness-related risks stemming from all cross-sectoral links is shown in Fig. 3.

An SC arrangement promises the coin holders redemption at par. Coin holders are offered a fixed nominal redemption value while investing pooled funds in short-term, liquid assets, the aforementioned, cash, government debt, and reverse repos. SC issuers thereby perform a form of liquidity transformation familiar from investment funds, including MMFs: they issue liabilities that are redeemable on demand and perceived as "safe," while holding assets that are liquid but not perfectly so, especially under stress.

Deviations from par arise continuously, however, because SCs operate in a segmented and frictional market structure where only selected participants can access the issuer. A perfectly redeemable token would never trade away from its peg in principle. However, SCs circulate among holders who cannot redeem directly with the issuer.[7] Redemption is subject to minimum sizes, operational lags, KYC procedures, fees, and banking hour constraints. When demand fluctuates, those unable to redeem from the issuer must therefore rely on secondary markets, where prices clear based on momentary supply and demand rather than contractual par. Arbitrage is to restore the peg but it requires time and balance sheet capacity.[8] Hence, temporary discounts or premia emerge that would not occur for other forms of money: cash is always exchangeable at face value, and bank deposits remain at par because they are redeemable on demand into central bank money and transferable across accounts at different banks, under a public backstop. SCs, by contrast, lack universal access to redemption into deposit money and, as of today, a lender of last resort, and do not feature deposit insurance—making their par value a target maintained via arbitrage rather than an institutional guarantee.

Reserve holdings in the form of reverse repurchase agreements represent a distinct liquidity characteristic. From the SC issuers' perspective, it means lending cash to a counterparty against collateral, typically again government bonds (here also including longer-term ones), expecting that cash be repaid at maturity. While such instruments are short-dated, their liquidity is not equivalent to that of cash reserves or government bond holdings. The posted collateral is legally transferred to the issuer and subject to an obligation to be returned at repo maturity. Unless the repo includes an explicit right-of-use clause, selling the collateral would breach the repo contract, and even when such a clause exists, doing so exposes the issuer to replacement-

[6] Any balance sheet schematic of certain connected financial system entities mean that one considers a store-of-value rationale—even if indirectly driven by a transaction purpose rationale—in some form of money or financial assets more generally.
[7] Circle/USDC's webpage states that "Circle Mint enables exchanges, institutional traders, banks, and large financial institutions to directly redeem USDC 1:1 for USD from Circle. Mint is not available to individuals or small businesses."
[8] For a discussion of secondary markets and the role of arbitrageurs, see Gorton et al. (2025), and Ma et al. (forthcoming).

cost and market-liquidity risks that materially reduce the instrument's effective liquidity. The cash lent is thus locked until the repo unwinds, making reverse repos liquid only if maturities are very short, e.g., overnight.[9] In a systemic stress event when one or multiple banks may face liquidity pressure, they may not be able to honor their repo-related repayment obligation to the SC issuer.

The risks associated with outright bond holdings versus short-term reverse repos differ in two respects. First, while outright purchases of longer-dated bonds often trade in reasonably liquid markets, they often remain less liquid than short-dated instruments, and they expose the issuer to greater market-price volatility when sold to meet redemptions. Second, in reverse repos the underlying collateral is typically longer-term, so if the cash-borrower defaults the SC issuer suddenly acquires those longer-term bonds and must dispose of them quickly—precisely in adverse conditions—thereby inheriting both liquidity and price-impact risks. Thus, although short-maturity repos minimize liquidity risk when they unwind smoothly, failure scenarios resemble forced liquidation of longer-term bonds and therefore should not be viewed as equivalent to selling short-term instruments.

Another type of liquidity risk stems from SCs offering redemption 24/7/365, while the markets for trading their assets close overnight and on weekends. Sovereign bond and repo markets operate only during market hours, with limited liquidity in off-hours. This creates a structural mismatch: redemptions can be requested any time, but bonds cannot be liquidated continuously. Issuers can only absorb this mismatch temporarily through prefunded cash-like reserve buffers, implying that large redemption waves may be met initially with available balances but ultimately may result in concentrated asset sales when markets reopen.

3.2 Systemic Amplification Channels and Broader Implications

The risks originating from SCs would scale if they attain systemic relevance, especially globally. SCs are different from other short-term investment vehicles not only regarding their balance sheet structure but also the speed, reach, and intensity with which redemptions may occur. SCs would circulate on digital platforms that operate continuously and *globally*, so redemptions are not confined to business hours or national jurisdictions. Hence, even small confidence shifts, which may originate in any jurisdiction given the global circulation of SCs, can translate into rapid and large outflows, beyond what traditional fund structures may face.

An inherently endogenous feedback loop arises (Figure 4), the consequence of which may extend beyond a systemic SC itself. Redemptions would force asset (bond) sales if cash reserves are insufficient, and those bond sales depress market prices and raise yields. As the bond portfolio's value then falls, the solvency of the SC issuer would weaken, user confidence would erode, which would trigger further redemptions, reinforcing the cycle. Once redemptions reach a critical scale, they can become self-fulfilling, producing destabilizing spirals that may also extend beyond the issuer to the underlying sovereign debt markets and other bond holders. That is, when redemptions translate into asset sales, the price and yield shifts affect all holders of the same financial asset, from banks and investment funds to foreign reserve managers (Figure 2 illustrated the connections with banks and NBFIs/MMFs). Repo and money markets may be disrupted as counterparties adjust haircuts or funding terms in response to forced unwinding. Because government securities and repo rates serve as benchmarks for a wide spectrum of financial contracts, stresses may propagate into broader markets.

The distribution of cash reserves across banks—or possible concentration in a few—must be considered. If balances are placed with only one or a few banks (or MMFs), concentration risk arises: the failure

[9] Repo borrowing, on the other hand, would mean borrowing against assets which encumbers them, which would expose an SC issuer to rollover risk. SCs do not at present engage in repo borrowing and evolving regulation largely prohibits it as well.

or distress of a custodian bank (or MMF) would impair the SC issuer's ability to honor redemptions.[10] Diversification across multiple banks (and MMFs) would reduce this risk but introduce coordination challenges and dependence potentially on multiple jurisdictions and supervisory regimes. From the banks' (or MMFs') perspective, large and concentrated placements would imply a material single-name wholesale deposit that may be subject to higher and material run risk (while implying higher liquidity requirements through LCR-type metrics for banks; see Coste, 2025). This creates a two-way feedback channel: a run on the SC could propagate to its custodian banks (or MMFs), while stress at a custodian could undermine confidence in the SC. Similar concerns have been noted for MMFs placing large deposits with single banks, but systemic SCs may magnify the issue due to their scale, speed, and global user base.

SCs may induce store-of-value competition for banks. If SC issuers would hold funds outside the banking system rather than redepositing them at banks, or redepositing them only with few banks, banks may face funding pressure. SC issuers may also invest in MMFs, which in turn provide wholesale funding to only a specific group of larger banks (Bindseil and Senner, 2023). Such general store-of-value competition vis-à-vis the banking system may incentivize banks to raise deposit rates (lower deposit–policy rate spreads) and thereby strengthen monetary policy pass-through. A similar mechanism of increasing competition for banks was discussed in a CBDC context, including endogenously falling deposit–policy rate spreads, e.g., in Gross and Letizia (2023).

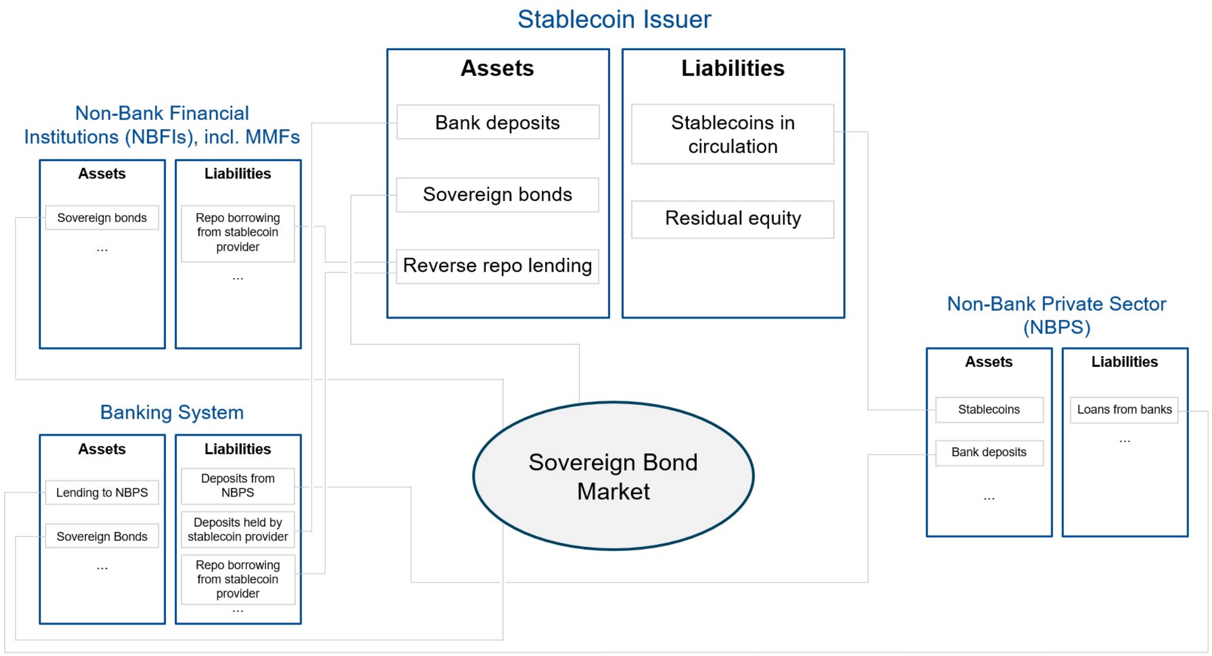
An SC issuer may in principle remunerate holdings directly or indirectly when third parties wrap the SC in yield products, with implications for store-of-value competition. Direct remuneration would make an SC a rate-bearing asset, potentially drawing deposits away from banks and MMFs more than otherwise (via the aforementioned store-of-value competition), thereby increasing an SC issuer's footprint in sovereign bond markets. Indirect remuneration—not prohibited for example under GENIUS in the U.S., allowing third-party yield but not issuer-paid yield—would undermine a ban's intent by strengthening the store-of-value motive. In either case, flows would become rate-sensitive, user retention depend on interest spreads, and run dynamics become more acute when rates shift or wrapper platforms reprice.

Non-remuneration of SCs would limit their store of value function but make SC in- and outflow dynamics a tighter function of interest rate cycles. Assuming non-remuneration—both direct and indirect through wrappers—and a positive interest rate environment, bank deposits and money market fund shares will be more attractive from a store-of-value perspective than SCs. However, in a low or negative interest rate environment, SCs may become more attractive. The state-dependence of the effectiveness of non-remuneration should therefore be appreciated. When interest on SCs was to be considered, it would likely move in tandem with other market rates, thereby reducing the state-dependent in- and outflow dynamics.

The absence of stabilizing overlays—such as deposit insurance or central bank liquidity backstops—would magnify vulnerabilities. For banks, liquidity pressures can be mitigated ex ante and be absorbed ex post by deposit insurance or lender-of-last-resort facilities. For MMFs, post-crisis regulation introduced redemption gates, fees, and portfolio constraints. SCs, by contrast, may still operate without such buffers. Their fragilities may be amplified by technological features (always-on redemption, global accessibility) and institutional gaps (lack of contingent liquidity support). The result is a system in which individual redemption decisions can escalate into market-moving fire sales and broader financial instability.

[10] Emerging regulations on SCs contain provisions to address such concentration risks through appropriate diversification of reserves, though so far in a generic manner. The GENIUS Act in the U.S., for example, generically calls for "reserve asset diversification" and hints in this context to deposit concentration at banks, which should be avoided. The ESRB also calls for diversification of deposit holdings across institutions (ESRB 2025).

Figure 2. A Stablecoin's Position in the Financial System



Note: The schematic summarizes the balance sheet structure of a stablecoin issuer, alongside the balance sheets of other sectors (banks, NBFIs, and NBPS). An explicit balance sheet of the sovereign is omitted, but the outstanding sovereign bonds are depicted by the oval—the sovereign bond market. It represents a common exposure for the SC issuer, banks, and NBFIs.

Figure 3. Risks Facing and Surrounding (Systemic) Stablecoins

Credit Risk

Reverse repo counterparts such as banks and NBFIs, and sovereign, may default (even though that risk is meant to be minimal)

Market Risk

Mark-to-market valuation of bond holdings, reflecting credit risk (and other risks) of asset-side counterparts + risk aversion in markets (the "market price of risk")

Liquidity (Redemption) Risk

SC issuer assets subject to market risk and degree of illiquidity (reverse repos, 24/7/365 redemptions), retail clients with no direct access to SC issuer, thus secondary market dependence; growing wholesale funding dependence for banks

Interconnectedness

Contagion risk due to interconnectedness; sovereign-stablecoin nexus and potential negative feedback to sovereign's financial stance; feedback loop with markets

Note: The various risks as summarized here are intertwined. For example, market risk is a function of credit risk, liquidity risk is a function of market risk (among other factors), and credit, market, and liquidity risks arise due to interconnectedness. See text for details.

Figure 4. The Endogenous Redemptions–Fire-Sale–Market Feedback Loop

Note: The schematic depicts the circular process whereby stablecoin redemptions may imply asset (bond) sales, depressing (bond) market prices, weakening SC issuer solvency, and further triggering redemptions. This process lies also at the core of the model that will be presented later in the paper.

