



# FINTECH

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## NOTES

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## **Regulating the Crypto Ecosystem**

### **The Case of Stablecoins and Arrangements**

Parma Bains, Arif Ismail, Fabiana Melo, and Nobuyasu Sugimoto

NOTE/2022/008

**FINTECH NOTE**

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Prepared by Parma Bains, Arif Ismail, Fabiana Melo, and Nobuyasu Sugimoto

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**Regulating the Crypto Ecosystem: The Case of Stablecoins and Arrangements**

NOTE/2022/008

Parma Bains, Arif Ismail, Fabiana Melo, and Nobuyasa Sugimoto\*

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## Acronyms/Glossary

AML .....	Anti–Money Laundering	FSB .....	Financial Stability Board
CFT .....	Combating the Financing of Terrorism	FSOC .....	Financial Stability Oversight Council (US)
CBDC .....	Central Bank Digital Currency	GFSR .....	Global Financial Stability Report
CPMI .....	Committee on Payments and Market Infrastructure	IMF .....	International Monetary Fund
DeFi.....	Decentralized Finance	IOSCO .....	International Organization of Securities Commissions
DEX.....	Decentralized Exchange	MMF .....	Money Market Fund
DIS .....	Deposit Insurance System	PFMI .....	Principles for Financial Market Infrastructures
DLT.....	Distributed Ledger Technology	SA .....	Stablecoin Arrangement
FDIC .....	Federal Deposit Insurance Corporation (US)	SSB .....	Standard Setting Body
FMI .....	Financial Market Infrastructure	USDT .....	Tether
		UST .....	TerraUSD

## Executive Summary

Stablecoins are crypto assets that aim to maintain a stable value relative to a specified asset or a pool or basket of assets.<sup>1</sup> To achieve stability, assets backing stablecoins are usually held.<sup>2</sup> These can be fiat currencies, bank deposits, short-term market instruments, and even other crypto assets. There are various types of stabilizing mechanisms, some of which are vulnerable to risks in a stressed market environment. So far, stablecoins have been issued by nonbanks, which are lightly regulated or unregulated. This paper focuses on stablecoins with a face value denominated in a monetary unit of account, such as the US dollar, and backed by financial assets, such as high-quality bonds.

Stablecoins have experienced periods of rapid growth, which also accelerated links between traditional finance and the crypto ecosystem. In 2021, the market value of stablecoins quadrupled in conjunction with the rise of decentralized finance (DeFi), although it has since fallen in line with the broader crypto market. Dollar-denominated stablecoins are growing in popularity in emerging market and developing economies as a potential store of value and hedge against inflation and exchange rate volatility, raising risks of dollarization and cryptoization. The involvement of large financial institutions in areas like reserve management, custody, and issuance has the potential to rapidly generate new risks. In addition, higher volatility correlation has been observed between stablecoins and stock markets, especially during recent market stress periods. Without proper regulation, contagion risks between traditional finance and crypto ecosystem will increase.

Comprehensive, consistent, and coordinated global standards are required to achieve effective crypto regulation and supervision, especially for stablecoins and their broader ecosystem. While sector-specific global standards are useful, cross-sectoral coordination is essential to achieve an effective regulatory framework for the crypto ecosystem, particularly stablecoins. The Financial Stability Board (FSB) is well placed to take the lead in coordinating and establishing global standards to support national regulation of crypto assets, including stablecoins, and their ecosystem (or “arrangements”), taking into account sector-specific standards developed by other standard setters.

Any global regulatory framework for stablecoins should be comprehensive, risk-based, and flexible, and it should provide a level playing field. The regulatory framework should be comprehensive, adequately covering all entities carrying out core functions, including issuers and crypto asset service providers that interact with the stablecoin, such as wallets, exchanges, and reserve managers. The regulatory framework needs to look at more than just the final economic functions, which will change over time and across countries. For instance, a stablecoin’s intended issuance may be for one purpose, but its primary use may be for another, and the same stablecoin may perform a different economic function in different jurisdictions (for example, hedge against inflation in one, and payment in another). Regulation should be risk based and ensure that the entities carrying out multiple activities are subject to greater prudential requirements. Regulation should provide a level playing field to ensure it is proportionate to the

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<sup>1</sup> Reference <https://www.fsb.org/work-of-the-fsb/financial-innovation-and-structural-change/crypto-assets-and-global-stablecoins/> and glossary in <https://www.fsb.org/wp-content/uploads/P160222.pdf>.

<sup>2</sup> In the case of algorithmic stablecoins there may be no backing assets.

risks and reflects the structural features, characteristics, and economic functions of the underlying stablecoin.

In particular, regulation should be risk-based, focusing on the structural features of stablecoins and in some cases their usage. This allows policymakers to look through terminology and marketing of issuers and intermediaries. Key risks to users stem from the inability of issuers to deliver on the purported structural features of their stablecoins. These include the denomination of the stablecoin's face value, investment mandate of the composition of reserves, and the pledge to redeem into cash. In some cases, regulation may need to be adapted for the use of stablecoins, such as to access the wider crypto ecosystem or represent bank deposits. Appropriate regulation would vary depending on the stablecoin's structural features and usage and ultimately its risks. Here are examples:

- Stablecoins denominated in a monetary unit of account and offering redemption into cash on demand—that will likely be used for payments—should be fully backed in perfectly safe and liquid assets. Here, regulation might take its cue from e-money frameworks. Where a stablecoin becomes widely used, requirements might be similar to those in bank regulation.
- Stablecoins offering redeemability within an elapsed time may be backed with safe but less liquid assets. And stablecoins offering redemption at the going market value of the underlying assets (or in kind) may hold riskier assets (for example, a tokenized bond). In these cases, regulation may also draw on that for money market funds (MMFs), including from constant net asset value funds.
- Issuers and intermediaries should clearly disclose and explain the structural features of their offering to end users.

Requirements on stablecoins should be tailored to address risks across the entire ecosystem and in relation to the three key functions of stablecoins. Although redemption risks are first order, other risks must also be addressed. Stablecoins involve not only the creation of assets that should be prudentially overseen but also the use of alternative infrastructure networks or transfer mechanisms that should be safe, sound, and efficient. The stablecoin ecosystem includes components that perform functions related to (1) issuance, redemption, and stabilizing mechanisms (involving issuers, reserve assets, custodians holding reserves, market makers, and individuals or entities in charge of governance); (2) transfer (involving, for instance, the network, network validators, and operators); and (3) access (normally through components such as wallets and exchanges). Key elements of the regulatory framework should address financial stability; consumer protection; credit; market; liquidity; operational, financial, market integrity; and concentration risks. Depending on the stablecoin arrangement structure and country circumstances, necessary regulatory adjustments would be different.

Given the variety of legal frameworks in IMF's membership, this note does not intend to be prescriptive on the legal denominations or design of the regulatory framework but to provide key elements that should feature in any regulatory arrangement (see table 1 for regulatory consideration). Global standard setting bodies (SSBs) are cognizant that various components of stablecoin arrangements may be performing an equivalent economic function to one performed by instruments and intermediaries of the traditional financial sector, and in some countries would already be subject to the legal and regulatory framework that applies to these ("same activity, same risk, same regulation"). In practice, available resources, existing legal and regulatory structure, and desired timeframe will ultimately affect domestic regulatory responses in different countries, while the novel nature of underlying technology might call for



same regulatory outcome rather than same regulation. While the design of domestic regulatory responses will vary, the following are essential:

- Authorities consider the most efficient and effective approach given the country’s circumstances. For example, in some countries it may be less resource-intensive and more expedient to narrow the universe of stablecoin issuers to entities that are already regulated and for which an established supervisory framework exists. This would reduce the need for regulatory adjustments to focus only on the risks arising from that activity. Authorities, however, would need to pay particular attention to risk management in these institutions and carefully assess interconnectedness and spillovers to the broader financial sector, and this may raise competition issues and limit user choice.
- Where currently unregulated/underregulated entities will be allowed to perform functions in the stablecoin ecosystem, authorities must develop bespoke regulation or revise existing regulatory frameworks to ensure that all entities that perform these functions are licensed or authorized. Licensing and authorization criteria should be clearly articulated, the responsible authorities clearly designated, and coordination mechanisms among them well defined. Regulation, supervision, and oversight for the various components should be proportional to the risks and functions to be performed and should adhere to the principle of “same risk, same activity, same regulation,” while considering the novel risks of the underlying technology.
- If those issuers become systemically important, authorities need careful analysis and regulatory adjustment to address new risks as well as contagion risks arising from stablecoin activities to other parts of their financial sector. They should apply requirements comparable to those applicable to systemically important banks—regarding more intensive supervision, safety and soundness, stress testing, recovery, and resolvability, while considering differences in business models, especially where stablecoins do not offer maturity transformation. Access to the financial safety net could be considered when stablecoins reach a systemic scale and when commercial banks issue their own stablecoins or tokenize their deposits, subject to safeguards.

Authorities must coordinate to address the risks arising from stablecoins both domestically and globally. By their very nature, stablecoins are cross-border, and stablecoins denominated in one currency might be used in markets that use a different unit of account. Issuers might be headquartered in one jurisdiction and market their services globally. This can lead to issues around capital flows and the monetary independence of jurisdictions. Dollar-denominated stablecoins held in emerging markets and developing economies can accelerate dollarization or cryptoization.

In markets where risks are growing quickly, authorities should take immediate action by using all the tools at their disposal. The growing systemic implications of crypto assets, including stablecoins, may warrant immediate regulatory actions, particularly in some emerging markets and developing economies. Regulators should use existing regulatory powers, guided by relevant international standards, and focus on areas of vulnerability, such as wallets, exchanges, and financial institutions’ exposures. Where stablecoins generate systemic risk, applicable regulatory requirements should reflect their main risks and economic functions, with rules aligned with those of similar products. The regulatory framework should retain the flexibility to incorporate the internationally coordinated standards for crypto assets and stablecoins that are under development at the FSB and other standard setters.

The alternative of restricting certain uses of stablecoins or imposing complete bans, while attractive in the short term, may constitute a disproportionate response to risk and is likely to be difficult to enforce in the long run. Where authorities face severe and immediate risks before the establishment of robust global standards, they may need to introduce measures to slow down stablecoin adoption in certain functions to protect customers and financial stability. However, those measures should not be seen as a permanent solution because there are strong incentives and technological alternatives for circumvention. Instead, authorities need to address the main drivers of stablecoin use, such as potentially weak macroeconomic conditions or unmet digital payment needs.

**Table 1. Recommendations for Prudential and Conduct Regulation of the Crypto Ecosystem: Stablecoins**

<b>Policy Objectives</b>	<b>Most Salient Risks</b>	<b>Regulatory Consideration</b>
<b>Financial Stability</b>	<ul style="list-style-type: none"> <li>▪ Run/liquidity risk</li> <li>▪ Interlink with wider financial sector and DeFi</li> <li>▪ Currency substitution and bank disintermediation</li> </ul>	<ul style="list-style-type: none"> <li>▪ Prudential requirements to address mismatches</li> <li>▪ Concentration limits</li> <li>▪ Cross-border cooperation</li> <li>▪ Compliance with PFMI (for designated and global stablecoin arrangements)</li> </ul>
<b>Consumer and Investor Protection</b>	<ul style="list-style-type: none"> <li>▪ Misleading disclosures</li> <li>▪ Inappropriate use of client assets</li> <li>▪ Conflicts of interest</li> <li>▪ Use of leverage</li> </ul>	<ul style="list-style-type: none"> <li>▪ Disclosure and audit requirements</li> <li>▪ Segregation of the reserve assets and restriction of the reuse of reserve assets</li> <li>▪ Implementation of IOSCO recommendations on crypto trading platforms</li> <li>▪ Limits or restrictions on the use of leverage</li> </ul>
<b>Operational and Cyber-Resiliency</b>	<ul style="list-style-type: none"> <li>▪ Operational failures</li> <li>▪ Cyberattacks</li> </ul>	<ul style="list-style-type: none"> <li>▪ Requirements for the robustness, resiliency, and integrity of operating system</li> <li>▪ Segregation of the client's private keys in cold wallets</li> <li>▪ Compliance with the PFMI where applicable</li> </ul>
<b>Financial Integrity</b>	<ul style="list-style-type: none"> <li>▪ AML/CFT</li> </ul>	<ul style="list-style-type: none"> <li>▪ Adopt Financial Action Task Force standards</li> </ul>
<b>Embracing the Potential of Stablecoins While Managing Risks</b>	<ul style="list-style-type: none"> <li>▪ Lack of sufficient powers or scope of regulatory authorities</li> <li>▪ Lack of regulatory resource and expertise</li> </ul>	<ul style="list-style-type: none"> <li>▪ Legislative change to empower regulators</li> <li>▪ Authorities to determine legal classification of stablecoins</li> </ul>

# Introduction<sup>3</sup>

## Scope

The FSB defines *stablecoins* as crypto assets that aim to maintain a stable value relative to a specified asset or to a pool or basket of assets.<sup>4</sup> This broad definition implies that stablecoins could be backed by a monetary unit of account such as the dollar or euro, a commodity such as gold, or a currency basket. The value of a stablecoin, as expressed against the asset to which it is pegged, would need to be stable if it is to be redeemed at par, in cash immediately, and at all times. Much hinges on how effective the stabilization mechanisms are and whether a stablecoin issuer has the means to honor a redemption request. Some stablecoins may be far from stable. Therefore, the use of the term to *stablecoins* in this note merely follows a common naming convention; it does not imply actual stability.<sup>5</sup>

This paper focuses on stablecoins with a face value linked to a commonly used monetary unit of account and backed by financial instruments. Currently, stablecoins with a face value linked to a monetary unit of account (for example, dollar-backed stablecoins) are used primarily in crypto asset markets to access other crypto assets across different exchanges and are growing especially rapidly as a means of generating yield in DeFi applications. But this class of stablecoins could see rapid adoption if it can ensure nominal stability relative to a unit of account widely used to price goods and services as well as financial assets. Such stablecoins could potentially become popular as a means of payment, including across borders, and as a store of value, and compete with other forms of money such as bank deposits, cash, or even central bank digital currency (CBDC) if introduced. Foreign currency stablecoins could also lead to currency substitution if they are used as a store of value and means of payment in countries with weak currencies.

This note—and its companion note on *Regulating the Crypto Ecosystem: The case of Unbacked Crypto Assets* (Bains and others 2022)—builds on the key elements of *Regulation of Crypto Assets* (Cuervo and others 2020). The two Fintech Notes together provide a closer look at the regulatory challenges brought by unbacked crypto assets, asset-backed stablecoins, and their ecosystem. In January 2020, staff issued a Fintech Note discussing various elements on the regulation and supervision of crypto assets.<sup>6</sup> The note covered (1) risk assessment of crypto assets, initial coin offerings, crypto asset exchanges, and stablecoins; and (2) regulation of crypto assets, initial coin offerings, and crypto asset exchanges. That paper raised some important regulatory issues and considerations of stablecoins; however, it did not discuss their regulation in detail, nor did it look closely at other entities and functions of the broader crypto asset ecosystem. This note reflects evolving market developments and their associated risks, as well as regulatory and supervisory developments, and provides a closer look at rapidly growing elements such as stablecoins and their arrangements. It also discusses other key entities

<sup>3</sup> Any reference to existing crypto assets and companies in this paper uses publicly available information and does not mean to endorse or analyze specific features of crypto assets or arrangements.

<sup>4</sup> Reference <https://www.fsb.org/work-of-the-fsb/financial-innovation-and-structural-change/crypto-assets-and-global-stablecoins> and glossary in <https://www.fsb.org/wp-content/uploads/P160222.pdf>.

<sup>5</sup> In fact, many if not most marketed “stablecoins” are neither stable nor coins. See P. Krugman’s opinion piece, “[From the Big Short to the Big Scam](#),” *The New York Times*, June 6, 2022.

<sup>6</sup> Cuervo, Morozova, and Sugimoto (2020), <https://www.imf.org/en/Publications/fintech-notes/Issues/2020/01/09/Regulation-of-Crypto-Assets-48810>.

that carry out core functions in the stablecoin ecosystem. The main purpose of this note is to help regulators and supervisors identify key challenges and risks, providing high level guidance for their consideration when designing a regulatory and supervisory approach to address risks.

This note is part of a broader set of IMF publications focused on crypto assets and digital money. In addition to the *Regulation of Crypto Assets* Fintech Note (Cuervo and others 2020), the companion Fintech Note *Regulating the Crypto Ecosystem: The Case of Unbacked Crypto Assets* (Bains and others 2022) covers closely related issues of the wider ecosystem, such as crypto asset exchanges and wallet service providers. Other IMF publications have covered crypto assets and financial integrity (Schwarz and others 2021),<sup>7</sup> digital money,<sup>8</sup> and capital flow management measures in the digital age (He and others 2022).<sup>9</sup> The Fintech Note on blockchain consensus mechanisms (Bains 2022) focuses narrowly on the underlying technology that delivers crypto assets.<sup>10</sup> The greater role of BigTech entities in the crypto asset ecosystem is an important development, and the *BigTech in Financial Services* Fintech Note (Bains, et al. 2022) discusses the unique regulatory considerations required to manage their risks.<sup>11</sup>

The IMF has also recently dedicated two *Global Financial Stability Report* (GFSR) chapters, including policy recommendations, to the crypto asset ecosystem. A chapter of the October 2021 GFSR explores the growing systemic risk of crypto assets, including stablecoins,<sup>12</sup> while the April 2022 chapter covers DeFi lending, in which stablecoins play an important role. In the chapter, the authors argue that proper stablecoin regulation is essential for the overall stability of DeFi applications. The IMF has also discussed crypto asset risks in a series of blogs exploring both the risks of crypto assets as legal tender<sup>13</sup> and the regulatory implications of the growth of crypto asset markets. The latter blog called for a global regulatory framework that provides a level playing field along the activity and risk spectrum, to be led by a global standard-setting body, such as the FSB.<sup>14</sup>

While CBDC is outside the scope of this note, some recommendations may be relevant to components of the CBDC ecosystem that have similar characteristics. Service providers and technologies related to CBDC could be subject to risks and challenges similar to those of stablecoin arrangements and other crypto ecosystems, to the extent that they rely on private sector firms to provide critical services, as most CBDC projects do. These may include technology vendors and wallet service providers, which should be subject to the same regulatory approaches discussed in this note.

## Why Stablecoin Regulation Matters

Stablecoins have grown rapidly, with market capitalization quadrupling in 2021 (Figure 1), coupled with the growth of DeFi. Market capitalization reached a peak of over \$175 billion in December 2021<sup>15</sup> before falling to less than \$160 billion by mid-2022. During the phase of rapid growth in 2021, stablecoin trading

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<sup>7</sup> [Virtual Assets and Anti-Money Laundering and Combating the Financing of Terrorism \(1\) \(imf.org\)](#).

<sup>8</sup> [The Rise of Public and Private Digital Money \(imf.org\)](#).

<sup>9</sup> [Capital Flow Management Measures in the Digital Age \(imf.org\)](#).

<sup>10</sup> [Blockchain Consensus Mechanisms \(imf.org\)](#).

<sup>11</sup> [BigTech in Financial Services \(imf.org\)](#).

<sup>12</sup> [Global Financial Stability Report, October 2021 \(imf.org\)](#).

<sup>13</sup> [Cryptoassets as National Currency? A Step Too Far \(IMF Blog\)](#).

<sup>14</sup> [Global Crypto Regulation Should be Comprehensive, Consistent, and Coordinated \(IMF Blog\)](#).

<sup>15</sup> According to DeFi Pulse; see <https://www.defipulse.com/>.

volumes outpaced those of all other crypto assets, primarily because they are usable for the settlement of spot and derivative trades across crypto asset platforms and applications without the need to convert to fiat currencies. DeFi also grew during this period to around \$100 billion by December 2021,<sup>16</sup> supported by the availability of stablecoins in a symbiotic two-way relationship, before falling significantly in 2022.