Domestic demand for SCs may shift longer to shorter term sovereign debt demand, while foreign demand for a domestic SC may increase demand for domestic sovereign debt in sum, and overall lead to an emerging sovereign-stablecoin nexus. Domestic SC issuance may induce a composition shift within existing sovereign debt demand—away from longer-term toward short-term bonds—since issuers seek liquid, low-duration assets to maintain stable value and redemption capacity in more liquid short-term markets. This reallocation may not expand total sovereign debt, but it would shorten the maturity structure, increasing the government's rollover frequency and interest rate sensitivity. By contrast, external demand for a domestic SC would represent a net new inflow into domestic sovereign debt—also in this case concentrated in shorter term tenors—raising overall demand for bills and temporarily easing funding conditions for the sovereign. Overall, a *sovereign-stablecoin nexus* may emerge and imply the aforementioned two-way feedback.

A surge in external demand for a domestic SC would likely appreciate the SC's home currency, with implications for trade competitiveness. The appreciation may weigh on domestic export competitiveness and boost import purchasing power, complicating deficit reduction efforts, if as such pursued. Foreign central banks might tighten monetary policy to defend their currencies, while the home country may lean against appreciation through rate cuts. The result would be asymmetric monetary adjustments and rising policy coordination challenges, as exchange rate dynamics may become increasingly shaped by cross-border SC flows rather than traditional trade or capital fundamentals.

A distinction can be made between SC-induced short-term, high-frequency liquidity risk and slower-moving cyclical and structural balance sheet shifts in the financial system. Short-term movements may entail the aforementioned redemption surges, fire sales, and market feedback, which may unfold over hours or days. Slower-moving dynamics can be split in cyclical and structural: cyclical dynamics can be driven by interest rate moves which can cause inflows and accumulating SC balances when interest rates are falling, and outflows and falling SC balances when they rise. Longer-term structural changes can result from gradual shifts in consumer preferences, new supply of SCs as well as structural shifts in the incumbent financial system, unfolding over months or years. The model in this paper will focus on the short-term amplification mechanisms.

Longer-term structural developments may further include unintended (digital) currency substitution, and an implied weakening of domestic monetary policy transmission. SC developments may lead to unintended digital currency substitution (the related literature was cited in Section 2)—more easily so than with physical currency due to their digital nature—and the weakening of monetary policy transmission in non-SC-dominant economies, including an implied loss of seigniorage income for central banks and sovereigns. With significant portions of an economy transacting in a foreign currency, whether physical historically or digital with SCs, central banks' ability to steer inflation and economic dynamics domestically may become impaired. This would be the case when business and financial cycle dynamics of an SC-adopting country would not be sufficiently synchronized with the SC home country. A loss of domestic monetary policy effectiveness for countries that wish to retain it would be more detrimental the more a-synchronous its economic cycles are with those of the currency's source country.

Capital controls may be easier to circumvent in the presence of SCs. This challenge is closely linked to financial integrity considerations, as cross-border, peer-to-peer SC transactions—particularly when weakly intermediated or insufficiently monitored—can facilitate the evasion of capital flow management measures and undermine Anti-Money Laundering (AML) and Countering the Financing of Terrorism (CFT) frameworks. As a result, the effectiveness of capital flow measures increasingly depends on their alignment with robust AML/CFT regimes and the regulation of SC issuers and service providers (He et al., 2022; IMF, 2023).

SCs may exacerbate capital flight during periods of economic uncertainty or political instability and thereby undermine domestic financial stability. Rapid outflows can strain domestic banking systems and financial markets, heighten exchange rate volatility, and trigger liquidity stress that may require central bank intervention. The vulnerability to such dynamics depends on a country's exposure to foreign capital and the composition of those inflows.[11] Sharp capital flight and currency depreciation typically force central banks to raise interest rates to stabilize the exchange rate, increasing debt service burdens for domestic borrowers, inducing defaults, raising unemployment, and ultimately leading to a contraction in domestic economic activity.

Widespread adoption of SCs may give rise to concentration risks and the emergence of dominant providers. Strong network effects, economies of scale in payments, and data advantages can lead to market tipping, allowing systemic SCs to potentially extract monopolistic rents that are not commensurate with the risks they bear. Such concentration can also amplify spillover risks, as operational disruptions, loss of confidence, or governance failures at a single large issuer may propagate rapidly across payment systems and financial markets, increasing systemic vulnerability.

Notwithstanding the various risks discussed in this section, SCs may also deliver economic benefits. By enabling faster and cheaper payments, they can reduce transaction costs and settlement delays in domestic transactions and cross-border remittances, benefiting households and firms.[12] Wider SC usage may facilitate international trade by easing cross-border payments and reducing reliance on correspondent banking chains. In some economies, SC-driven dollarization may enhance monetary stability and support import purchasing power by providing access to a stable unit of account.

The various SC-induced structural changes discussed here—especially regarding monetary sovereignty and monetary policy transmission—may prompt central banks to develop public or regulated private alternatives. Central bank digital currencies (CBDCs) and tightly supervised domestic SCs can thus be viewed as policy responses to preserve monetary sovereignty, safeguard financial stability, and maintain effective monetary policy transmission, while still capturing some of the efficiency gains from digital payment innovations.

[11] Countries with more foreign capital exposure may face larger and faster outflows as foreign investors respond more strongly in the face of domestic shocks (Fu, 2023). Foreign asset composition matters during capital outflow periods (Levchenko and Mauro, 2007; Tong and Wei, 2011).

[12] The prevailing cost, complexity, and limited speed of cross-border payments is still notably hindering cross-border trade of SMEs (Wise, 2003). Having faster and cheaper cross-border means of payments may benefit businesses and households alike, especially in emerging markets and developing economies (Panetta, 2023).

3.3 Parallels to Investment Funds

Fiat-backed SCs share structural features with open-end investment funds, most directly with MMFs. Both offer investors liabilities redeemable at short notice and at par or near-par, while holding portfolios of ostensibly safe and liquid securities. This liquidity transformation exposes them to a first-mover advantage: early redeemers obtain full value, while those who remain bear the costs of fire sale losses and impaired asset values. The run dynamics observed in MMFs during the 2008 financial crisis and the March 2020 COVID-19 pandemic map closely onto the risks potentially facing large SC arrangements. In contrast to SC arrangements, investors in equity or real estate funds have a pro rata claim on the fund's assets, not a fixed at par value. Their shares directly reflect the fluctuating market value of the underlying portfolio. Annex 1 summarizes how MMFs and SCs compare along various dimensions, and what MMF types exist. Fiat-backed SCs may resemble government MMFs when reserves consist of only short-dated public-sector instruments, but when issuers hold riskier, less liquid, or opaque assets—as some do at present—SC structures are instead akin to prime MMFs, with correspondingly higher run-risk.

A further parallel is the systemic relevance of portfolio holdings. MMFs are major investors in sovereign bills, commercial paper, and repo markets; their sudden asset sales can disrupt markets. SCs, if scaled, would concentrate reserves in similar assets and could exert pressures of comparable magnitude, with the aforementioned accelerant of 24/7, cross-border redemption. In both cases, portfolio concentration in sovereign and money market instruments creates a channel through which fund-specific runs can propagate into broader market stress.

Policy responses to MMF fragility are directly informative for the design of SCs. Over the past decade, regulators have introduced liquidity requirements, minimum holdings of daily and weekly liquid assets, redemption fees, and gates (FSB, 2024b) (redemption gates have, however, been removed again in the U.S. in 2024). Swing pricing has more recently been adopted in parts of the investment fund sector to internalize redemption costs.[13] These measures aim to slow runs, allocate liquidity costs fairly, and limit fire sales. For SCs, similar tools could be considered: limits on eligible assets, liquidity buffers in cash, redemption frictions, and dynamic pricing mechanisms that prevent par redemption in stress.

The analogy is not perfect. SCs may function as near-money in payment systems, while MMFs are investment vehicles primarily serving a store-of-value function. Regulatory treatment differs accordingly: MMF regulation focuses on investor protection and market stability, whereas systemic SCs may increasingly be treated as payment infrastructures subject to the Principles for Financial Market Infrastructures (PFMI), reflecting additional objectives related to payment integrity, operational resilience, and monetary sovereignty (CPMI-IOSCO, 2022). Nevertheless, the MMF experience shows that instruments designed to appear "safe" can generate systemic risk without adequate guardrails, and that stabilizing design remains relevant in the SC context.

The MMF analogy is relevant not only for risk assessment and design choices but also for the competitive landscape. Developments in the fund space may affect SC demand, as the emergence of tokenized MMFs and government bond funds creates yield-bearing alternatives with similar technological features. While the at par promise and convenience of SCs might outweigh regular portfolio reallocations in a low-interest rate environment, the demand for zero-yielding SCs could structurally decline in higher interest rate environments (Bibow, 2025). In line with this, already today, SC market size declines after monetary policy tightening, while prime MMF assets rise (short-term corporate debt holdings) (Aldasoro et al., 2025b).

[13] Swing pricing is widely used in the UK and other European countries. As an example, a 2022 survey conducted by the Association of the Luxembourg Fund Industry found that swing pricing is used for 71 percent of assets under management in Luxembourg-domiciled funds (ALFI 2022).

4. The Model

4.1 Model Logic (Verbal)

The model simulates the balance sheet dynamics of a systemic fiat-backed SC whose assets consist of cash reserves and a bond portfolio, with each iteration involving seven steps. The simulation runs in daily time steps and produces stochastic paths of asset values, solvency ratios, redemption flows, and various related metrics. Each period involves seven steps (Figure 5). (1) Bond yields evolve stochastically through a mean-reverting process. (2) The bond portfolio is revalued using a modified duration formula, so that yield changes translate into valuation gains or losses for the SC issuer. (3) The SC issuer's solvency ratio is updated accordingly, as asset values shift relative to liabilities. (4) When the asset–liability ratio falls below one, SC redemptions are triggered, with intensity increasing as under-collateralization deepens. (5) Redemption outflows are serviced hierarchically: first from cash reserves, then through bond sales, and—if still insufficient—via emergency borrowing which would record a shortfall on the liability side. (6) Bond sales exert market pressure, captured by a price-impact function that links the amount of bonds liquidated to additional valuation losses in the bond market. (7) Bond yields are recalibrated to be consistent with the new, lower bond valuation in the market.

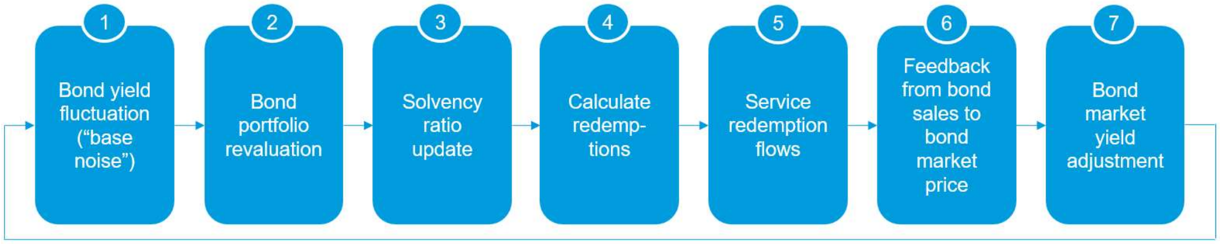
Cash reserves may be drawn down fully even if cash reserve requirements were assumed. This choice (in Step 5 in Figure 5) reflects the supposition that in a systemic stress scenario, supervisors might tolerate temporary cash reserve ratio breaches (if they were in place) to mitigate broader market disruptions and the adverse fire sale feedback. The consequence would also be that it preserves interest income for the SC issuer by postponing or reducing the need for selling interest income-generating bonds. The cash reserves may be held at banks or the central bank, which will not make a difference for what the scope of the model is—but in reality will of course have implications for the aforementioned reserve dynamics and balance sheet structure for the banking system, changes in liquidity risk profiles of banks, and so on.

From the various financial economic aspects discussed in Section 3, only selected ones are reflected in the model for now. These features include the SC holders' redemption sensitivity to SC issuer solvency, the run–fire-sale feedback, liquidity transformation, and valuation-solvency effects. Numerous other effects, such as bank funding spillovers, currency substitution, and capital-flow considerations are not in scope yet.

4.2 Model Setup (Formal)

The stochastic model simulation proceeds in time increments, each entailing the seven calculation steps from Figure 5, which this section will lay out in detail. The simulation frequency is daily, with a horizon up to $\boldsymbol{T}$, e.g., $\boldsymbol{T = 30}$ days (the simulation frequency may be set to higher than daily (e.g., hourly), to reflect higher frequency run dynamics as they may well be relevant in reality). Table A3 in Annex 3 summarizes the ten endogenous model variables and 14 model parameters. A time step $\boldsymbol{t}$ comprises all seven steps in Figure 5. In the following, the intra-period values of stock variables will be subscripted with a "$\boldsymbol{t-}$" notation.

Figure 5. The Model—Seven Calculation Steps per Time Increment



Note: The schematic summarizes the seven calculation steps that are conducted in that sequence within each time period.

Step 1: Bond Yield Fluctuation ("Base Noise")

A discrete Ornstein-Uhlenbeck process is used to simulate a "base noise" component for the short-term bond yield at the beginning of the period. Simulation steps are daily, that is, $dt = 1/252$. We define:

(1) $$\phi = e^{-\tau dt} \in (0, 1) \text{ and } \sigma_d = \sigma\sqrt{\frac{1-\phi^2}{2\tau}},$$

where $\tau > 0$ is a mean reversion speed in years, σ is an annual diffusion parameter, and σ_d is the standard deviation of a discrete-time innovation. The annualized bond yield, i_t then evolves as:

(2) $$i_t = \phi i_{t-1} + (1-\phi)i^{LR} + \sigma_d \varepsilon_t, \text{ with } \varepsilon_t \sim N(0, 1),$$

where i^{LR} is a long-run mean of the annualized bond yield and ε_t is an i.i.d. standard Normal shock. Optionally, i_t can be floored at zero. The parameters τ, σ, and i^{LR}, may be estimated from daily annualized bond yield data. The bond yield at the onset, i_0, can be anchored in an observed value. The daily change of the simulated annual interest rate is defined as $\Delta \mathrm{i}_t = \mathrm{i}_t - \mathrm{i}_{t-1}$. In conjunction with Step 7 later, the mean, drift, and volatility of the bond market yield may eventually deviate from what is implied by this process here in Step 1.

Step 2: Bond Portfolio Revaluation

With B_t being the market value of the SC issuer's bond portfolio, D the portfolio's Macaulay duration (in years), and χ a convexity parameter (in years^2), the portfolio is revalued using a modified duration formula[14]:

(3) $$B_t = B_{t-1}\left(1 - \frac{D}{1+i_{t-1}}\Delta \mathrm{i}_t + \frac{1}{2}\chi(\Delta \mathrm{i}_t)^2\right).$$

Step 3: Solvency Ratio Update

With cash reserve levels for the current period for now at $R_t = R_{t-1}$, and after carrying over the SC liability balance as $L_t = L_{t-1}$, total assets A_t and the asset-liability ratio (ALR) can be updated as:

(4) $$A_t = R_t + B_t \text{ and } ALR_t = \frac{A_t}{L_t}.$$

[14] The convexity term is not strictly required for the logic of the model, and all conclusions would hold in its absence. It is retained, however, as it helps capture nonlinear price effects and tail behavior associated with large shocks, which is part of the model narrative.

Step 4: Redemption Flows

A daily redemption rate, $\boldsymbol{f_t}$, is defined as a daily redemption flow in monetary terms, $\boldsymbol{f_t^{\$}}$, over the pre-redemption stock of an SC balance ($\boldsymbol{L_{t-}}$). A daily redemption flow rate ceiling is denoted as $\boldsymbol{f_{\max} \in (0, 1]}$. The redemption flow rate is made a downward-sloping function of the $\boldsymbol{ALR_t}$:

(5) $$\boldsymbol{f_t = \max\{0, f_{\max}[1 - (ALR_t)^{1/\kappa}]\}} .$$

This behavioral relationship involves a steepness parameter $\boldsymbol{\kappa}$. With $\boldsymbol{\kappa > 1}$ ($\boldsymbol{\kappa < 1}$), the function is convex (concave), with $\boldsymbol{\kappa = 1}$, it would be linear. The shape of the function is illustrated in Figure 6. A convex shape will be considered for the simulations later. The redemption flow in currency units is computed as:

(6) $$\boldsymbol{f_t^{\$} = f_t L_{t-}} .$$

The redemption flow subtracts from the SC balance from the liability accounting perspective:

(7) $$\boldsymbol{L_t = L_{t-} - f_t^{\$}} .$$

Step 5: Servicing the Redemptions

The current period's redemption flow, $\boldsymbol{f_t^{\$}}$, is first opposed to the cash reserve stock, which may be zero or positive:

(8) $$\boldsymbol{useR_t = \min\left(R_t, f_t^{\$}\right)} .$$

The reserve stock is reduced:

(9) $$\boldsymbol{R_t = R_{t-} - useR_t} .$$

A residual need is defined as $\boldsymbol{f_t^{\$,\text{resafterR}} = f_t^{\$} - useR_t}$, which is either positive or zero. That residual need is opposed to the available bond portfolio balance, which yields the fire sale flow, $\boldsymbol{b_t^{\$}}$:

(10) $$\boldsymbol{b_t^{\$} = \min\left(B_t, f_t^{\$,\text{resafterR}}\right)} .$$

The bond portfolio balance is reduced:

(11) $$\boldsymbol{B_t = B_{t-} - b_t^{\$}} .$$

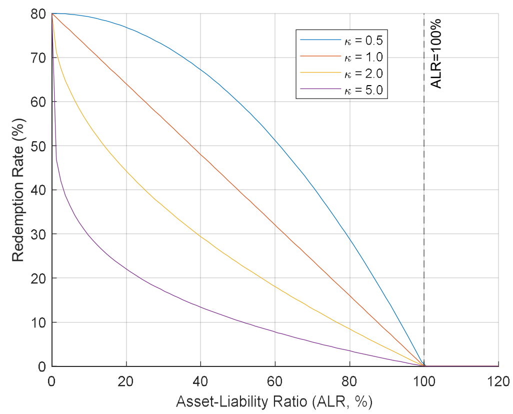
A residual need is defined as $\boldsymbol{f_t^{\$,\text{resafterB}} = f_t^{\$,\text{resafterR}} - b_t^{\$}}$. If it is positive, it adds to a cumulatively evolving "emergency debt" balance, $\boldsymbol{U_t}$ (initialized at 0 in $\boldsymbol{t = 0}$), which creates a liability and asset to cover the shortfall[15]:

(12) $$\boldsymbol{U_t = U_{t-1} + f_t^{\$,\text{resafterB}}} .$$

The initial book value of the bond portfolio is tracked for its later use, denoted $\boldsymbol{B_t^{ref}}$. This reference value tracks the quantity of bonds remaining in the portfolio, valued at their initial $\boldsymbol{t = 0}$ price, i.e., $\boldsymbol{B_0^{ref} = B_0}$. That reference value is not marked-to-market along the horizon and only reflects the periodic sales, in terms of $\boldsymbol{t = 0}$ prices. It is used in the next step to scale the market impact relative to the issuer's initial footprint in the bond market.

[15] The emergency borrowing feature is included in the model to be able to handle the liquidity shortfall situation. In all simulations that will be conducted and shown later in the paper, no shortfalls arise.

Figure 6. Stablecoin Redemption Rate as a Function of the Issuer's Asset-Liability Ratio (ALR)



Note: The chart visualizes the shape of eq. (5) for different values of κ, with $f_{\max} = 0.8$ (80 percent). A convex relation ($\kappa > 1$) will be used for the model simulations.

Step 6: Feedback from Bond Sales to Bond Market Price

The following function links the bond market price impact factor π_t to the bond sales flow $b_t^{\$}$ (from eq. 10):

(13) $$\pi_t = \frac{dP_t}{P_t} = -\underbrace{\frac{B_t^{\text{ref}}}{B_0^{\text{ref}}}}_{\text{market-share scaling}} \times \underbrace{\frac{\lambda_0}{(B_0)^{\alpha}}}_{\text{primary slope parameter}} \times \underbrace{\left(b_t^{\$}\right)^{\alpha}}_{\text{flow response}} \times \underbrace{\left(\frac{D^*}{D}\right)^{1+\gamma}}_{\text{duration adjustment}} .$$

The $\lambda_0 > 0$ parameter captures the initial bond market price sensitivity, given the SC's observed or hypothesized market price impact and implicit market share at the onset. The impact factor is scaled down (via the first term in the equation) when bonds are sold during the simulation, making the bond market footprint decline. The sales flow contribution itself (third term) can be concave ($0 < \alpha < 1$), linear ($\alpha = 1$), or convex ($\alpha > 1$). The duration adjustment (fourth term) allows for counterfactuals with alternative durations D^*, such that smaller durations imply smaller price factors and yield impacts. Step 7 below elaborates on this mechanism and on γ's role in this context. The function never returns a positive π_t, and should be parameterized so that it does not yield $\pi_t < -1$ during the simulations (by steering λ_0 so that implies a reasonable baseline price and yield impact, reflective of the SC's initial, implicit bond market footprint).

The markdown parameter is now used to update the bond portfolio value:

(14) $$B_t = B_{t-}(1 + \pi_t) .$$

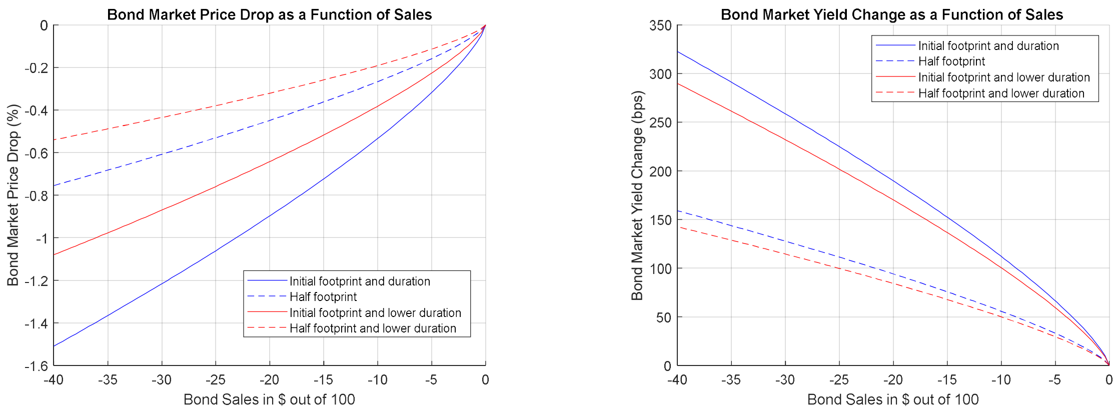
Step 7: Bond Yield Adjustment

When $\pi_t < 0$, an implied yield that is consistent with the portfolio valuation change should be computed. Denoting the yield before the adjustment as i_{t-}, the bond yield shift is:

(15) $$\Delta i_t^{\text{fire}} = -\frac{2\pi_t}{\frac{D}{1+i_{t-}} + \sqrt{\left(\frac{D}{1+i_{t-}}\right)^2 + 2\chi\pi_t}} ,$$

which is the modified duration formula from eq. (3) solved for $\Delta \mathrm{i}_t$. The parameter γ in eq. (13) governs how strongly the yield response from eq. (15) scales with the bond portfolio's counterfactual duration D^*.

Figure 7. Bond Market Price and Yield Impacts as a Function of Stablecoin Bond Sales



Note: The chart illustrates the shape of the price impact function (left side, from eq. 13) and the implied yield shift (right side, from eq. 15). The initial slope is at $\boldsymbol{\lambda_0 = 0.03}$, duration $\boldsymbol{D = 0.5}$ and convexity $\boldsymbol{\chi = 0.8}$. "Half footprint" denotes the implied $\boldsymbol{\lambda}$ after half the SC's bond portfolio would be sold (i.e., $\boldsymbol{B_t^{\text{ref}}/B_0^{\text{ref}} = 0.5}$). "Lower duration" denotes lower duration and convexity at $\boldsymbol{D^* = 0.4}$ and $\boldsymbol{\chi^* = 0.586}$, respectively. The interest rate is at $\boldsymbol{i = 0.04}$, the shape parameter is $\boldsymbol{\alpha = 0.75}$ (implying concavity), and $\boldsymbol{\gamma = 0.5}$ (implying that lower $\boldsymbol{D^*}$ yields lower price and yield impacts).

A value of $\boldsymbol{\gamma = -1}$ would make the price impact independent of $\boldsymbol{D^*}$ and cause $\Delta \boldsymbol{i_t^{\text{fire}}}$ to vary with $\boldsymbol{D^*}$ in the wrong direction. Setting $\boldsymbol{\gamma = 0}$ would make $\Delta \boldsymbol{i_t^{\text{fire}}}$ independent of $\boldsymbol{D^*}$. A $\boldsymbol{\gamma > 0}$ will ensure that both $\Delta \boldsymbol{i_t^{\text{fire}}}$ and $\boldsymbol{\pi_t}$ are inversely related to $\boldsymbol{D^*}$ for a given fire sale flow; representing the intended and economically meaningful specification.[16] Figure 7 illustrates the bond sales impact on bond market prices and yields from eqs. (13) and (15), respectively, for different SC market footprints (initial and half), and the initial and a lower bond duration. The bond yield can be updated, to serve as the next period's starting point yield for the "base noise" simulation in Step 1:

(16) $$\boldsymbol{i_t = i_{t-} + \Delta i_t^{\text{fire}}} \ .$$

A final step entails an update of total assets, the asset-liability ratio, and the cash reserve ratio (cash reserves over liabilities), as these metrics' underlying components may have changed through Steps 4-6. These updates are considered to have all end-of-period metrics at hand for diagnostic purposes.

4.3 Counterfactual Design Simulations

Four counterfactual scenarios, alongside a baseline simulation, were conducted with the model. Table 1 summarizes the baseline parameter settings. The baseline parameters were set in a judgmental manner, so that the simulation outcome for all model variables move in economically reasonable ranges for illustrative purposes. Table 2 shows the counterfactual settings building on the baseline. They include:

[16] The combined design of eqs. (13) and (15) reflects the aim to model market price impact as a function of the amount of interest rate risk (notional × duration) that is sold into the market, also under the premise that sales of shorter-duration bonds exert smaller price and yield feedbacks. The latter aspect is supported by the idea that yields adjust to shifts in the aggregate supply of duration risk, as documented by Greenwood and Vayanos (2014) and by Fleming (2024) who shows that Treasury market liquidity is higher—measured by bid-ask spreads and the price impact per $100 million of net flow which is smaller—for shorter-duration securities. In microstructure theory (Kyle, 1985) and in formulations of the square-root law of market impact (Bouchaud et al., 2009), price reactions to order flows are concave in traded volume (hence we will set $\alpha < 1$). Using the duration exponent $\gamma > 0$ ensures that shorter portfolio durations yield proportionally smaller price and yield responses for a given sales flow.

- **Capital requirements**: raising the initial asset-liability ratio (ALR) to a level above 100 percent;
- **Minimum cash reserve ratio**: as an example of a liquidity requirement;
- **Redemption gates**: cap daily redemption rate, defined as a percentage of outstanding SC liabilities;
- **Lower durations for bond holdings**: reduce the duration of the bond portfolio to a level below the baseline, to thereby reduce the mark-to-market valuation sensitivity.[17,18]

The calibration of the four counterfactuals was designed so that the impacts are quantitatively comparable across scenarios. First, the ALR, for example, was dragged up to a level that implies that the probability of cumulative redemptions and fire sales at the end of the 30-day horizon equals 5 percent (instead of around 50 percent in the baseline, with its ALR=1 in T0).[19] For the cash reserve ratio (RR) counterfactual, the fire sale probability was targeted to 5 percent at end-horizon (the redemption probability does not quite fall under that scenario, so it is not meaningful to target it). Since the redemption gate and lower duration counterfactuals do not notably influence the probability of redemptions and fire sales (as we will shortly see confirmed), they are calibrated to match the mean cumulative redemption rate of the RR scenario. Overall, this calibration scheme is meant to make the impacts quantitatively comparable across scenarios. Figure 8 shows an illustrative simulation, in which the initial ALR=1 and the cash reserve ratio at a small positive percentage (0.5 percent).