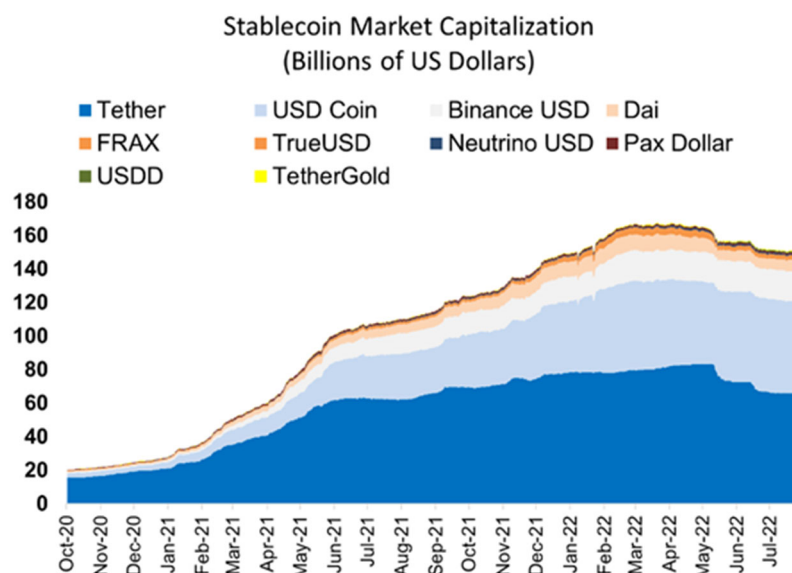
The growth of stablecoins is linked to the growth of crypto markets and DeFi. Stablecoins are the “currency” of DeFi and enable other services. DeFi aims to provide financial services without centralized financial entities, although centralization exists to varying degrees. It operates on permissionless blockchains where financial transactions are executed automatically based on predefined conditions through programmed smart contracts. Operations such as developing protocols, decision-making, and liquidation are conducted autonomously and often anonymously. While DeFi activities are mostly conducted on chain, admin key and governance token holders provide an avenue of centralization.<sup>17</sup> The GFSR observed that DeFi seems to be largely used by a small number of institutional entities, but because of pseudonymity of on-chain data, these were not identifiable. Anecdotal evidence suggests those entities include market makers and hedge funds, with many protocol developers funded by venture capitalists, especially in advanced economies. The GFSR concluded that the regulatory approach for DeFi should focus on elements of the crypto ecosystem that enable DeFi, such as stablecoin issuers (which define technical specification and use cases); centralized crypto exchanges and hosted wallet service providers (which connect crypto markets with the broader financial system); and reserve managers, network administrators, and market makers (which play important roles in operationalization and stability).

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<sup>16</sup> DeFi includes decentralized exchanges that allow users to trade crypto assets without an intermediary, and credit platforms that match those of borrowers and lenders without the need for a credit risk evaluation of the borrower, among other growing uses.

<sup>17</sup> Many decentralized applications (dApps) allow token holders to have voting rights, with those holding a greater proportion of tokens having a greater share of voting rights. In other dApps, only a certain class of token has voting rights, and these tokens are conferred on a select group of individuals and/or entities.

Figure 1. The Growth of Stablecoins by Market Capitalization



Risks will increase as unregulated stablecoins grow, as they become more interconnected with the existing financial system, and if they become used as a means of payment and store of value. Stablecoins supported by high-quality and liquid reserves could potentially become a stable store of value. This stable store of value will advance the stated goal of many stablecoins—to create a means of payments and become a credible, widely accepted means of exchange. Although that is not yet the case (stablecoins are mainly used within the crypto ecosystem), they could be widely accepted by, and become interconnected with, existing financial entities and payment infrastructures in the future. They could also potentially be used to improve the efficiency of cross-border payments. However, absent robust regulatory frameworks, prudential, conduct, and payment system–related risks will increase across the stablecoin ecosystem, potentially leading to instability.

Stablecoins could be used as a hedge against inflation and weak currencies in emerging markets and developing economies and exacerbate currency substitution. Crypto asset adoption in some emerging markets and developing economies has outpaced that of advanced economies, particularly in retail holdings. Stablecoins could potentially be issued by BigTech or other large technology-driven firms that enjoy international recognition among a broad range of users, thereby providing greater convenience and an additional sense of security to users, especially in emerging markets and developing economies with weak macroeconomic conditions. This could accelerate currency substitution through crypto assets (cryptoization) and could be the source of spillovers into the exchange rate market as described in the October 2021 *Global Financial Stability Report*.

Given the potential involvement of BigTech,<sup>18</sup> some stablecoins could also be systemic at launch, or quickly scale. A stablecoin ecosystem could combine features that attract a broad range of users

<sup>18</sup> Other large technology-driven entities such as PayPal have also led developments in the crypto asset space.

across multiple jurisdictions. While the Diem project is no longer led by Meta, other BigTech entities could enter financial markets by issuing a stablecoin and developing its ecosystem or by partnering with existing stablecoin issuers. The potential involvement of BigTechs as issuers or members of the stablecoin ecosystem, counting on their large consumer base and potential for strong network effects in payment and remittance services, could result in stablecoins' quickly achieving systemic importance.

Standard-setting bodies are advancing the development of global standards to address risks in stablecoin arrangements, but the focus so far has been narrow. Some cross-sectoral standards apply, such as the Financial Action Task Force standards for anti-money laundering and combating the financing of terrorism (AML/CFT), but their scope is limited (financial integrity). The FSB's 10 high-level recommendations for regulation, supervision, and oversight are also cross-sectoral but apply only to global stablecoins. Additionally, the Committee on Payments and Market Infrastructures (CPMI) and the International Organization of Securities Commissions (IOSCO) have published guidance on how their Principles for Financial Market Infrastructures might be relevant for systemic stablecoin arrangements. IOSCO has also published guidance on crypto asset trading platforms (commonly known as crypto asset exchanges). The Basel Committee on Banking Supervision has issued two consultation papers on the prudential treatment of bank exposures to crypto assets (June 2021 and June 2022).

More coordination is required among standard setters to develop comprehensive international standards, especially for nonsystemic stablecoins. Further coordination is necessary to address the risks stablecoins pose to financial stability, financial and market integrity, operational stability, and consumer and investor protection—particularly for stablecoins that are not considered global or systemic. In this regard, the FSB's recent work on the vulnerabilities concerning existing stablecoins and the recent statement on international regulation and supervision of crypto asset activities are steps in the right direction.<sup>19</sup> Nonglobal or nonsystemic stablecoins tend to share many of the risks with global stablecoins; therefore, it is necessary to apply similar but proportionate rules to address those risks. This paper aims to contribute to this endeavor by identifying considerations for potential regulatory responses to emerging risks.

## I. The Stablecoin Ecosystem: Components and Risks

The various components of the stablecoin ecosystem perform functions related to issuance of, transfer of, and access to stablecoins.<sup>20</sup> First, stablecoins need to be created (or destroyed) and associated with a stability mechanism. These functions will involve stablecoin issuers (which may hold a balance sheet consisting of tokenized customer funds as liabilities); reserves assets; and other related components, such as custodians holding reserves, market makers, and individuals or entities in charge of governance. Second, stablecoins are traded and transferred, and several components of the ecosystem are involved

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<sup>19</sup> FSB *Assessment of Risks to Financial Stability from Crypto-assets*, February 2022 <https://www.fsb.org/wp-content/uploads/P160222.pdf> and FSB *Statement on International Regulation and Supervision of Crypto-asset Activities*, July 2022 <https://www.fsb.org/wp-content/uploads/P110722.pdf>.

<sup>20</sup> See FSB, *Regulation, Supervision and Oversight of "Global Stablecoin" Arrangements: Final Report and High-Level Recommendations*, October 2020.

in these functions: the network, network operators, and validators. Third, stablecoins need to be accessed by end users, normally through components such as wallets and exchanges.

Depending on the arrangements, these functions may be carried out by the same or different entities and generate risks unique to their specific functions. In some stablecoin arrangements, the same firm is involved in issuance, transfer, and access. Others involve multiple specialized firms. In some cases, several firms or individuals provide the same function, such as multiple technology vendors managing a network, or several custodians over which reserves are split.

Crypto exchanges provide important services and functions and may carry out multiple activities. They act as underwriters and distributors at the issuance stage. Many stablecoin issuers rely on crypto exchanges as redemption gates. Some crypto exchanges act as market makers of stablecoins, which perform important stabilization functions. Crypto exchanges also perform transfer functions among their own wallets through off-chain transactions. Crypto exchanges often provide hosted wallet services to their account holders.<sup>21</sup>

Each function of the stablecoin ecosystem is associated with important challenges and risks arising from the specific functions undertaken and the combination thereof. The most salient challenges related to the issuance functions are liquidity mismatch and run risk, legal certainty, sound governance, consumer/investor protection, and concentration of economic power to key service providers. Other risks are also relevant, including risks to operational resiliency, cybersecurity, and data protection. The functions associated with the transfer of stablecoins raise concerns regarding sound governance, operational resilience, cyber-resilience, and safety and integrity. Finally, components performing functions related to access to stablecoins are vulnerable to issues such as financial integrity, consumer protection, data privacy, and cybersecurity.

Some recent initiatives to identify challenges and risks from stablecoin arrangements and propose regulatory responses have also focused on the underlying functions of stablecoins. For instance, the US president's Executive Order on the development of digital assets, focused on payment stablecoins, highlighting risks emanating from the issuance, transfer, and access functions, where the first raises stability and run risks, the second transfer risks, and the third concentration risks. These are summarized in Box 1.

### **Box 1. US President's Working Group on Financial Markets and Executive Order on Ensuring Responsible Development of Digital Assets<sup>1</sup>**

In November 2021, the US president's Working Group on Financial Markets published a report focused on the potential for increased use of stablecoins as payments, foreshadowing the potential regulatory direction in the United States. The report (US President's Working Group, November 2021) states that the current regulatory framework does not adequately manage the risks of payment stablecoins, so it calls for urgent legislative action to impose federal prudential regulation and overcome gaps (see page 16). New federal legislation would "complement existing authorities

<sup>21</sup> For more detail on crypto exchange functions, see the companion note on the regulation of unbacked crypto assets.



with respect to market integrity, investor protection, and illicit finance,” and would address three broad areas:

- 1. Stability/run risks:** To address risks to stablecoin users and guard against stablecoin runs, legislation should require stablecoin issuers (institutions or holding companies) to be insured by depository institutions subject to supervision and regulation (including capital, liquidity, and resolution requirements) and eligible for Federal Reserve emergency liquidity.
- 2. Transfer risks:** To address payment system risk, legislation should require federal oversight over stablecoin issuers and custodial wallet providers. Any entity that performs critical functions for stablecoin arrangements should be required to meet appropriate risk-management standards.
- 3. Concentration risks:** To address concerns about systemic risk and concentration of economic power, stablecoin issuers and wallet providers should have restrictions that limit affiliation with commercial entities. Standards to promote interoperability among issuers should be introduced to address concentration of economic power. Other standards for custodial wallet providers, such as on accessing users’ transaction data, should also be considered.