The discussion now proceeds by analytical dimension, following the sequence of chart panels (Figures 9–18). Within each dimension, the effects of the individual design levers—capital buffers, cash reserve ratios, redemption gates, and lower portfolio duration—are compared. Emphasis is placed on the relative effects across scenarios, and less so on absolute effects. The latter becomes more relevant once the model is empirical estimated and calibrated.

Table 1. Model Parameter Settings

#	Category	Parameter	Value	Comment
1	Bond portfolio	D	0.5	Macaulay duration in years
2		Xi	0.8	Modified convexity in years^2
3	Bond yield process (base noise)	i0	0.04	Current annualized yield to maturity of short-term bonds
4		i_lr	0.04	Long-run average bond yield
5		i_speed	20	Mean reversion speed per year (=20 implies half-life of shocks of about 9 days)
6		i_sigma	0.07	Diffusion parameter (annualized standard deviation)
7	Redemption function	kappa	2	Steepness of redemption response (>1 for convex)
8		f_max	0.25	Max daily redemption rate
9	Bond market price impact function	lambda	0.05	Primary impact/slope parameter
10		alpha	0.75	Shape parameter (<1 for concave)
11		gamma	0.5	Dependence on duration (>0 for meaningful price and yield response to change in

Note: The table lists the base parameterization of the model, which the counterfactual settings in Table 2 build upon.

[17] The lower-bond-duration scenario assumes that also the convexity of the bond portfolio falls to an extent. An adjustment formula for convexity was derived to reflect the following rationale: convexity can be decomposed into a function of the Macaulay duration and the variance of the cash-flow timing distribution. This means that for any bond or bond portfolio, duration captures the “average” timing of cash flows, while convexity captures both this average and how dispersed payments are around it. When we run a counterfactual that reduces the duration, we implicitly shift the average timing of cash flows; if we want convexity to adjust consistently, we must preserve some measure of dispersion so that the new convexity still reflects a feasible distribution of payments. A formula does this by holding constant the relative dispersion parameter (variance relative to duration squared), so that the new convexity scales systematically with the new duration (without relying on assumptions about zero-coupon or coupon structures). Reducing also the convexity does not impair the ability to interpret the fourth counterfactual as one focused on duration.

[18] If regulation would not prescribe an upper limit for a bond duration, SC issuers may have an incentive to invest in bonds with somewhat longer maturities, as they generally result in higher interest income (at times when yield curves are upward sloping).

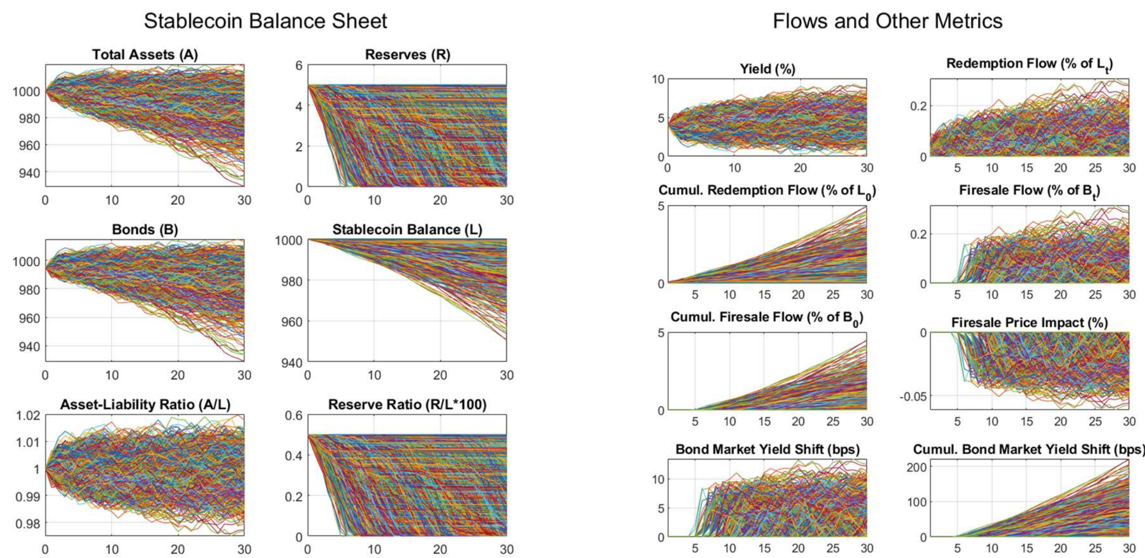
[19] The probability of cumulative fire sales and redemptions as well as their percentages relatives to initial bond balances and SC balances, respectively, are identical throughout the simulation as long as cash reserve ratios are zero. This is intuitive because any redemption must be serviced with a corresponding bond sale in this situation.

Table 2. Counterfactual Simulation Settings

	ALR_0	RR_0	Daily redemption cap	Duration (D) & Convexity (χ)
Baseline	100%	0%	-	0.5 / 0.8
Asset-liability ratio up	101.3%	0%	-	0.5 / 0.8
Cash reserve ratio up	100%	2%	-	0.5 / 0.8
Redemption gate	100%	0%	0.07%	0.5 / 0.8
Duration down	100%	0%	-	0.41 / 0.61
Calibration rationale	Make prob. of cumulative redemptions and fire sales at end-horizon be 5%	Make prob. of cumulative fire sales at end-horizon be 5%	Make mean/median cumulative redemption rate at end-horizon match that of the RR Up scenario	

Note: The table summarizes the parameterization of the counterfactual simulations that are discussed in this section.

Figure 8. Baseline Simulation—Illustration



Note: The two chart panels illustrate the simulated evolution of the model's endogenous variables. The lines represent 5,000 simulation rounds up to a 30-day horizon each. The initial cash reserve ratio was here assumed at a low 0.5 percent (unlike in the baseline reference scenario where the cash ratio in T0 is left at zero percent). Total assets and total liabilities (the SC balance outstanding) were initialized at 1,000 currency units. The bond portfolio's market value in T0 equals 995 currency units; the cash balance 5 units. Since assets equal liabilities in T0, residual equity is zero and the asset-liability ratio therefore at 1, in T0.

Analysis of all Counterfactual Simulation Results

The unconditional distributions of model metrics (Figure 9) suggest a most influential role for solvency and cash buffer requirements. The end-horizon ALR distribution shifts most visibly up in the higher-ALR-at-T_0 counterfactual, as expected, while the other three design variants also raise the lower tails and tighten the distributions. The ALR > 1 setup thus makes all metrics less adverse. The fire sale results—both unconditional and conditional on positive realizations—highlight an asymmetry: a higher RR lowers the unconditional frequency and severity of fire sales, but conditional on their occurrence, the intensity remains elevated. The redemption-gate case, by construction, truncates the upper tail of the redemption distribution, capping daily outflows. The lower-duration portfolio likewise yields more contained ALRs, reflecting smaller valuation swings and reduced mark-to-market sensitivity.

Event likelihoods (Figure 10) suggest a notable role for solvency requirements to reduce redemption occurrence and liquidity requirements the fire sale probability. The ALR > 1 design most effectively reduces the likelihood of adverse events—namely, end-horizon ALRs < 1, cumulative redemptions > 0, and cumulative fire sales > 0. The cash-reserve counterfactual produces probabilities consistent with Figure 9: modest feedback to ALRs, still high redemption probabilities, and lower fire sale probability as cash buffers absorb withdrawals first. In turn, redemption-gate and lower-durations leave event probabilities broadly unchanged, confirming that their stabilizing power operates mainly through timing and valuation sensitivity rather than event frequency.

Scatter plots opposing pairs of model metrics (Figures 11–13) confirm the distinguishing features for solvency and liquidity requirements. They visualize the relation between time-cumulative redemptions, fire sales, and fire sale-induced yield shifts. In Figure 11, all scenarios except the RR requirement exhibit a near perfect, one-to-one correspondance (45-degree line) between redemptions and fire sales. This is because, in the three non-RR cases, initial cash reserves are zero and every redemption must be met through bond sales. The ALR > 1 configuration tightens the dispersion around that line, indicating smaller and less variable redemption–fire-sale episodes. In the RR case, the relation is flat up to roughly 2 percent cumulative redemptions—as cash reserves absorb outflows up to that level—after which bond sales resume and the 45-degree slope re-emerges at a lower level than the baseline. Figure 12 plots cumulative fire sales against the fire sale-induced yield shifts. The ALR > 1 and RR buffers compress the cloud, while redemption gates curb extreme outliers by limiting daily sales. The lower-duration design flattens the slope, as the duration adjustment in the price-impact function reduces yield shifts per unit sale. The redemption gate line lies slightly above baseline because delayed sales occur later, at already higher yields. Figure 13 mirrors these relations when conditioning on redemptions rather than fire sales. The same concave upward shape appears, with ALR > 1 compressing outcomes, RR flattening the lower segment, redemption gates modestly above baseline for timing reasons, and lower duration below baseline due to reduced price sensitivity.

Overall market yield feedback effects are visibly reduced under most design choices (Figures 14 and 15). The analysis is here extended to overall market yield effects, combining “base noise” and fire sale-induced yield shifts if they happen. The baseline shows strong nonlinear amplification: larger fire sales or redemptions drive sharp yield increases, revealing how liquidation stress transmits system-wide. The ALR > 1 and RR designs compress these clouds, dampening both incidence and magnitude of yield spikes. Redemption gates shorten the right-tail—large daily shocks become rarer—but slightly raises the yield-per-event ratio as delayed sales occur in higher-yield conditions. Lower durations shift the relation down since the duration adjustment scales down price and yield responses.

Tail risk metrics (Figure 16) and time to first bond sales metrics (Figure 17) confirm that capital and liquidity requirements can most potently reduce tail risk in various dimensions. The ALR > 1 and RR buffers halve 1 percent tail metrics relative to baseline, while redemption gates and lower duration trim upper-percentile extremes. Capital and liquidity buffers thus prevent large-scale events; gating and shorter duration temper the distribution’s edges. The ALR > 1 and RR designs extend the median time to first bond sales (Figure 17), while redemption gates shift the distribution furthest right—sales occur later and more gradually. Lower duration causes a modest delay through smaller mark-to-market shocks. Buffers suppress event onset; gates smooth it once underway.

Overall, the analysis suggests that capital and cash-reserve designs deliver the broadest stabilization, lowering both likelihood and severity of de-pegs, redemptions, and fire sales, as well as bond market feedback. Figure 18 summarizes the take-aways from all simulations and model metrics. It further suggests that redemption gates and lower duration offer consistent but milder mitigation, moderating intensity rather than frequency. In sum, solvency and liquidity buffers act as preventive stabilizers while gating and duration adjustments serve as mitigating mechanisms once stress materializes.[20]

Robustness and Possible Model Extensions

The findings and conclusions we draw from the model are robust to parameter variation. This is because the model is deliberately kept parsimonious, with economically interpretable mechanisms, so that changes in parameters do not overturn the core qualitative findings. Across wide ranges for redemption elasticities, market impact parameter values, and all other model parameters (see Annex 3 for the list), the direction of effects and the relative magnitudes of responses across counterfactuals remain stable. Two additional, specific sensitivity tests were conducted, assuming that the redemption function be concave instead of convex, and the bond price impact function be convex instead of concave. The conclusions remain robust.

Various model extensions can be considered. Eight examples include:

1. The redemption–solvency sensitivity ($\boldsymbol{f}_{\mathbf{max}}$ and/or $\boldsymbol{\kappa}$ in eq. 5) can be made endogenous to the presence and tightness of redemption gates, capturing investors' possible propensity to redeem pre-emptively when access constraints are foreseeable—partly undermining the stabilizing effect of gates.
2. The redemption function can be augmented to allow for exogenous triggers (e.g., through social-media-mediated news), news about material losses in flow terms, expectations thereof, or a shortfall of an asset-liability ratio below a regulatory minimum if it is set at a level above 1. Redemption propensities may also be made a function of levels and changes of interest rates in the market and for SC holdings.
3. Redemption gates can be modeled in a way to resemble their real-world design more closely, i.e., for them to be triggered when, for example, liquid asset or net-asset-value metrics fall below certain thresholds.
4. Allow a continuous-time or non-business-day simulation ($dt < 1/252$) to capture 24/7 trading and redemption, thereby analyzing how weekend dynamics and uninterrupted market access would alter run dynamics, liquidity needs, and issuer risk exposure.
5. A slow-moving flow component tied to the interest-rate environment can be added (e.g., rate differentials vs. bank deposits/MMFs) to complement short-horizon stress dynamics (the model's current focus) and capture gradual portfolio reallocation in and out of SCs, i.e., the aforementioned cyclical dynamics, which are not currently the focus of the model.
6. Model issuer portfolio rebalancing and maturity management decisions endogenously, thereby allowing the issuer to shorten or lengthen duration, or shift between cash/bills/reverse repos, in response to redemption pressures and rate environments.
7. Consider a multi-entity network (multiple SCs, banks, central bank, MMFs) to assess cross-entity contagion and amplification through balance sheet links and common exposures as depicted in Figure 2. When introducing banks and the central bank, it will be useful to distinguish deposits held at commercial banks—where counterparty credit risk arises—and deposits held at the central bank, which entail no such risk. Adverse feedback from banks can then be examined, when a troubled bank would not be able to honor expiring reverse repo lending from an SC to the bank.

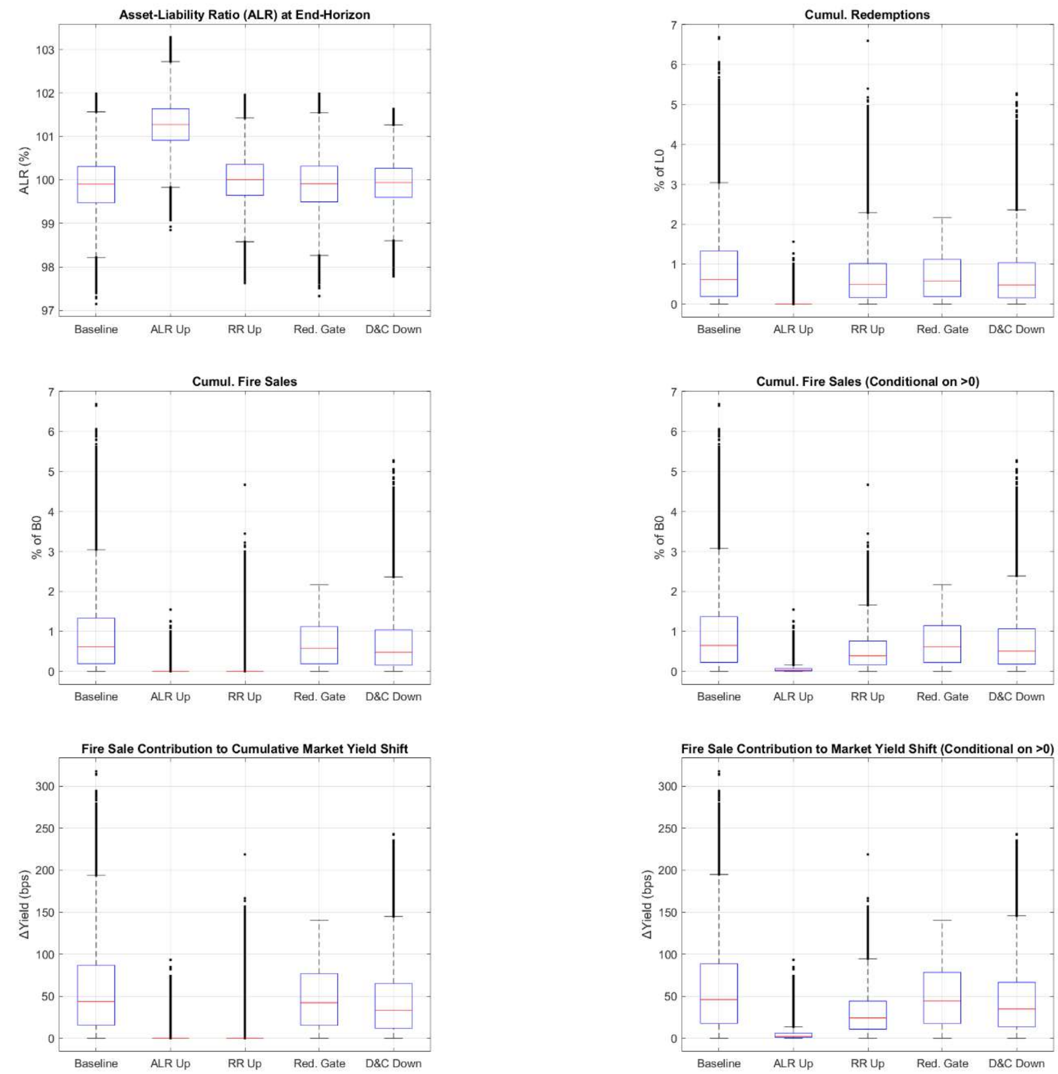
[20] When considering very significant cash reserve requirements, e.g., in the ranges of 30-60 percent for certain business in the EU, the positive impacts of a cash reserve requirement as discussed in this section would just become more material, i.e., it would yet more materially reduce the likelihood of bond sales and—if they were to happen—they may induce less adverse bond market feedback due to a smaller bond market footprint implied by the high cash requirement.

8. A multi-country extension with explicit elements of capital flows and FX dynamics. This will allow speaking to distinct dynamics for emerging market economies as well, considering additional design choices such as constraints that would limit the use of foreign currency denominated SCs domestically, e.g., through restrictions on domestic PSP intermediation, or limitations on the use of FX-SCs for salaries and tax payments.

The model parameters can be estimated for real world SCs, to conduct simulations for inferring certain design choices while targeting threshold probabilities. All model parameters can be estimated for real world entities and the surrounding market, to then conduct the reverse calculations as illustrated with the counterfactuals in this section. That is, for example, capital requirements—the level of ALR above 1—can be inferred to target a certain end-horizon probability of redemptions, e.g., at 0.1 percent. Likewise, a cash reserve ratio can be inferred to let cumulative redemption probabilities not exceed a small tail percentage. Other, alternative counterfactual calibrations schemes can then be considered as well, in terms of target outcome variables and threshold probabilities.[21]

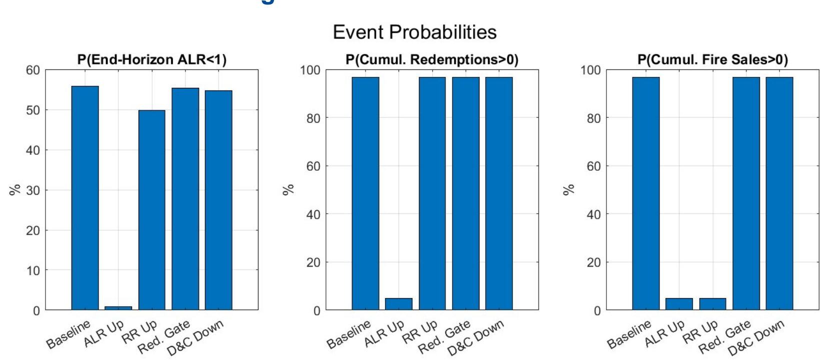
[21] The tail probability targeting resembles the logic underlying Basel capital requirements and risk weight calculations.

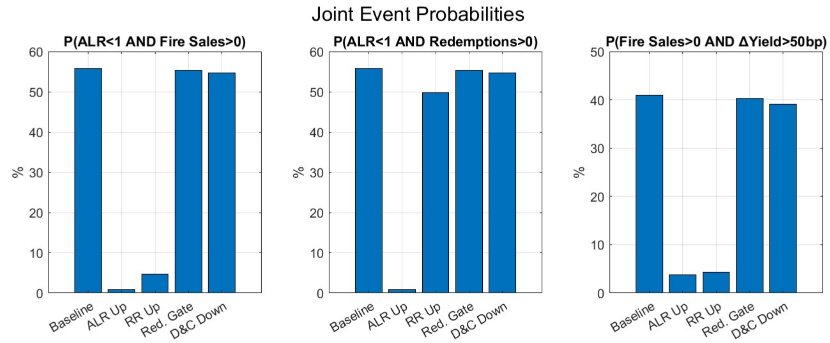
Figure 9. Counterfactual Simulations: Unconditional Distributions of Model Metrics



Note: The box plots illustrate the distribution of selected model variables at the end of the 30-day simulation horizon, under the baseline and the four counterfactual scenarios, with an underlying 10,000 stochastic simulation paths.

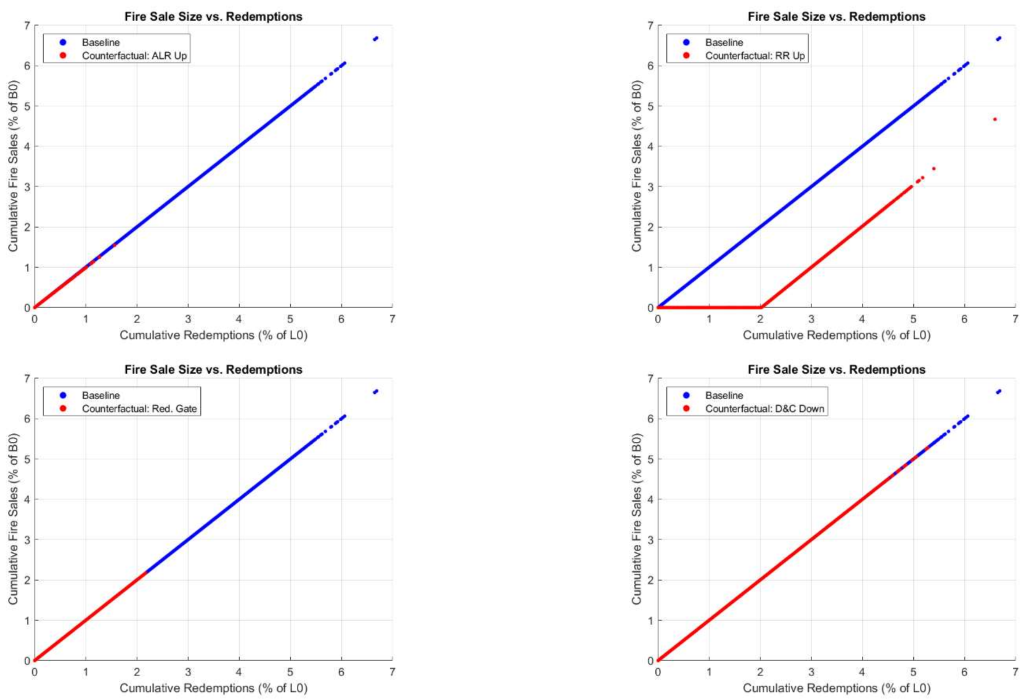
Figure 10. Event Probabilities





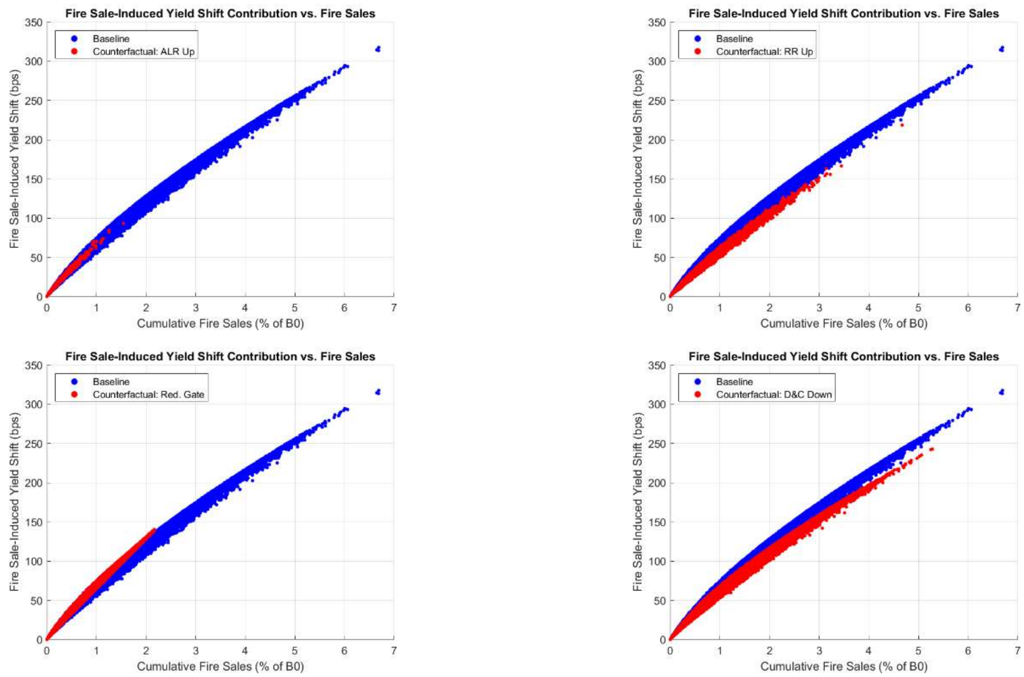
Note: The bar charts show certain probability metrics pertaining to the asset-liability ratio, cumulative redemptions, and cumulative fire sales, at the end of the 30-day simulation horizon, under the baseline and the four counterfactual scenarios, with an underlying 10,000 stochastic simulation paths.

Figure 11. Redemptions vs. Fire Sales



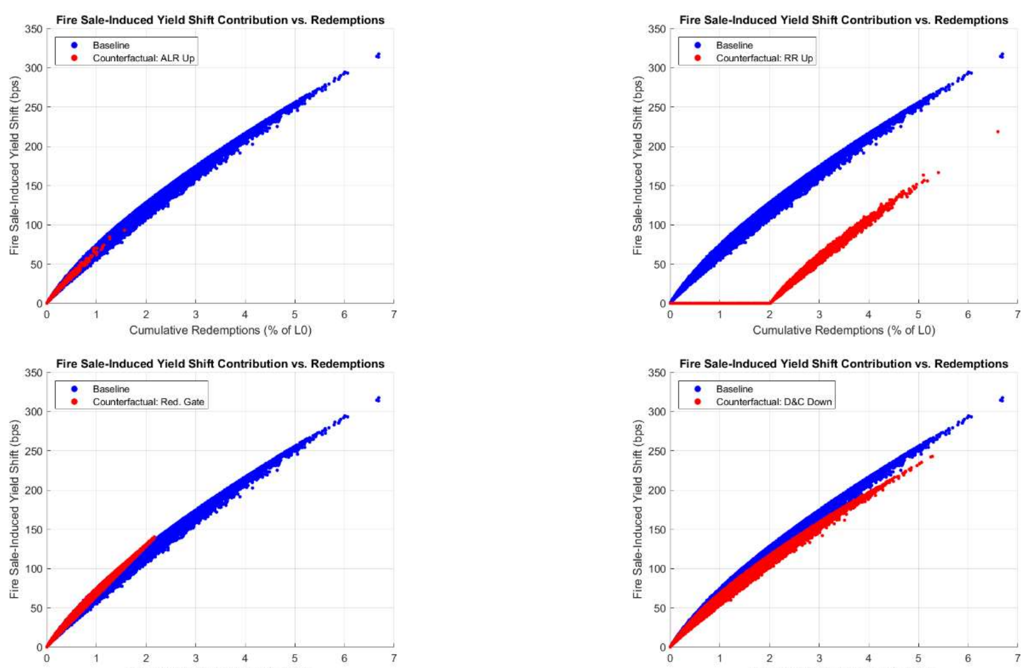
Note: The four plots correspond to the four counterfactual scenarios (red, as an overlay to the baseline in blue), based on 10,000 stochastic simulation paths up to a 30-day horizon.