Absent Congressional action, the report recommends that certain activities of stablecoin arrangements be considered as systemically important. This designation by the Financial Stability Oversight Council (FSOC) would trigger the application of relevant risk-management standards and examination and enforcement frameworks.

In March 2022, the US president issued an executive order on ensuring responsible development of digital assets (White House 2022). The executive order calls for measures to do the following:

- Protect US consumers, investors, and businesses by directing the Department of the Treasury and other agency partners to assess and develop policy recommendations to address the implications of the growing digital asset sector and changes in financial markets for consumers, investors, businesses, and equitable economic growth. The order also encourages regulators to ensure sufficient oversight and safeguard against any systemic financial risks posed by digital assets.
- Protect US and global financial stability and mitigate systemic risk by encouraging the FSOC to identify and mitigate economy-wide (i.e., systemic) financial risks posed by digital assets and to develop appropriate policy recommendations to address any regulatory gaps.
- Promote US leadership in technology and economic competitiveness to reinforce US leadership in the global financial system by directing the Department of Commerce to work across the US government in establishing a framework to drive competitiveness and leadership in and leveraging of digital asset technologies. This framework will serve as a foundation for agencies and integrate this as a priority into their policy, research and development, and operational approaches to digital assets.

- Support technological advances and ensure responsible development and use of digital assets by directing the US government to take concrete steps to study and support technological advances in the responsible development, design, and implementation of digital asset systems while prioritizing privacy, security, combating illicit exploitation, and reducing negative climate impacts.

The executive order also described the next steps where the relevant authorities are assigned to produce reports to achieve the objectives described previously. For example, within 210 days of the date of this order, the Secretary of the Treasury should convene the FSOC and produce a report outlining the specific financial stability risks and regulatory gaps posed by various types of digital assets and provide recommendations to address such risks.

<sup>1</sup> The executive order covers a range of issues, including central bank digital currency. This box summarizes issues relevant to the scope of this note.

The remainder of this note explores these key components and functions, the risks and challenges they might generate, and potential regulatory responses. As mentioned, components that perform key functions within the ecosystem are both sources of, and vulnerable to, risks. This note focuses on elements that are unique to stablecoins and proposes regulatory considerations. Some components (like wallets and exchanges) that are relevant to stablecoin arrangements are also key elements of the broader crypto ecosystem and are therefore covered in the companion Fintech Note, *Regulating the Crypto Ecosystem: The Case of Unbacked Crypto Assets* (Bains, et al. 2022).

In addition to the functions of stablecoins, regulators should track their use, which may change over time and across countries. The use of the same stablecoin could differ across countries—for instance, a stablecoin may be designed mainly for payment purposes in one country but function as an investment vehicle in other countries. In some countries, the main use case of stablecoins may be to provide access to other crypto assets, whereas in other countries it may be to serve as an inflation hedge. Regulation might reflect these changing uses to ensure that new risks arising from changing uses are managed. Cross-sectoral cooperation is important to ensure that regulation is consistent and addresses the risks across jurisdictions in line with “same risk, same regulation.”

## II. Issuance, Redemption, and Stabilization

Stablecoins backed by financial instruments usually have an identifiable issuer, unlike many unbacked crypto assets. They are more likely to be issued by a single issuer or a small number of known issuers (such as a consortium) in a closed network. The destruction of stablecoins is also usually carried out by the issuer. Issuers could be banks, nonbank financial entities, and large technology conglomerates known as BigTech.

Decisions for stablecoin arrangements are usually taken by a governance body. The power and composition of these governance bodies are likely to differ among arrangements, but in many stablecoin arrangements governance bodies are composed of token holders with governance rights. These rights

may be distributed broadly in an open manner or be concentrated in a few known entities that exercise ultimate control. Governance rights may be held by just an issuing entity, or they could be held by broader network members (such as network administrators). They may include decisions on the type of assets that reserves can be invested in and on setting the collateral ratio (in instances of overcollateralization).

A key element of stablecoin issuance is the stabilization mechanism, which aims at reducing volatility and underpins the holder's expectation that stablecoins will be redeemed at par, on demand, and in any state of the world. For most stablecoins covered in this note, the stabilization mechanism is a peg to a fiat currency, sustained by reserves. Stablecoin issuers and network administrators face pressure from end users to meet redemptions at, or very close to, par upon request, even if issuers have no obligation to do so. The ability to meet such requests hinges on the safety and liquidity of the assets held as reserves. The management of reserves is specified by the governing body (usually the issuer). Reserves are typically held in custody by a third party, such as a financial institution. Reserves, though, can vary along a continuum from highly liquid to illiquid depending on the redemption pledge by the issuer and the redemption needs from the end-holders.

Banks may also be issuers of stablecoins or crypto asset-linked products. Typically, applicable laws and regulations in many jurisdictions do not allow banks to issue stablecoins directly, but banks can create a special-purpose vehicle or subsidiary to do so in the same way as nonbank issuers. In addition, some banks are considering tokenizing their deposits (Box 2). Some banks are considering issuing stablecoins to allow for more efficient payments and delivery compared with payment of securities. The latter may occur within a closed network created by a consortium of banks (for example, Utility Settlement Coins initiated by UBS Group but with wider participants).

Some stablecoins are being tested for domestic payment services and cross-border remittances. For example, some issuers offer debit cards using stablecoins, thereby linking the stablecoin universe with the full array of payment services, although few merchants accept such payments. In another example, Novi, a Meta-owned subsidiary, launched a pilot program of remittances, since closed, that partnered with Coinbase, a centralized crypto asset service provider. The pilot involved users in the United States and Guatemala, with a maximum value of \$1,000 per wallet. Novi used a stablecoin (Pax Dollar) for domestic payment and remittance services, and users could transfer money within the United States and between United States and Guatemala through WhatsApp. Some crypto exchanges have also introduced credit and debit cards to their users.

### **Box 2. Stablecoins Issued by a Commercial Bank and Deposit Tokenization<sup>1</sup>**

Some commercial banks are actively exploring the potential of stablecoins and distributed ledger technology (DLT) applications. J.P. Morgan is developing JPM Coin. Silvergate Bank purchased a blockchain-based network from the Diem group. UBS Group is leading the project for Utility Settlement Coin. Many of those projects aim to reduce the cost and time of money transmission for their customers.

In some jurisdictions, banks are not permitted to directly issue stablecoins. In those jurisdictions banks may need to wait for the authorities to clarify and add stablecoin issuance activities as permitted activity. Alternatively, some banks are considering establishing a subsidiary

or an affiliate to issue their coins. In those cases, the banking regulator may consider the issuing subsidiary sufficiently relevant to be included in the scope of consolidation. Many of the prudential regulations (such as capital, liquidity, and concentration limits), therefore, would be applicable to the exposures of the issuing entities. In addition, those entities are likely to be subject to any new regulation specifically applicable to stablecoin issuers and virtual asset service providers. It is expected that such stablecoin regulations would be imposed regardless of issuer's ownership structure, in addition to bank regulations that would be applicable at the group level.

Issuing banks are focusing on permissioned networks and stricter policies around unhosted wallets. Permissionless networks and unhosted wallets make it very difficult for banks to comply with existing regulations. Therefore, projects led by commercial banks aim to eliminate or minimize certain risks arising from permissionless network and unhosted wallets (such as settlement finality and anti-money laundering and combating the financing of terrorism [AML/CFT] risks). Many existing projects choose permissioned networks, allowing only existing account holders or hosted wallets.

Alternatively, banks are exploring the option of tokenizing deposits. Tokenization of deposits means that “bank depositors would be able to convert their deposits into and out of digital assets—the tokenized deposits—that can circulate on a DLT platform. These tokenized deposits would represent a claim on the depositor's commercial bank, just as a regular deposit does.”<sup>2</sup> The idea is that this would address some of the risks and some of the regulatory and legal uncertainties of stablecoins. For regulators, that would mean that, in principle, these tokenized deposits would be subject to existing regulations (including prudential, conduct, and AML/CFT). Although not yet clearly defined or operational, tokenized deposits would operate and transfer in a closed network and only among existing bank account holders.

Nevertheless, the operational aspects of tokenization of liabilities are complex, and banking regulation and supervision would need to be adjusted to address potential new features and risks.<sup>3</sup> For tokenized deposits to work as intended, it would be necessary that the DLT network would ensure instant settlement, and that tokenized deposits issued by a bank were interchangeable with tokenized deposits issued by another bank. In addition, while tokenized deposits would operate in a safer environment than stablecoins, they may create additional risks to the issuing banks and the users. For example, hosted wallet services are likely to be provided by the issuing banks themselves, and so banks may need to provide support in case the end users lose their private keys. If banks rely on third parties for key functions, the same concerns expressed in this note regarding third-party risks would apply. The legal and regulatory framework may also need to be adjusted to address new features and risks. Legal status of the tokenized deposits would need to be established or clarified in all countries if tokenized deposits are used for cross border payments.

<sup>1</sup> Caroline Wu and Nobu Sugimoto are the authors of this box.

<sup>2</sup> NYFED (February 2022) *The future of payments is not stablecoins*  
<https://libertystreeteconomics.newyorkfed.org/2022/02/the-future-of-payments-is-not-stablecoins/>.

<sup>3</sup> <https://www.citibank.com/ts/insights/articles/article191.html>.

## Challenges and Risks

Key risks to consumers and markets can arise from issuance functions. These functions include components related to the issuer itself as well as the governance of the arrangements (including decisions on composition of reserves, reserve custodians, and redemption). The risks and risk drivers are related not only to the characteristics of the stability mechanisms and reserves—which underpin stablecoins’ price stability—but also the governance and management of risks such as operational risk, conflicts of interest, and concentration.