Figure 12. Fire Sales vs. Fire Sale-Induced Yield Shift



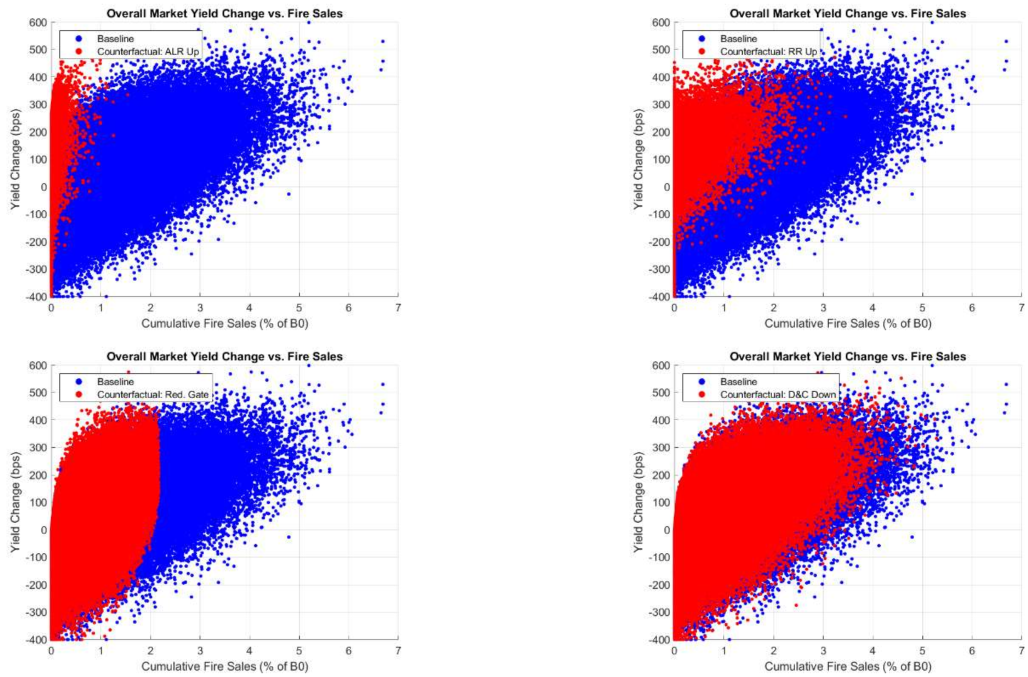
Note: The four plots correspond to the four counterfactual scenarios (red, as an overlay to the baseline in blue), based on 10,000 stochastic simulation paths up to a 30-day horizon.

Figure 13. Redemptions vs. Fire Sale-Induced Yield Shift



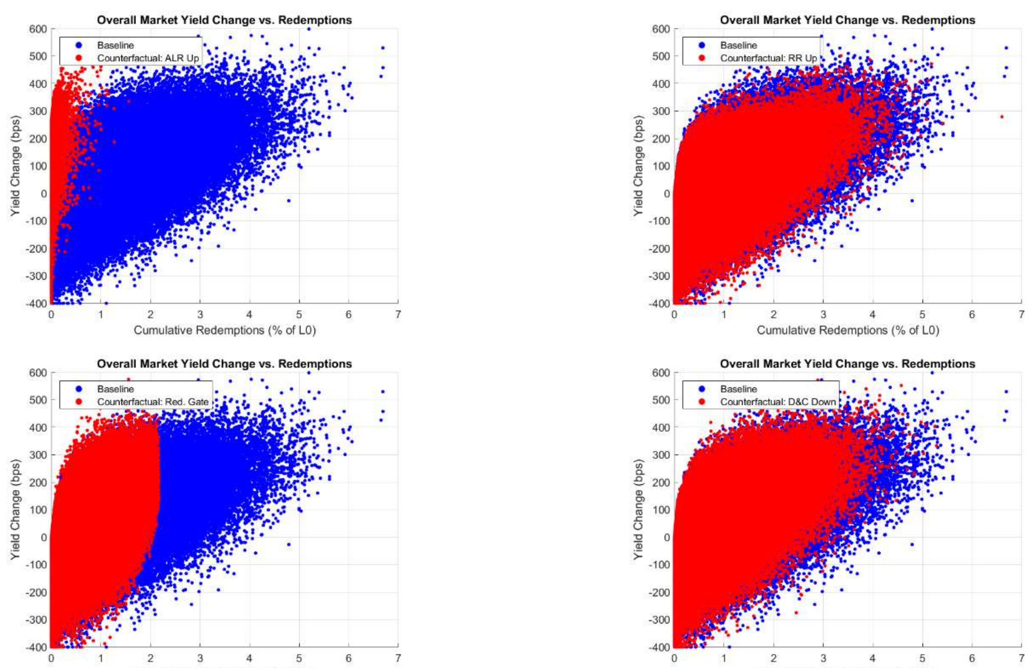
Note: The four plots correspond to the four counterfactual scenarios (red, as an overlay to the baseline in blue), based on 10,000 stochastic simulation paths up to a 30-day horizon.

Figure 14. Fire Sales vs. Overall Market Yield



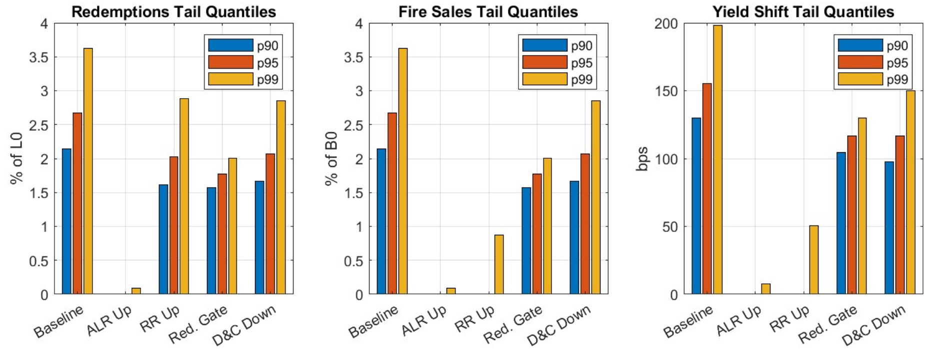
Note: The four plots correspond to the four counterfactual scenarios (red, as an overlay to the baseline in blue), based on 10,000 stochastic simulation paths up to a 30-day horizon.

Figure 15. Redemptions vs. Overall Market Yield



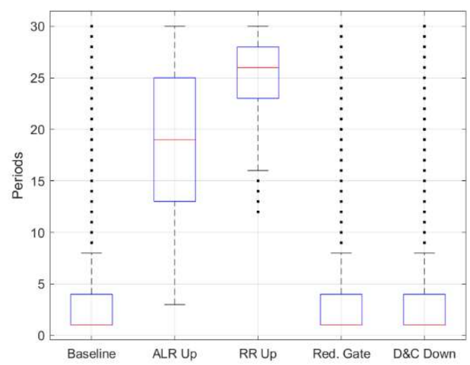
Note: The four plots correspond to the four counterfactual scenarios (red, as an overlay to the baseline in blue), based on 10,000 stochastic simulation paths up to a 30-day horizon.

Figure 16. Tail Risk Metrics



Note: The chart summarizes the quantile estimates (for tail probabilities at 10 ,5, and 1 percent), for three model variables (cumulative redemptions, cumulative bond fire sales, and cumulative fire sale-induced yield shifts, all at the end of the 30-day simulation horizon), covering the baseline and the four counterfactual simulations, and with an underlying 10,000 stochastic simulation paths.

Figure 17. Time to First Bond Sales (Conditional on Occurrence)



Note: The chart shows the distributions of the "time (days) to first bond sales," for the baseline and four counterfactual scenarios, with an underlying 10,000 stochastic simulation paths.

Figure 18. High-Level Summary of Effects of Design Choices

	De-peg (ALR<1)		Redemptions		Fire Sales		Fire sales cond. on >0	Market feedback
	Likelihood	Severity	Likelihood	Severity	Likelihood	Severity	Severity	Severity
ALR Up	↓	↓	↓	↓	↓	↓	↓	↓
Cash RR Up	↘	↘	→	↘	↓	↓	↘	↓
Redemption Gate	→	→	→	↘	→	↘	↘	↘
D&C Down	→	↘	→	↘	→	↘	↘	↘

Note: The table summarizes the findings from the counterfactual design simulations discussed in this section. Blue right-directed arrows denote no notable change. Light green slightly downward-sloping arrows indicate mild improvement. Green downward arrows indicate a notable improvement.

5. Design Implications

We structure the discussion of design implications along nine questions (Table 3). The discussion in the table is not meant to be understood as policy recommendations. Instead, it represents a financial economics-grounded discussion of SC design choices, with a view to maintaining domestic and global monetary stability. While several design features in Table 3 imply some costs (or likewise foregone income) for an SC issuer, they would simultaneously strengthen the issuer's stability and contribute to the robustness of the broader ecosystem.[22] Capital and liquidity requirements could affect competitiveness and incentivize regulatory arbitrage or off-shoring, which various aspects in Table 3 relate to via the need for cross-jurisdictional coordination.

Table 3. Stablecoin Design Choices

#	Question	Rationale	Comments
1	**Should capital requirements for SC issuers be considered?**	Strengthens solvency and confidence, lowering the likelihood and severity of redemptions, fire sales, and market spillovers.	Consider asset-liability ratio (ALR) floors (e.g., 1.01–1.05) with size-linked surcharges; phase in for entrants. Restrict distributions until buffers are met. Residual equity (assets exceeding liabilities) can be built organically by reinvesting income in bonds. Avoid procyclicality through stable, through-the-cycle calibration.[23] Coordinate internationally to prevent regulatory arbitrage.
2	**Should minimum cash reserve requirements be considered?**	Lowers fire-sale risk by meeting redemptions first with cash, reinforcing liquidity and user confidence.	Cash reserve requirements mainly reduce fire-sale frequency, not redemption probability. Conditional fire sale severity remains elevated if not paired with capital requirements. Diversify placements across banks and, possibly, central bank. Ensure segregation and bankruptcy remoteness at banks. Interest-bearing central bank deposits would imply interest income for SC issuer. A cash deposit requirement at banks may, if deposits pay low or zero interest, imply less income generating capacity for the SC issuer. Coordinate internationally to avoid migration to regimes with less stringent requirements.
3	**If cash reserve requirements are used, should their distribution across holding institutions (banks vs. central bank) be regulated?[24]**	Diversified placement avoids concentration risk, distortions, and funding asymmetries, supporting stability and smoother monetary policy transmission.	Consider minimum diversification rules (e.g., no more than a certain percentage of reserves per bank group) or tiered placement ratios between banks and the central bank. When banks receive more wholesale deposits from SC issuer (and may lose retail deposit liabilities), they may then rotate from longer-term to short-term sovereign debt investments (duration matching).
4	**What role may redemption gates play for SC and market stability?**	Help smooth redemptions and limit fire sale spillovers to markets.	Too strict gates may spur pre-emptive runs and reduce transactional utility and the perceived "moneyness" of the SC. Distinguish issuer-level from system-wide activation. Use clear triggers, notice periods, or swing pricing as complementary tools.
5	**Should maximum duration limits be imposed on stablecoin bond holdings?**	Shorter maturities reduce valuation and solvency risk, weakening redemption–fire-sale loops.	Shorter-term bonds are more liquid, reducing price and yield impact in fire sale scenarios. A shift to shorter-term sovereign funding could raise sovereign rollover and rate-risk exposure. SCs already hold short-duration bonds, so limits would largely codify practice but remain useful to deter future yield-driven maturity extensions.
6	**Should interest-bearing wrappers (i.e., mechanisms that pass reserve**	Preserve payment function of stablecoins, avoiding rate competition and implied	If the regulator decides to prohibit remunerated SCs, issuer, affiliate, or third-party yield programs and implicit remuneration schemes should be banned. If yield is offered, require a separate, non-par investment product regulated under fund or securities rules to maintain neutrality

[22] A quantitative cost-benefit analysis in the various dimensions that the table addresses is beyond the scope of this paper.

[23] Through-the-cycle calibration means that required capital or ALR floors should not mechanically tighten in stress periods when market values of reserves fall or redemptions spike, as this would amplify fire sales and procyclicality. Instead, requirements should be set based on long-run risk characteristics and remain stable across phases of the cycle, so that buffers are accumulated in good times and available to absorb losses in downturns.

[24] Beyond the "diversification across banks and the central bank" aspect covered here, a more general diversification across instruments and markets can be considered, to thereby reduce concentrated market, liquidity, and credit risk, as well as adverse feedback into core markets (Adrian et al., 2025).

	yield to stablecoin holders) be banned?	store-of-value competition for bank deposits and MMFs.	with banks and MMFs.[25] Consider measures to prevent excessive rent-seeing by SC issuer in positive interest rate environment (see #8 below). By limiting store-of-value competition; reduce thereby also the systemic footprint of the SC issuer in bond markets.
7	**Should stablecoin issuers be prohibited from lending to the nonfinancial private sector?**	Reserves more liquid and low-risk, safeguarding par convertibility and avoiding overlap with the banking system's credit and hence money creation role.	Lending would turn SCs into money-creating entities (assuming its liabilities, SCs, would serve the functions of money and be used as such). If ever allowed, it may occur in a separate, capitalized vehicle; or otherwise imply for the issuer to become a bank and be subject to ordinary banking regulation, regarding both solvency and liquidity. Align with e-money and MMF precedents. Coordinate internationally to prevent offshore regulatory arbitrage.
8	**How may regulation prevent monopoly formation or dominance by a single systemic stablecoin domestically or globally?**	A dominant stablecoin could extract rents, entrench network effects, and pose systemic and monetary-sovereignty risks.	Recognize that network effects and economies of scale favor concentration. Build interoperability ex ante to thereby allow for competition to arise, as ex-post remedies are hard once dominance emerges. Apply antitrust and merger review, consider CBDC as a public benchmark, and pursue international coordination.
9	**Should stablecoin issuers have access to standing central bank facilities?**	Access can support at-par redemption promise, thereby reducing run risk, contagion, and adverse market feedbacks.	May be considered when SCs would become a widely used public good. Access to standing facilities would be collateralized with high-quality assets and conservative haircuts. To avoid moral hazard, access can be paired with full prudential regulation. Cross-border SCs require coordinated home–host arrangements.