### a) Reserve Composition, Allocation, and Management

The composition of reserves can generate not only risks to consumers and investors but also financial contagion and instability. Risks stem from reserves’ being insufficient, risky, illiquid, or opaque—and concentrated. Some stablecoins are backed by risky and illiquid assets, including commercial paper, and in those cases, reserves might not always be redeemable at par. The incentive for investing in less liquid, higher-risk assets generally comes from a search for yield but could also be the result of, for example, conflicts of interest between the issuer and its related parties (such as crypto exchanges). As described in Box 3, the reserves of one major stablecoin have not always covered the value of stablecoins issued. Even if the value of assets exceeded the value of stablecoins issued, the reserves were not always cash or cash equivalent.

The composition and allocation of reserves are often opaque, elevating risks of conflict of interest between issuers and custodians and of misappropriation of reserve assets. While some stablecoins provide attestations, major issuers (including Tether, Circle, and Binance) are yet to release audit reports regularly by independent auditors. An investigation<sup>22</sup> by the New York attorney general also revealed that Tether lent a substantial amount of its reserve assets to its related party (Bitfinex), raising concerns of misappropriation (see Box 3).

Concentration of reserves in certain institutions and on certain assets brings risks to consumers, investors, and the financial system. Many commercial banks avoid establishing relationships with stablecoin issuers for several reasons, including regulatory uncertainty and concerns about financial integrity. As a result, stablecoin issuers may place reserves in only a few commercial banks. Moreover, the asset allocation of stablecoin reserves tends to be relatively undiversified. Asset concentration may have implications of systemic risk, as liquidity pressures from higher redemptions of stablecoins would create a stronger impact on the market for the underlying assets.

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<sup>22</sup> *New York Attorney General ends virtual currently trading platform Bitfinex’s illegal activities in New York* (February 2021)

### Box 3. Tether and Its Reserves

Recent disclosures<sup>1</sup> show that Tether, the world's largest stablecoin by market capitalization, which has reached a market capitalization of over \$60 billion, may have exposed users to significant risks, raising consumer and user protection concerns. Lack of information about the profile and location of Tether's users makes it difficult to conduct a meaningful analysis of systemic implications. The issuing entity of Tether is domiciled in the British Virgin Islands and is largely unregulated. While Tether is pegged to the dollar, US authorities may have limited influence over the issuer. At the same time, Tether is not available to US households and firms.<sup>2</sup>

US authorities have taken some enforcement actions. The office of the New York attorney general identified that a significant amount of Tether's reserve assets had been provided to its related crypto exchange (Bitfinex), which was suffering from a liquidity shortage without proper disclosure—this loan would not have been allowed if Tether were a financially regulated entity. In February 2021, Bitfinex and Tether agreed to pay a fine, cease their services to New York residents and entities, and start providing quarterly transparency reports. The Commodity Futures Trading Commission also identified that Tether held sufficient fiat reserves for only 27.6 percent of the days in a 26-month sample period from 2016 through 2018 and imposed civil monetary penalties in October 2021.

The recent disclosures (at the end of March 2022) still lack important information but make it clear that Tether's assets risk exposures are still high. Only 6 percent of Tether is backed by cash, indicating liquidity mismatches as Tether allows direct and "immediate" redemption at face value into US dollars through Bitfinex, with small fees (although it reserves the right to delay redemptions or redeem in kind with reserve assets). Exposures to commercial paper and MMF are high (28 percent and 10 percent, respectively). To respond to the order from New York attorney general and Commodity and Futures Trading Commission (CFTC), the issuer began to disclose more details in 2021, including duration and credit ratings of the bond and loans, although not the issuers of the bonds and loans and their geographic information. The issuer also increased their liquidity by holding US treasury bills (which account for 56 percent).

<sup>1</sup> [Transparency \(tether.to\)](https://www.tether.to/transparency).

<sup>2</sup> Terms of service of Tether prohibit a US person from using any services offered by Tether.

Greater use of stablecoins could trigger fire sales of collateral assets in stress, bringing risks to the broader financial sector. If use were to grow and as users expect to be able to redeem their stablecoins quickly at par, issuers and service providers may need to sell bonds and withdraw bank deposits. Depending on the size, nature, and concentration of the reserve assets, if large issuers have trouble, this might have a negative impact not only on the token holders but also on the broader financial sector, such as banks and bond markets (see Box 4). Any collapse in the price—or trust—of stablecoins could trigger further redemptions, adding pressure on short-term credit markets already hit by the liquidation of stablecoin reserve holdings. Some analyses have suggested that the price instability of stablecoins and

concerns over insufficient reserve assets could be related to trading activities of their affiliated exchanges in the unbacked crypto market.<sup>23</sup>

#### Box 4. Failures of Algorithmic Stablecoins<sup>1</sup>

Algorithmic stablecoins are generally not significant—but it is important to observe how developments in algorithmic stablecoins can affect the wider crypto market. The collapse of TerraUSD is a good example on how runs on even small stablecoins can have ripple effects on the trust of the broader crypto ecosystem.

In May 2022, TerraUSD (UST), the third largest stablecoin and the largest algorithmic stablecoin (market cap at \$18 billion before the crash), experienced a sudden failure. The collapse of UST started from a \$2.5 billion UST withdrawal from Anchor (a decentralized finance lending platform on Terra blockchain) on May 8, for unclear reasons. On the same day, \$150 million in UST liquidity was removed from UST's primary decentralized exchange (DEX), Curve3Pool (DAI, Tether [USDT], USD Coin (USDC)), to test for an upgrade of the Curve4Pool (UST, FRAX, USDT, USDC),<sup>2</sup> leaving the liquidity pool balanced but much smaller. Within a few hours after the withdrawal, a few unforeseen large swaps to other stablecoin occurred (the highest at \$85 million), leaving the liquidity pool extremely unbalanced and vulnerable to even small transactions.<sup>3</sup>

The stabilization protocol was able to maintain the peg within 200 basis points for one day,<sup>4</sup> but the panic sell-off of UST continued and eventually outran the stabilization mechanism. Notably, large depositors disproportionately withdrew from UST, adding to the pressure and leaving smaller depositors more exposed. UST eventually depegged on May 9, sending it into a death spiral (the supply of LUNA exponentially increased as an attempt to repeg UST, but at the same time greater supply meant more selling pressure on LUNA's price). By May 16, the price of UST dropped to \$0.16 and the price of LUNA fell from over \$80 to \$0.0002.

UST/LUNA's failure rippled through the entire crypto ecosystem because of Luna Foundation Guards' (LFG) attempt to defend the peg by selling \$2 billion worth of bitcoin.<sup>5</sup> Bitcoin price sharply fell by \$2,000 right before UST first materially depegged. Tether, the largest stablecoin, also dropped below its peg on secondary markets.

Algorithmic stablecoins rely on a smart contract-based algorithm to regulate between a pair of tokens, a stablecoin, and a balance token, although details can differ from model to model. The price-stabilizing arbitrage is performed when the value of one stablecoin is higher than \$1, to burn \$1 of balance token and mint one stablecoin and, in contrast, when the value of one stablecoin is lower than \$1, to burn stablecoin and mint the balance token until the stablecoin returns to the peg.<sup>6</sup> This mechanism is vulnerable as the balance token (LUNA) is also issued by Terraform Labs and thus relied on market confidence on Terraform Labs.

The stability of algorithmic stablecoin protocols relies to a large extent on market confidence and market making by and through exchanges. UST market liquidity was based primarily on DEX, which was significantly lowered during the initial sell-off of UST. Through DEX, UST holders were

<sup>23</sup> See Griffin and Shams (2020) for their analysis.

swapping UST for a more reliable stablecoin (such as USDT). It is also notable that only small depositors on Anchor (original wallet size under \$10K) increased their position from May 6 to 9. Liquidity in centralized exchanges (CEX), at the same time, disappeared even more rapidly, causing a trading halt of UST/LUNA on several CEXs.<sup>7</sup> This disproportionately prevented retail investors to exit UST. The governance structure of UST was also unclear, with opaque allocation of responsibilities between Terraform Labs and the LFG on which would do what to defend the peg. The LFG chose bitcoin, a known volatile crypto asset, as the backstop for repegging UST in case of emergency. At the time of the initial stress, how and when the bitcoin reserve would kick in were not publicly known.

The collapse of UST showed the potentially significant spillovers of stablecoins to the broader crypto ecosystem, raising concerns not only on other noncollateralized stablecoins but also on how generally stablecoin protocols would function in a bank run–like situation.

<sup>1</sup> Caroline Wu is the author of this box.

<sup>2</sup> Do Kwon on Twitter.

<sup>3</sup> [Jump Crypto - The Depegging of UST | Jump Crypto](#).

<sup>4</sup> Through minting more LUNA and through the actions of the Luna Foundation Guard (LFG), a nonprofit organization that act as a reserve for UST.

<sup>5</sup> [Luna Foundation Guard \(LFG\) on Twitter](#).

<sup>6</sup> Malwa Shaurya, “Anchor Protocol Will Readjust Interest Rates Each Month, ANC Falls by 5%,” *CoinDesk*, March 25, 2022.

<sup>7</sup> Riyadh Carey, “A Data-Driven Exploration of UST’s Collapse,” *Kaiko*, May 2022.

## b) Reserves Custody

Third parties involved in custody and redemption can amplify run risks by delaying redemptions and adding costs. Some stablecoin issuers may rely on crypto asset exchanges, market makers, commercial bank/ATM operators, or other money transmitters to meet the redemption requests and distribute cash to end token-holders. For example, even though Tether allows direct redemptions to the holders, those are allowed only for requests larger than \$100,000. The second largest stablecoin (USD Coin or USDC) also limits the redemption rights to institutional investors. As a result, the majority of retail holders of stablecoins must rely on crypto exchanges to convert their stablecoins to fiat currencies.

## Considerations for Regulatory Responses

The regulation of stablecoins is at an early stage, and more work is needed to ensure risks are appropriately managed and addressed. A key limitation of the development of international standards so far is that the approaches have had a sector-specific (payments, banking, or securities) or product-specific focus (“global” stablecoins). However, stablecoins are not used widely for payments, nor is it clear that any existing stablecoins would be considered systemic or global. In both cases, the broader risks from the various stablecoins that currently exist are unlikely to be fully captured. Furthermore, some major US dollar–linked stablecoins are regulated by existing regimes (such as those for money transmitters and trust companies by individual states within the United States), while other US dollar–linked stablecoins



operate in offshore jurisdictions outside the remit of existing regulatory frameworks. Discussions of the legal classification of stablecoins are also in the early stages (see Box 5 for more details).

### Box 5. Stablecoins and Legal Uncertainty<sup>1</sup>

Legal certainty helps achieve policy objectives, preserve financial stability, and mitigate risks of major financial losses. Legal certainty is essential for the predictability and enforceability of the rights and obligations of the parties in a stablecoin arrangement. In most jurisdictions, there is still no certainty on the legal classification of stablecoins, and the use of distributed ledger technology (DLT) could amplify existing legal uncertainties.

Jurisdictions are grappling with the legal classification of stablecoins and exploring various solutions such as applying existing classifications or designing new reforms to achieve legal certainty. Such certainty is premised on the combination of private and financial law, with solutions varying across stablecoins' business models and countries' legal systems. In some cases, this could result in discrepancies of legal treatments and fragmented approaches that fail to mitigate all the risks involved.

- **Private law.** Depending on its business model, a stablecoin could be classified as an intangible property, a claim, or a *sui generis* asset. That, in turn, defines many fundamental aspects of stablecoins, including the boundaries of contract freedom; the rights and obligations of parties; how stablecoins can be transferred, lent, or pledged; and the extent of protections available to the holders of stablecoins. This classification would also govern the rights of the holders in the event of insolvency of the issuer or the custodian.
- **Financial law.** Under financial law, a stablecoin instrument may be potentially classified as a deposit, a security, e-money, or a commodity. The classification of the instrument will be informed by its private law nature and will in turn be relevant to consider the issuer, for example, as a depository institution, money transmitter, securities issuer, e-money provider, or trust. Depending on such classification, participants in a stablecoin arrangement may have different rights and obligations with respect to the issuance, custody, assets backing the stablecoin, and redemption mechanisms.

Additionally, legal uncertainties are either amplified or created from the use of DLT:

- In such a decentralized setting of stablecoins that spreads across borders, what is the applicable law?
- How is settlement finality provided for in the context of chain immutability and nonrepudiation?
- Are the digital data just the representation of evidence of ownership or are they a separate asset on their own?
- Does the knowledge of the private key equate to the stablecoin possession as movable property?
- Will holders benefit from the innocent acquirer rule, or will stablecoins' traceability hinder this protection?

<sup>1</sup> Marianne Bechara and Juan Sebastian Viancha Trujillo are the authors of this box.

The first general consideration for regulation is that the assets of end users should be segregated from the issuer's asset. This segregation requirement would minimize the risk of losses of the end user's assets or of delayed access to them. The assets should be held in supervised and regulated entities (typically commercial banks) that are able to ensure robust accounting practices, effective safekeeping, and internal controls. Prompt access to assets should be ensured. User assets could be invested in instruments that carry minimal credit, market, and liquidity risks.

To ensure adequacy of reserves and redeemability, requirements should be set on reserve asset allocation, custody, and transparency. Issuers must adhere to the specified requirements for assets held in reserve, including credit quality, maturities, and diversification in terms of issuers and sectors. The requirements should be based on the redemption pledge made by the issuer and marketed by the intermediaries. These requirements should reflect the underlying risks (such as capital and liquidity requirements on high-risk and less liquid investments), similar to prudential requirements for banks. However, banking regulations would need to be adjusted considering that some stablecoin issuers may not engage in maturity transformation and may have simpler business models.

Depending on the structural features of stablecoins, regulatory approaches akin to MMFs and e-money could apply. If a stablecoin is denominated in a monetary unit of account and is redeemable into cash upon demand, it needs to be fully backed by perfectly safe and liquid assets. If the issuer clearly pledges redeemability within an elapsed time, then it may hold safe but less liquid assets. And if the issuer offers redemption at the going market value of the underlying assets (or in kind) and intermediaries explained such features very clearly, then it may hold riskier assets. While e-money regulation may offer more useful guidance in the first case, and MMF regulation in the second (including from constant net asset value money market funds), the two have similarities. Both are based on operational thresholds—such limits regarding illiquid assets, maturity, and diversification requirements—that may be fine-tuned to the specific structure features of stablecoins (see Box 6).

### Box 6. Stablecoins and Lessons from Money Market Funds and E-Money Regulations

Where stablecoins do not pledge redemption at par and on demand, reserve assets can be invested into illiquid assets for higher returns, and so money market fund (MMF) and similar regulatory considerations may offer guidance. MMFs are subject to comprehensive requirements, such as disclosure, audit, and governance, to ensure users' protection without explicit safety net arrangements. After the 2008 global financial crisis, prudential regulations on MMFs have been enhanced. MMFs are now subject to various prudential requirements (investment limits regarding credit quality, maturity limits, diversification requirements, redemption restrictions) to address first-mover advantage in case of excessive redemptions. However, it should be noted that the March 2020 market turmoil triggered government intervention to address significant redemptions in some MMFs.

Some stablecoin issuers have already adopted liquidity management tools similar to those applicable to MMFs, but those may not be suitable for all stablecoins. Some stablecoins have similar risks to those of MMFs, so liquidity management tools used by MMFs, such as redemption gates and in-kind redemptions,<sup>1</sup> can help address the liquidity risks of stablecoins held as investment products. However, the implementation of some liquidity management could prevent the user's immediate redemption of stablecoins for their day-to-day operation. In such a scenario, the issuer would need to adopt different measures to address their liquidity mismatch risks.

For stablecoins issued with immediate redemption pledges, guidance from e-money regulations may be useful. E-money institutions are typically subject to comprehensive prudential requirements, such as investment limits, simple minimum and ongoing capital charges (as a share of the float), or diversification requirements. Reserve assets are typically required to be segregated and ring-fenced from the provider's own funds and need to be deposited into a commercial bank's trust or escrow account or central bank. In some jurisdictions, while segregation is not required, E-money institutions are required to have insurance or a guarantee to protect the users' funds. As for e-money issuers, regulation on stablecoin issuers should ensure the certainty of the claim by the end users.

<sup>1</sup> Redemption gates allow an issuer to suspend or limit redemptions for a short period. In-kind redemptions allow an issuer to transfer its underlying assets to the redeeming holders instead of cash.

Application of MMF regulation would need to be tailored to the specificities of stablecoins, and some risks may be better addressed by relevant components of bank regulations. Given the pseudonymity of some stablecoin holders, some of the liquidity management tools used by MMFs (such as in-kind redemptions) are difficult to implement. Therefore, to address the risk arising from liquidity transformation, banklike regulation (such as the liquidity coverage ratio and the net stable funding ratio) could be useful. Stablecoin issuers should be also subject to adequate reporting requirements. In addition, supervisors need to conduct more intensive supervision, similar to that for banks, including liquidity stress testing. Resolution authorities should require issuers to prepare recovery and resolution plans.

To enable regulators to monitor evolving risks, stablecoin arrangements should be required to have robust systems of collecting, storing, and safeguarding data. Regulators must continually assess the changing industry landscape, participants, business models, interconnectedness, and risk concentrations. Regulators also need to enhance their data collection and analytical capabilities and exchange information with other relevant regulators both across borders and across sectors. Authorities should remain flexible in order to address the evolving and new risks that the monitoring identifies.

To improve overall transparency, including on reserve holdings, timely and public disclosures should be required. An issuer should disclose in a publicly accessible manner, such as a website or a separate document, a detailed explanation of its reserve holdings (preferably no more than a predefined number of business days after the end of each month).<sup>24</sup> Furthermore, publication of a white paper could be mandatory—an information document to provide fair and comprehensible information to potential investors and users. The white paper should contain, for example, general information on the issuer and its governance arrangement, description of reserve assets and their investment policy if applicable, nature and enforceability of redemption rights, and information on the underlying technology used and the related risks.

Intermediaries should be subject to robust regulations to ensure that their marketing of stablecoins are unbiased and clearly explain the structural features of stablecoins. Intermediaries play an important role in distributing stablecoins to end users. However, their marketing often omits important structural features of stablecoins, such as redemption limits both in normal and extreme circumstances. Misleading marketing could create panic and run scenarios on the stablecoins in extreme cases. Intermediaries should be subject to robust regulation that requires them to clearly disclose and explain the structural features of their offering to end users. For a more complete overview of the type of regulation these intermediaries might be subject to, please see the companion Fintech note, *Regulating the Crypto Ecosystem: The Case of Unbacked Crypto Assets* (2022).

Requirements for independent audits should be introduced to help ensure the accuracy of disclosures and that reserve assets actually exist and are properly invested. That said, independent audits are costly and so their frequency and detail need to be tailored to the size of the reserve assets and the risks that the issuer presents to local and global markets. Most jurisdictions require the issuers of public offering of securities and collective investment schemes to disclose annual financial reports with proper audit. In a market that moves as quickly as crypto assets, any auditing might be at least annual or even more frequent in order to provide confidence to authorities, markets, and consumers.

To further address the risk of conflicts of interests, custodians should be regulated and independent. Independent third-party custodians play a key role in ensuring safety and proper investment of the reserve assets and need to be regulated accordingly. As is the case for collective investment schemes, authorities may want to limit the role of reserve custodians to regulated financial institutions only, such as commercial banks and/or trust companies licensed by financial authorities. It is also important to ensure sufficient independence of the custodian from the issuer and its related parties (such as crypto exchanges and market makers of the stablecoins). Authorities may explore the conditions of independence in

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<sup>24</sup> Michel and Schulp, *A simple Proposal for Regulating Stablecoins* (November 2021) <https://www.cato.org/sites/cato.org/files/2021-11/briefing-paper-128.pdf> (accessed 5/29/2022)

individual cases, for example if the issuer is a commercial bank, the authorities may or may not allow the bank to use its own entity as custodian.