The prudential design considerations discussed so far could be complemented with a dedicated recovery and resolution framework. Even an SC with sound financial design remains vulnerable to governance or operational failures, such as major cyber-attacks or internal fraud. For a systemic entity, such a failure cannot be handled through ordinary corporate bankruptcy proceedings, which are too slow and ill-equipped to prevent financial contagion. A resolution framework provides the necessary tools for a designated authority to intervene in a failing issuer, ensuring its critical functions are maintained and the entity is wound down in an orderly manner. A discussion of further details of such resolution frameworks for SCs is beyond the scope of this paper (see FSB, 2023/2025).

As of today, national regulatory frameworks appear to pursue a set of common design elements while differing in implementation details. The common elements include (i) capital requirements, with some jurisdictions considering explicit capital buffers calibrated as fixed minima or on a risk-weighted basis; (ii) reserve asset eligibility rules that permit bank deposits and government securities and, in some frameworks, also allow investments in MMFs or reverse repurchase agreements—provided criteria for liquidity, credit quality, and maturity are met; and (iii) explicit limits on maturity transformation achieved through maximum maturities for individual holdings or limits on the portfolio's weighted average maturity (FSB, 2025).

6. Conclusions

Fiat-backed stablecoins, if scaled to systemic size, would extend beyond the crypto sphere and become interwoven with financial markets. Their defining feature—instant, par redemption backed by portfolios that include liquid but non-cash assets, in particular sovereign securities—creates fragilities known from money market and investment funds, but amplified by always-on, cross-border, DLT-based platform technology. Such

[25] Related, Bindseil (2025) suggests requiring tools such as holding limits to guard against "excessive success of SCs at the expense of banking" (Bindseil, 2025).

SC arrangements can trigger self-reinforcing run–fire-sale–market feedback loops, transmitting stress from a single issuer into sovereign bond and repo markets. Terminology-wise, we should keep in mind that “fiat” in “fiat-backed SC” and, similarly, the notion of “fully backed,” does not mean outright fiat deposit holdings.

The economics of SCs center on their balance sheet linkages, exposures to credit, market, and liquidity risk, contagion potential created by common asset holdings, and the endogenous interplay with markets. SCs connect directly and indirectly to banks, MMFs, and sovereign debt markets through holdings of cash, repos, and sovereign bonds. Credit risk is ideally limited, but market and valuation risk arises from changes in market liquidity, the market price of risk, and counterparty credit risk (even though small). Peg deviations can emerge because not all SC holders have direct redemption access to the SC issuer. Liquidity risk stems from maturity mismatches and 24/7 redemption against markets that close overnight and on weekends. Endogenous feedback loops between an SC issuer and bond markets can arise if the issuer has a sizeable bond market footprint, which is further amplified by connections to other financial system entities and the other entities’ common exposures.

SCs differ from MMFs because SCs operate with 24/7 global retail access for purchase and redemption and no formal backstops. Meanwhile, MMFs remain regulated investment vehicles with business-hour redemption and liquidity safeguards. While both structures transform liquidity and face run risk, SCs circulate in payment systems, redeem continuously at par or near-par in secondary markets, and rely on self-held reserves so far without central-bank access, while MMFs redeem into brokerage cash, settle on T+0/T+1 schedules, and operate under post-crisis reforms that mandate liquidity buffers and restrict risky investments. Hence, while MMFs provide a useful reference for understanding liquidity and run dynamics, the institutional and operational features of SCs warrant distinct prudential considerations.

Structural effects of large-scale SC emergence include a shortening of sovereign debt maturities, a growing sovereign-stablecoin nexus, and digital currency substitution for non-SC-dominant economies. Shortening sovereign debt maturities for a jurisdiction in whose currency a potentially dominant global SC were to develop would raise rollover and interest rate risk for its sovereign. It may let a significant sovereign-stablecoin nexus emerge. Digital currency substitution for non-SC-dominant economies may arise, undermining their monetary sovereignty and monetary policy transmission, and implying the development of local SCs or CBDC, the development of new SC-specific capital controls, all to uphold monetary sovereignty and monetary policy transmission. The latter aspects were hinted in the paper, while surely deserving more detailed follow-up work.

The model developed in this paper captures SC-related amplification channels and can be used to assess different SC designs. The model simulates the SC balance sheet and its surrounding financial system—so far the bond market. Key functions in the model include one that relates SC redemptions to SC issuer solvency, and one that makes bond market prices a function of bond sales. The model allows simulating counterfactual SC design scenarios (capital and liquidity requirements of different kinds) to outcomes (e.g., run frequency and intensity, fire sale frequency and intensity, and bond market feedback). Possible model extensions were discussed in the paper. The model can be used to reversely infer an SC issuer’s capital and liquidity requirements to target certain tail probabilities, akin to capital requirements for banks under the Basel risk weight framework.

SC design choices matter for monetary and financial stability, as illustrated with the model. Capital and cash-reserve designs deliver the broadest stabilization, lowering the likelihood and severity of de-pegs, redemptions, and fire sales, as well as bond market feedback. Redemption gates and lower duration offer consistent but milder mitigation, moderating intensity rather than frequency. Overall, solvency and liquidity buffers act as preventive stabilizers while redemption gating serves as a mitigating mechanism once stress materializes. Broader measures on competition and interoperability can curb monopoly formation and safeguard monetary sovereignty. Parallels to investment-fund regulation are direct: tools such as liquidity buffers, gates, fees, and swing pricing have proven effective elsewhere and could be adapted to SCs.

Annex 1: Stablecoins vs. Money Market Funds

While fiat-backed SCs and MMFs differ in purpose and market positioning, their structures exhibit similarities that make the comparison instructive. Both hold liabilities that feature redeemability at short notice, while investing in short-term assets that are liquid but not perfectly so, thereby exposing themselves to liquidity transformation and run risk. At the same time, they are distinct in some dimensions which let them differ regarding systemic footprint: SCs circulate as near-money instruments in payment systems, with 24/7 global redemption and no formal backstops, whereas MMFs remain investment vehicles subject to business-hour redemption and regulatory coverage developed in the past. Table A1 summarizes the parallels and distinctions.

A deeper look at MMFs shows that risk is not solely determined by their redemption policies. At first sight, MMFs offering redemption at par appear riskier than those that do not, but recent stress events have illustrated that the composition of their assets is also a critical factor. Constant Net Asset Value (CNAV) MMFs offer redemption at par and, therefore, could theoretically face more rapid outflows in times of stress than Variable Net Asset Value (VNAV) MMFs. In some jurisdictions, such as Switzerland, CNAV MMFs are not permitted. However, episodes of stress, including the March 2020 turmoil, have shown that MMFs investing in riskier assets—such as non-public or non-government debt—can be particularly vulnerable (FSB, 2024b). Reflecting this, regulations in the EU and UK, for example, allow only public debt MMFs to operate as CNAV funds (FSB, 2024).

Table A1. Stablecoins vs. Money Market Funds

Dimension	Fiat-Backed Stablecoin	Money Market Fund (MMF)
Liabilities	Tokens redeemable at par, transferable peer-to-peer, circulate in secondary markets	Shares redeemable at NAV (often close to par), held in brokerage accounts
Assets	Cash, short-term sovereign debt, reverse repos, bank deposits	Sovereign bills, repos, commercial paper, short-term corporate debt
Redemption	24/7, platform-based, potential global reach; instant settlement at par	Limited to market hours; typically T+0 or T+1 settlement
Liquidity transformation	Strong: par redemption vs. partly liquid reserves	Strong: daily liquidity vs. imperfectly liquid portfolios
Backstops	None (no deposit insurance, no central bank access)	Some implicit/explicit support (sponsor support, post-crisis liquidity facilities, central banks as market maker of last resort)
Systemic channels	Direct links to sovereign bond markets, repo, and banks via reserve placements	Links to short-term funding markets (CP, repo, short-term sovereign bonds)
Regulatory tools	Emerging, heterogeneous; still debated	Redemption gates, fees, liquidity requirements, swing pricing (post-2008/2020 reforms)
Function	Near-money instrument used in payments & savings	Investment vehicle, cash management tool

Source: Authors.

Annex 2: Types of Stablecoins

Stablecoin arrangements take several forms beyond the fiat-backed model that is the focus of this paper. Some are collateralized by crypto assets, some by commodities, while others rely on algorithmic or hybrid mechanisms. Each design differs in how stability is maintained or instabilities may arise. Table A2 summarizes the main types of SCs and their features. A taxonomy of SCs is presented in Bullmann et al. (2019), along three dimensions: accountability of issuer, decentralization of responsibilities, and type of asset backing; resulting in a distinction between tokenized funds, off-chain and on-chain collateralized SCs, and algorithmic SCs.

The financial economics of these different types follow different logics. Fiat-backed SCs resemble MMFs, where liquidity transformation and run dynamics are central. Crypto-collateralized designs instead hinge on collateral valuation and margining, making them vulnerable to procyclical liquidation spirals. Algorithmic SCs are best understood through currency-crisis style models of peg credibility or sometimes simple models of Ponzi schemes, while commodity-backed variants behave more like exchange-traded products, with risks centered on custody and market liquidity. Hybrids combine elements of these risks.

Table A2. Types of Stablecoins

#	Type	Comments
1	Fiat-backed stablecoins	• Backing: cash, bank deposits, short-term government bonds, reverse repos. • Economics: classic liquidity transformation and run risk, with direct linkages to sovereign bond and money markets. • Fragility: redemptions → reserve liquidation → market impact → feedback to solvency → redemptions
2	Crypto-collateralized stablecoins	• Backing: over-collateralized crypto assets (ETH, BTC, etc.), often with liquidation thresholds (e.g., MakerDAO/DAI). • Economics: stability rests on collateral value volatility. If collateral prices drop, liquidations are triggered. Procyclical dynamics may arise. • Fragility: less about short-term liquidity, more about asset price spirals: falling crypto prices → collateral calls → forced liquidations → further price falls. • Systemic linkages: concentrated in crypto markets, limited spillovers (so far), but strong price correlation and feedback within crypto ecosystems.
3	Algorithmic stablecoins (unbacked or partially backed)	• Backing: no fully matched reserve; rely on algorithms and incentive mechanisms (burn/mint, seigniorage shares). • Economics: resemble a self-referential confidence game; stability depends on ongoing demand and trust in the peg. • Fragility: when confidence weakens, redemption spirals collapse the coin (e.g., Terra/LUNA). There is no true reserve buffer, so the economics of liquidity transformation do not apply; instead, it is a peg-credibility problem. • Systemic linkages: can destabilize broader crypto markets but little direct link to sovereign bond markets.
4	Commodity-backed stablecoins (e.g., gold-backed)	• Backing: physical commodities held in custody. • Economics: stability tied to commodity market prices. Not “stable” in fiat terms but marketed as “hard asset-backed.” • Fragility: more like an exchange-traded product: value tracks the commodity, no par redemption at fiat. Risks lie in custody, liquidity of the underlying commodity, and storage.
5	Hybrid or synthetic stablecoins	• Backing: mix of fiat assets, crypto collateral, derivatives. • Economics: risk profile depends on design. Often combine liquidity risk (from fiat assets) and market volatility risk (from crypto). • Fragility: can inherit the weaknesses of both models if not carefully structured.

Source: Authors.

Annex 3: Model Variables and Parameters

Table A3 summarizes the ten endogenous model variables, alongside 14 model parameters.

Table A3. Model Variables and Parameters

#	Alias	Variable	Comments
Endogenous model variables (stocks, all end-of-period)			
1	L	Stablecoin balance	Liability of stablecoin issuer, at book value
2	B	Bond portfolio (market value)	Asset of stablecoin issuer, measured at market value
3	B^{ref}	Bond portfolio (par/book value)	Value of bonds held, reflecting only sales, not revaluation, during the simulation; needed when endogenizing the fire sale impact parameter (λ)
4	R	Cash reserves	Deposit-like reserve holdings, e.g., at banks or a central bank
5	U	Emergency debt	Additional liabilities possibly incurred, if B and R were depleted, under stress
Endogenous model variables (flows and related)			
6	i	Bond yield	Annualized yield to maturity of the bond portfolio
7	$f^{\$}$	Redemption flow	In monetary terms
8	$b^{\$}$	Fire sale flow	In monetary terms
9	π	Fire sale price impact	Decimal, i.e., -0.1 means -10% (means a 10% drop in price)
10	Δi^{fire}	Fire sale yield impact	Decimal, i.e., 0.01 means a 1 p.p. (100 bps) shift in yield
Other metrics, including ratios, as a function of endogenous model variables			
.	ALR	Asset-liability ratio	$(R + B)/L$
.	RR	Cash reserve ratio	R/L
.	f	Redemption flow rate	Redemption flow (f_t) over pre-redemption stablecoin balance (L_{t-})
.	b	Fire sale flow rate	Fire sale flow (b_t) relative to pre-sale bond portfolio size (B_{t-})
Parameters for initialization			
1	L_0	Initial stablecoin balance	Book value
2	RR_0	Initial cash reserve ratio	Initial cash-like reserve stock implied as $R_0 = RR_0 \times L_0$
3	ALR_0	Initial asset-liability ratio	Initial bond holding implied as $B_0 = B_0^{\text{ref}} = ALR_0 \times L_0 - R_0$
4	i_0	Initial bond yield	Annualized interest rate at the onset; decimal, i.e., 0.01 means 1%
Parameters			
5	D	Macaulay duration	Bond portfolio's Macaulay duration in years
6	χ	Modified convexity	Bond portfolio's convexity in years-square
7	σ	Diffusion parameter	Three parameters relevant for the stochastic interest rate process ("base noise", see eqs. 1 and 2).
8	τ	Mean reversion speed	
9	i^{LR}	Long run mean of i	
10	κ	Steepness of redemption rate response	Two parameters relevant for the function that relates the redemption flow rate f to the stablecoin issuer's asset-liability ratio (see eq. 5).
11	$f_{\max}$	Max daily redemption rate	
12	λ_0	Sales impact parameter	Three parameters relevant for the function that relates the bond market price impact to the stablecoin issuer's bond sales into the market (see eq. 13).
13	α	Functional shape of price impact	
14	γ	Dependence on duration	

References

Adrian, T., Bains, P., Bechara, M., Cerutti, E., Forte, S., Grinberg, F., Gullo, A., Hengge, M., Jekabsone, A., Kao, K., Mancini Griffolo, T., Martinez Peria, S., Miccoli, M., Reuter, M., and Sugimoto, N. (2025). "Understanding Stablecoins." IMF Departmental Paper, International Monetary Fund, Washington DC.