Where redemption depends on third parties, the governance body of the arrangement must have clear plans to ensure redeemability in case of failure of the third parties. The governance body should have robust operational and liquidity arrangements with those third parties to ensure immediate and at/or near par redemption even during periods of market stress. For example, even if direct redemption by end users is not allowed in normal market circumstances, the issuer should be prepared to offer other redemption options, including direct redemption, in case liquidity providers and crypto exchanges cannot provide timely and efficient conversions from stablecoin to fiat currency.

When the issuer engages with lending services, conflict of interests should be carefully managed or otherwise should be prohibited. Some stablecoin issuers provide lending services, which often attract many investors to the stablecoin for high returns. Such lending service should be operated on an arms-length basis with the issuing and other critical functions of the stablecoin arrangement and should not provide unsustainable guarantee of returns. Conflict of interests with the lending services should be carefully managed by imposing proper market conduct requirements. When the governance framework of the stablecoin arrangement cannot ensure proper control of the lending service, the authorities should prohibit the stablecoin issuer to engage in lending services.

Issuers should have little or no credit or liquidity risk, in particular if the stablecoin is to be considered an acceptable payment alternative. If a stablecoin is used as the settlement asset, participants will be subject to the credit and liquidity risks of the stablecoin itself, the stablecoin issuer, and/or the settlement institution. The governance body of the stablecoin arrangement should ensure that the stablecoin provides its holders with a direct legal claim on the issuer and/or claim on, title to, or interest in the underlying reserve assets for timely convertibility at par into other liquid assets and a clear and robust process for fulfilling holders' claims in both normal and stressed times.

If stablecoins are linked to a foreign currency or a basket of foreign currencies, the authority should coordinate with the authorities of the referring currencies to address the additional risks. Stablecoins linked to a foreign currency, or a basket of foreign currencies would create additional risks, including of currency substitution and thus to the transmission of monetary policy of both the issuing and recipient jurisdictions. Relevant authorities should have close coordination to ensure that additional risks are appropriately mitigated before commencing any operation in the jurisdiction.

If stablecoin arrangements become systemic domestically, additional requirements on issuers, similar to those of systemically important institutions, may be needed. International standards on global stablecoins provide high-level guidance, but further cross-sectoral standards are required. The FSB high level recommendations on global stablecoins offers guidelines on these additional requirements. Similarly, CPMI-IOSCO provide additional guidance to minimized risks related to the transfer function. However, as noted, detailed requirements have not yet been established by any standard setting body, and the level at which a stablecoin is considered systemic is at the discretion of authorities. Additional requirements, similar to those applicable to systemically important financial institutions, may include more intensive supervision, safety and soundness, stress testing, recovery and resolvability. Finally, coverage by deposit insurance may be considered for stablecoins issuers that become systemic, subject to strict safeguard including robust prudential regulation (Box 7).

### Box 7. Stablecoins and Deposit Insurance<sup>1</sup>

A deposit insurance system (DIS) protects depositors against the loss of insured deposits at supervised deposit takers. International standard setters have yet to issue guidance on whether asset-backed stablecoins, such as those backed by bank deposits, should also be covered by deposit insurance. The Financial Stability Board (FSB) stressed the need for recovery and resolution planning for global stablecoins but did not touch upon the issue of extending deposit insurance, which it viewed as being outside of its scope (FSB 2020). The International Association of Deposit Insurers recently established a Fintech Technical Committee to consider the issues. In advance of international consensus, authorities are considering national approaches. The President's Working Group (PWG) in the United States recommended that payment stablecoins backed by fiat currency be subject to a prudential framework, which would require stablecoin issuers to be "insured depository institutions" (meaning members of the US DIS, the Federal Deposit Insurance Corporation [FDIC], and thereby subject to the regulations of the FDIC) resolution regime (PWG Report on Stablecoins, November 2021). The Bank of England expects that stablecoins issued as tokenized deposits by banks subject to the bank regulatory regime would be covered by the DIS, while a modified insolvency regime would suffice for systemic nonbank stablecoins.<sup>2</sup>

A precondition for deposit insurance is that DIS members be well regulated and supervised. Extending deposit insurance to unregulated stablecoins backed by illiquid reserve assets could create moral hazard and burden regulated banks with the costs of failed, volatile stablecoins.<sup>3</sup> The operational complexity of stablecoin arrangements, including its distributed ledger technology, may raise challenges when operationalizing deposit insurance (for example, which entity would retain the user information needed by the DIS to identify and reimburse insured users).

When discussing the potential extension of deposit insurance to the conceptual models discussed in this paper, the following preliminary conclusions may be drawn:

- A prudent regulatory framework for stablecoins and legal certainty (Box 5) should be prior conditions for deposit insurance coverage.
- Stablecoins that have less-liquid reserve assets (such as commodities, crypto assets) and are mainly used for investment purposes or are not redeemable at par should not be insured.<sup>4</sup> From their purpose and risk profile, these coins are more comparable to securities investments (such as money market funds or other securities funds), to which deposit insurance is not extended.
- Where commercial banks, which are already members of a DIS, issue tokenized insured deposits or their own stablecoins backed by insured bank deposits that can be redeemed on a one-to-one basis for fiat currency, deposit insurance coverage could apply. This is because issuers would already fully meet the requirements, including for regulation and supervision.
- If stablecoins are issued by nonbank entities and are used primarily for payment purposes, then deposit insurance coverage may not be warranted. Similar to e-money and in the absence of being systemic, regulatory arrangements to safeguard users may be sufficient.<sup>5</sup> As with e-money, this should include regulation that addresses redeemability, reserve assets

management (including a matching requirement, ensuring high liquidity of the reserve assets, and addressing concentration risks), and strict customer asset segregation and ringfencing.<sup>6</sup> Consideration could be given to extending deposit insurance to nonbank-issued stablecoins if they became systemic (that is, presented similar financial stability risks and consumer protection issues to—and were regulated like—bank deposits).

<sup>1</sup> Jan Nolte is the author of this box.

<sup>2</sup> Bank of England, “Financial Stability in Focus: Cryptoassets and Decentralised Finance,” March 2022.

<sup>3</sup> A separate insurance mechanism for stablecoins, which would insulate banks from losses, would likely not be viable for a small pool of stablecoin issuers.

<sup>4</sup> Non-asset-backed stablecoins (such as those based on an algorithm) should not be covered by deposit insurance.

<sup>5</sup> Even with these safeguards in place, a loss of user funds could be triggered by the failure of the issuer, such as if reserve assets were misappropriated or the bank in which reserve assets were deposited failed.

<sup>6</sup> Dobler et al., “E-Money: Prudential Supervision, Oversight, and User Protection,” December 2021.

Stablecoins issued by commercial banks should be subject to adjusted bank regulation. Some risks arising from issuing stablecoins could be addressed by existing prudential and conduct regulations at the entity and group levels. However, other risks (especially those arising from public blockchains and unhosted wallets) may not be fully addressed by the existing banking regulatory framework. Banking regulators should specify under what conditions and technologies commercial banks are allowed to issue their own stablecoins. The Basel Committee on Banking Supervision’s second consultation paper (June 2022) on prudential treatment of crypto asset exposures clarifies some prudential treatments (such as liquidity charges for issuing a stablecoin) in case bank-issued stablecoins.

Additional risk management and prudential requirements for banks may be applied. Careful analysis is needed if an issuing entity is established independently from the prudentially regulated financial institutions. When appropriate, the issuing entity should be consolidated into the banking/financial group and should be subject to existing prudential regulation, such as liquidity coverage ratio and net stable funding ratio requirements.<sup>25</sup> While banks may not be legally obliged to meet redemption requests to the issuing entity, they may face strong pressure to step in and provide liquidity if this could cause reputational damage to the group. In any case, financial institutions are expected to manage operational risk (arising from the platform operation of cross-border payment services) and conduct risk (for example, when issuing structured bonds).<sup>26</sup>

Finally, effective cross-border cooperation between home and host supervisors is necessary to address various risks arising from stablecoin arrangements. While the drivers for adoption are likely to be different between advanced economy and emerging market and developing economy users, prudential regulation on issuers is typically imposed by the home supervisor where issuers are domiciled. The home supervisor would need to consider different economic functions and business models globally and tailor

<sup>25</sup> If the issuing entity is truly independent and there are sufficient safeguards or firewalls between the stablecoin issuing entity and banking group, it may be acceptable not to include the issuing entity as part of the banking group.

<sup>26</sup> Some financial institutions have already issued structured bonds linked to crypto assets. Marketing of structured products in general needs to observe requirements regarding obligations to investors, which become more complex when crypto assets are involved (<https://www.finra.org/rules-guidance/notices/05-59>).

the regulations accordingly, considering the risks arising from these functions and business models. Effective cross-border cooperation mechanisms are critical for achieving consensus among home and host supervisors on the regulation that captures globally active stablecoin issuers.

### III. Transfer

Stablecoins' potential use as a means of payment depends on the reliability of transfer functions in the stablecoin arrangement. The transfer function permits the transfer of stablecoins between users, and it entails the operation of a platform, a set of transfer rules, and a mechanism for transaction validation.<sup>27</sup> This section is most relevant for stablecoin arrangements and their regulation if a stablecoin has been adopted for payment purposes and where safe and reliable transfers are important.

CPMI and IOSCO have noted that the transfer function inherent in stablecoin arrangements is comparable to the transfer function in financial market infrastructures (FMIs). Their report on the application of the principles for financial market infrastructures (PFMI) to systemically important stablecoin arrangements<sup>28</sup> provides concrete guidance to stablecoins arrangements performing these transfer functions (see Box 7). The guidance is not intended to create additional standards but to highlight structural features from stablecoin arrangements that create new risks. Furthermore, the guidance does not discuss issues specific to stablecoins denominated in, or pegged to, a basket of fiat currencies. Recognizing that stablecoin arrangements present novel features and risks compared with other FMIs, the report covers only a subset of principles, that is, governance (Principle 2), framework for the comprehensive management of risks (Principle 3), settlement finality (Principle 8), and money settlements (Principle 9).

Other principles from the PFMI remain relevant. Principles such as legal certainty of the stablecoin arrangement, management of business and operational risk, and the interlinkages between arrangements should all be considered. Guidance from CPMI and IOSCO emphasizes the importance of not only addressing new risks, but also the usual risks (such as liquidity and credit risks) applicable to systemically important systems. The key risks and considerations below draw directly from the guidance and the relevant text in the PFMI.