Ahmed, R., and Aldasoro, I. (2025). "Stablecoins and Safe Asset Prices." BIS Working Papers No. 1270, Bank for International Settlements, Basel.

Ahmed, R., Aldasoro, I., and Duley, C. (2025). "Public Information and Stablecoin Runs." BIS Working Papers No. 1164, Bank for International Settlements, Basel.

Ahmed, R., and Rebucci, A. (2024). "Dollar Reserves and U.S. Yields: Identifying the Price Impact of Official Flows." *Journal of International Economics,* 152.

Aldasoro, I., Mehrling, P., and Neilson, D. H. (2023). "On Par: A Money View of Stablecoins." BIS Working Papers No 1146.

Aldasoro, I., Aquilina, M., Lewrick, U., and Lim, S.H. (2025a). "Stablecoin Growth—Policy Challenges and Approaches." BIS Bulletin No. 108, Bank for International Settlements, Basel.

Aldasoro, I., Cornelli, G., Ferrari Minesso, M., Gambacorta, L., and Habib, M.M. (2025b). "Stablecoins, Money Market Funds and Monetary Policy." Economics Letters 247.

Aldasoro, I., and Doerr, S. (2023). "Who Borrows from Money Market Funds?" BIS Quarterly Review, December 2023, Bank for International Settlements, Basel.

ALFI (2022). "Swing Pricing—Update 2022." Survey conducted by the Association of the Luxembourg Fund Industry. https://www.alfi.lu/getattachment/8417bf51-4871-41da-a892-f4670ed63265/app_data-import-alfi-alfi-swing-pricing-survey-2022.pdf

Arner, D., Auer, R., and Frost, J. (2020). "Stablecoins: Risks, Potential and Regulation." BIS Working Paper No. 905, Bank for International Settlements, Basel.

Auer, R., Lewrick, U., and Paulick, J. (2025), "DeFiying Gravity? An Empirical Analysis of Cross-Border Bitcoin, Ether and Stablecoin Flows." BIS Working Paper No. 1265, Bank for International Settlements, Basel.

Barucca, P., Mahmood, T., and Silvestri, L. (2021). "Common Asset Holdings and Systemic Vulnerability Across Multiple Types of Financial Institution." *Journal of Financial Stability*, Vol. 52.

BCBS (2018). "Global Systemically Important Banks: Revised Assessment Methodology and the Higher Loss Absorbency Requirement." Basel Committee for Banking Supervision, Bank for International Settlements, Basel.

Bertsch, C. (2025). "Stablecoins: Adoption and Fragility." Working Paper.

Bibow, J. (2025). "Banking on Payments?" Levy Institute Working Paper No. 1091.

Bindseil, U., and Lanari, E. (2022). "Fire Sales, the LOLR, and Bank Runs with Continuous Asset Liquidity." *Journal of Financial Crises*, 4(4):77–102.

Bindseil, U., and Senner, R. (2023). "Destabilization of Bank Deposits across Destinations: Assessment and Policy Implications." ECB Working Paper No. 2942, European Central Bank, Frankfurt.

Bindseil, U., and Senner, R. (2025). “Revisiting National, Economic, and Monetary Sovereignty.” Available at SSRN: 5486546.

Bindseil, U. (2025). “Regulatory Responses to the Financial Stability Implications of Stablecoins.” Forthcoming.

BIS (2025). “The Next-Generation Monetary and Financial System.” Chapter 3 in BIS Annual Report 2025.

Bouchaud, J.-P., Farmer, J. D., and Lillo, F. (2009). “How Markets Slowly Digest Changes in Supply and Demand.” In T. Hens and K. R. Schenk-Hoppé (eds.), Handbook of Financial Markets: Dynamics and Evolution, Elsevier, Amsterdam, pp. 57–160.

Bullmann, D., Klemm, J., and Pinna, A. (2019). “In Search for Stability in Crypto-Assets: Are Stablecoins the Solution?” ECB Occasional Paper 230, European Central Bank, Frankfurt.

Caccioli, F., Ferrara, G., and Ramadiah, A. (2024). “Modelling Fire Sale Contagion Across Banks and Non-Banks.” *Journal of Financial Stability*, 71.

Cantú, C., Frost, J., and Noone, T.M. (2025). “Some Perspectives on the Regulation of Stablecoins.” *Law and Contemporary Problems*, 87:129–56.

Caccioli, F., Shrestha, M., Moore, C., and Farmer, J.D. (2014). “Stability Analysis of Financial Contagion Due to Overlapping Portfolios.” *Journal of Banking & Finance*, 46:233–45.

Cetorelli, N., Duarte, F., and Eisenbach, T. M. (2016). “Are Asset Managers Vulnerable to Fire Sales?” Federal Reserve Bank of New York, Liberty Street Economics.

Chanson, M., and Senner, R. (2022). “Stablecoins’ Quest for Money: Who is Afraid of Credit?” *The Journal of FinTech*, 2(01n02), 2250002.

Cont, R. and Schaanning, E. (2017). “Fire Sales, Indirect Contagion and Systemic Stress Testing.” Norges Bank Working Paper, 2.

Coste, C. E. (2024). “Toss a Stablecoin to your Banker-Stablecoins’ Impact on Banks’ Balance Sheets and Prudential Ratios.” ECB Occasional Paper 2024/353, European Central Bank, Frankfurt.

CPMI-IOSCO (2022). “Application of the Principles for Financial Market Infrastructures to Stablecoin Arrangements.” Bank for International Settlements, Basel.

D’Avernas, A., Maurin, V., and Vandeweyer, Q. (2023). “Can Stablecoins be Stable?” Working Paper.

Duarte, F. and Eisenbach, T. M. (2015). “Fire-Sale Spillovers and Systemic Risk.” Federal Reserve Bank of New York Staff Reports No. 645.

Dwyer, Jr. G.P. (1996). “Wildcat Banking, Banking Panics, and Free Banking in the United States.” *Economic Review (Federal Reserve Bank of Atlanta)*, 81(3):1–20.

Eichengreen, B., and Mathieson, D. (2000). “The Currency Composition of Foreign Exchange Reserves: Retrospect and Prospect.” IMF Working Paper 00/131, International Monetary Fund, Washington DC.

Ellul, A., Jotikasthira, C., and Lundblad, C. T. (2011). “Regulatory Pressure and Fire Sales in the Corporate Bond Market.” *Journal of Financial Economics*, 101:596–620.

ESRB (2025). “Crypto Assets and Decentralised Finance. Report on Stablecoins, Crypto-Investment Products and Multi-Function Groups.” ESRB Report, October 2025, European Systemic Risk Board, Frankfurt.

Fleming, M. J. (2024). “How Treasury Market Liquidity Improved in 2024.” Federal Reserve Bank of New York, *Liberty Street Economics*.

Frankel, J. A. (2000). “Impact of the Euro on Members and Non-members” In: The Euro as a Stabilizer in the International Economic System, Mundell, R., Clesse, A. (eds). Kluwer: Boston.

FSB (2023). ”High-Level Recommendations for the Regulation, Supervision and Oversight of Global Stablecoin Arrangements.” Final report, 17 July 2023, Financial Stability Board, Basel.

FSB (2024a). “2024 List of Global Systemically Important Banks (G-SIBs).” Financial Stability Board, Basel.

FSB (2024b). “Thematic Review on Money Market Fund Reforms.” Financial Stability Board, Basel.

FSB (2025). “Thematic Review on FSB Global Regulatory Framework for Crypto-asset Activities.” Peer review Report, 16 October 2025, Financial Stability Board, Basel.

Fu, Z. (2023). “Capital Flows and the Making of Risky Currencies.” Available at SSRN 4671508.

Garratt, R., and Shin, H.S. (2023). “Stablecoins versus Tokenized Deposits: Implications for the Singleness of Money.” BIS Bulletin No. 73, Bank for International Settlements, Basel.

Goel, T., Lewrick, U., and Agarwal, I. (2025). “Making Stablecoins Stable(r): Can Regulation Help?” Available at SSRN: https://ssrn.com/abstract=5070116.

Gorton, G.B., Klee, E.C., Ross, C.P., Ross, S.Y., and Vardoulakis, A.P. (2025). “Leverage and Stablecoin Pegs.” *Journal of Financial and Quantitative Analysis*, pp. 1–38.

Gorton, G.B., and Zhang, J.Y. (2023). “Taming Wildcat Stablecoins.” *The University of Chicago Law Review*.

Greenwood, R., Landier, A., and Thesmar, D. (2015). “Vulnerable Banks.” *Journal of Financial Economics*, 115(3):471–85.

Greenwood, R., and Vayanos, D. (2014). “Bond Supply and Excess Bond Returns.” *The Review of Financial Studies*, 27(3):663–713.

Gross, M., and Letizia, E. (2023). “To Demand or Not to Demand: On Quantifying the Future Appetite for CBDC.” IMF Working Paper No. 23/9, International Monetary Fund, Washington DC.

Gulde, A.-M., Hoelscher, D., Ize, A., Marston, D., and De Nicoló, G. (2004). “Financial Stability in Dollarized Economies.” IMF Occasional Paper 230, International Monetary Fund, Washington DC.

Hartmann P., and Issing, O. (2002). “The International Role of the Euro.” *Journal of Policy Modeling*, 24(4):315–45.

He, D., Kokenyne, A., Lavayssiere, X., Lukonga, I., Schwarz, N., Sugimoto, N., and Verrier, J. (2022). “Capital Flow Management Measures in the Digital Age: Challenges of Crypto Assets.” IMF Fintech Note No. 22/05, International Monetary Fund, Washington DC.

Illes, A., Kosse, A., and Wierts, P. (2025). "Advancing in Tandem—Results of the 2024 BIS Survey on Central Bank Digital Currencies and Crypto." BIS Papers No. 159, August 2025, Bank for International Settlements, Basel.

IMF (2023). "Elements of Effective Policies for Crypto Assets." IMF Policy Paper 2023/004, International Monetary Fund, Washington DC.

IMF (2025). "Global Financial Stability Report—Shifting Ground Beneath the Calm." International Monetary Fund, Washington DC.

Kosse, A., Glowka, M., Mattei, I., and Rice, T. (2023). "Will the Real Stablecoin Please Stand Up?" BIS Papers No 141, Bank for International Settlements, Basel.

Krishnamurthy, A., and Vissing-Jorgensen, A. (2012). "The Aggregate Demand for Treasury Debt." *Journal of Political Economy*, 120(2):233–67.

Kyle, A. S. (1985). "Continuous Auctions and Insider Trading." *Econometrica*, 53(6):1315–36.

Levchenko, A. A., and Mauro, P. (2007). "Do Some Forms of Financial Flows Help Protect Against "Sudden Stops"?" *The World Bank Economic Review*, 21(3):389–411.

Liao, G.Y., Fishman, D., and Fox-Green, J. (2024). "Risk-Based Capital for Stable Value Tokens." Working Paper.

Luckner, von C.M.G., Koepke, R., and Sgherri, S. (2023). "Crypto as a Marketplace for Capital Flight." IMF Working Paper No. 2024/133, International Monetary Fund, Washington DC.

Ma, Y., Zeng, Y., and Zhang, A.L. (forthcoming). "Stablecoin Runs and the Centralization of Arbitrage." *Review of Financial Studies*. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4398546

Oefele, N., Baur, D.G., and Smales, L.A. (2024). "Are Stablecoins the Money Market Mutual Funds of the Future?" *Journal of Empirical Finance*, 79.

Panetta, F. (2023). "Extending the Benefits of Digital Technologies to Cross-Border Payments." European Central Bank Blog Article, October 31, 2023.

Reuter, M. (2025). "Decrypting Crypto: How to Estimate International Stablecoin Flows." IMF Working Paper No. 2025/141, International Monetary Fund, Washington DC.

Rollnick, A.J., and Weber, W.E. (1983). "New Evidence on the Free Banking Era." *The American Economic Review*, 73(5):1080–91.

Salvatore, D., Dean, J. W., and Willet, T.D. (2003). *The Dollarization Debate*. Oxford University Press.

Shleifer, A., and Vishny, R. (2011). "Fire Sales in Finance and Macroeconomics." *Journal of Economic Perspectives*, 25(1):29–48.

Tong, H., and Wei, S. J. (2011). "The Composition Matters: Capital Inflows and Liquidity Crunch During a Global Economic Crisis." *The Review of Financial Studies*, 24(6):2023-52.

Wise (2023). *How Big Banks Block Small Businesses' International Ambitions*. Report.

Yeyati, E. L., and Sturzenegger, F. (2002). *Dollarization: Debates and Policy Alternatives*. The MIT Press.

PUBLICATIONS

From Par to Pressure: Liquidity, Redemptions, and Fire Sales With a Systemic Stablecoin

Working Paper No. WP/26/5