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<sup>27</sup> CPMI-IOSCO 2022, 4.

<sup>28</sup> CPMI-IOSCO *Application of the Principles for Financial Market Infrastructures to stablecoin arrangements* (July 2022) <https://www.bis.org/cpmi/publ/d206.pdf>.



### Box 8. Guidance on the Application of the Principles for Financial Market Infrastructures to Stablecoin Arrangements<sup>1</sup>

CPMI-IOSCO guidance on the application of the principles for financial market infrastructures (PFMI) to stablecoin arrangements (SAs) applies to SAs considered as systemically important financial market infrastructures (FMIs), including the entities integral to such arrangements. While the guidance is provided on only a subset of principles, a systemically important SA used primarily for making payments is expected to observe all the relevant principles. Depending on the design of an SA, types of entities, and functions involved, the principles that apply to payment systems will apply to SAs that are used primarily for making payments based on a functional approach (“same business, same risks or risk profile, same rules”). When an SA provides functions that more closely resemble those provided by other types of FMIs (such as securities settlement system or trade repository), the SA should observe the respective principles.

Principle	Guidance
<b>Governance</b> (Principle 2)	<p>A systemically important SA should have appropriate governance arrangements.</p> <p>A systemically important SA should consider how:</p> <ul style="list-style-type: none"> <li>▪ the SA’s ownership structure and operation allow for clear and direct lines of responsibility and accountability, for instance, it is owned and operated by one or more identifiable and responsible legal entities that are ultimately controlled by natural persons.</li> <li>▪ the SA’s governance allows for timely human intervention, as and when needed.</li> <li>▪ the SA’s ownership structure and operation allow the SA to observe Principle 2 and the other relevant principles of the PFMI irrespective of the governance arrangements of other interdependent functions.</li> </ul>
<b>Comprehensive management of risks</b> (Principle 3)	<p>A systemically important SA should regularly review the material risks that the FMI function bears from and poses to other SA functions and the entities (such as other FMIs, settlement banks, liquidity providers, validating node operators and other node operators, or service providers) which perform other SA functions or on which the SA relies for its transfer function.</p> <p>A systemically important SA should develop appropriate risk-management frameworks and tools to address these risks. In particular, it should identify and implement appropriate mitigations, taking an integrated and comprehensive view of its risks.</p>
<b>Settlement finality</b> (Principle 8)	<p>A systemically important SA should provide clear and certain final settlement, at a minimum by the end of the value date, regardless of the operational settlement method used. Where necessary or preferable, such settlement should be provided on an intraday or real-time basis.</p> <p>A systemically important SA should:</p>

	<ul style="list-style-type: none"> <li>▪ clearly define the point at which a transfer of a stablecoin through the operational method used becomes irrevocable and unconditional.</li> <li>▪ ensure that there is a clear legal basis that acknowledges and supports finality of a transfer.</li> <li>▪ have robust mechanism(s) for preventing any misalignment between the state of the ledger and legal finality and ensure that legal finality of a transfer, once it has occurred, is maintained regardless of competing state(s) of the ledger.</li> </ul>
<p><b>Money settlements</b> (Principle 9)</p>	<p>A stablecoin used by a systemically important SA for money settlements should have little or no credit or liquidity risk. In assessing the risk presented by the stablecoin, the SA should consider whether the stablecoin provides its holders with a direct legal claim on the issuer and/or claim on, title to or interest in the underlying reserve assets for timely (as soon as possible, at a minimum by the end of the day and ideally intraday) convertibility at par into other liquid assets such as claims on a central bank, and a clear and robust process for fulfilling holders' claims in both normal and stressed times.</p> <p>A systemically important SA should determine whether the credit and liquidity risks of the stablecoin that it uses for money settlements are minimized and strictly controlled and the stablecoin is an acceptable alternative to the use of central bank money. Relevant factors may include but are not limited to:</p> <ul style="list-style-type: none"> <li>▪ The clarity and enforceability of the legal claims, titles, interests and other rights and protections accorded to holders of the stablecoin and SA participants in relation to the issuer of a stablecoin and reserve assets backing it, including their treatment (e.g. seniority) in the event of insolvency of the issuer, its reserve manager or a custodian of the reserve assets and/or other protections such as thirdparty guarantees.</li> <li>▪ The nature and sufficiency of the SA's reserve assets to support and stabilize the value of the outstanding stock of issued stablecoins, and the degree to which the SA's reserve assets could be liquidated at or close to prevailing market prices.</li> <li>▪ The clarity, robustness, and timeliness of the process for converting the stablecoin into other liquid assets such as claims on a central bank in both normal and stressed circumstances. The stablecoin should be convertible into other liquid assets, as soon as possible, at a minimum by the end of the day and ideally intraday.</li> <li>▪ The creditworthiness, capitalization, access to liquidity, and operational reliability of the issuer of the stablecoin, provider of the settlement accounts, and custodian(s) of the reserve assets. Reserve assets held or placed in custody should be protected against claims of a custodian's creditors. Any chosen custodians should have robust accounting practices, safekeeping procedures, and internal controls to protect the</li> </ul>

assets as well as a sound legal basis supporting its activities, including the segregation of assets.

- The sufficiency of the regulatory and supervisory framework that applies to the issuer, reserve manager(s), and/or custodian(s) of the reserve assets.
- The existence of risk controls that could, where needed, reduce credit and/or liquidity risks. Possible examples include collateral pools supporting committed lines of credit, third-party guarantees and procedures for allocating losses arising from a default by the issuer, or a decrease in value of the stablecoin.

<sup>1</sup> Agnija Jekabsone is the author of the content in this box.

## Challenges and Risks

Clarity and transparency of the governance of the transfer or exchange function of stablecoins may be clouded by software automation. Unlike traditional FMIs where an identifiable legal entity can be held responsible for decisions, for stablecoin arrangements such decision functions may be performed solely by software (smart contracts). While such automation may introduce numerous benefits such as potentially decreased governance coordination costs, the ability to hold an entity clearly accountable is diminished. Governance risks may be exacerbated during times of crisis.

Uncertainty over settlement finality and irrevocability is a key risk. The potentially large-scale deployment of emerging technologies such as DLT may have an impact on how an FMI observes certain PFMI principles, for example, in terms of finality of transfers. Unlike in centralized FMIs, where settlement is final and irrevocable, once a book entry is made (usually in the ledger of the central bank), stablecoin arrangements may use consensus mechanisms to achieve settlement. These processes may lower the certainty of when settlement finality is reached. This “probabilistic settlement” may be caused by a misalignment between the state of the ledger and when legal finality may occur.<sup>29</sup> Without a responsible legal entity, it could be challenging to enforce the legal finality or the resulting legal claim.

Settlement in privately issued money can expose users to counterparty risks. The PFMI sets the expectations for the settlement asset(s) and states that money settlement should be conducted in central bank money where practical and available as the central bank is able to provide a safe and liquid settlement asset. Stablecoins are privately issued forms of value but not central bank money. To comply with the requirements of Principle 9 on money settlements, a privately issued settlement asset should have little or no credit or liquidity risk to be considered an acceptable alternative to central bank money

<sup>29</sup> CPMI-IOSCO 2022, 16. “Technical settlement (or operational settlement) describes the point in time at which the state of an SA’s electronic ledger reflects that a transaction has occurred. In some DLT arrangements, it can take time to update and synchronise changes to the ledger of each node. The first instance of an update may not represent technical settlement because it may take time for consensus to be achieved across the nodes in the synchronization of ledgers. In arrangements that use a proof-of-work or other consensus mechanisms, technical settlement is probabilistic (‘probabilistic settlement’).”

(CPMI-IOSCO 2022).<sup>30</sup> Depending on the model, participants may be subject to credit and liquidity risk from the issuer, settlement account provider, and reserve assets' custodian.

Risks arise from interdependent functions. Stablecoin arrangements typically perform other functions beyond a transfer function, and the boundary with other functions may vary across stablecoin models. Such functions have been discussed earlier in this note (such as issuance, redemption, and stabilization of the value) and might be governed and/or performed by a single entity or several entities different from the entity performing the transfer function. These multiple interdependent functions can exacerbate risks in relation to the transfer function (such as legal, operational, and other risks) and so affect the ability of a systemic stablecoin arrangement to observe the PFMI.

Stablecoin arrangements might lead to additional friction and concentration, particularly where there are closed ecosystems or a lack of interoperability. Where stablecoins operate on private or permissioned blockchains, or otherwise operate in siloed ecosystems, these arrangements could increase concentration in the provision of services and potentially generate additional frictions in payments through a lack of interoperability. This is particularly true where such arrangements might grow to form a key component of domestic or cross-border payments infrastructure. This risk is not limited to DLT-based systems, and significant efforts are underway to improve operationalization on certain public blockchains. Because of cost or lack of interoperability, market concentration could potentially increase, creating financial stability risk.

Lack of interoperability among blockchains and stablecoins may lead to market fragmentation and excessive concentration. As discussed in the companion Fintech note of *Regulating the Crypto Ecosystem: The Case of Unbacked Crypto Assets* (2022), widely used blockchains are not yet interoperable with each other; hence issuers have created stablecoins that are available on multiple blockchains. These stablecoins minted by different issuers are not entirely interoperable with each other and so require strong support from market makers to ensure price stability. This is also true where the same stablecoin (minted by the same issuer) operates on several blockchains: Each unit of stablecoin issued may not be directly fungible with the same token in a different blockchain. This might create market fragmentation and excessive concentration by large firms, including BigTechs, and may hinder competition and inclusion. Furthermore, should these stablecoins become systemic, a lack of interoperability between different stablecoins could create additional market frictions. Finally, it will be important to consider potential interoperability issues among private stablecoins, commercial bank money, and central bank money, should these stablecoins be used more broadly for payments.

## Considerations for Regulatory Responses

To strengthen governance, stablecoin arrangements should have identifiable decision-making structures that are transparent and promote safety and efficiency of the arrangement. This would support the objective of ensuring that stakeholders place high priority on the safety and efficiency of the arrangement. Furthermore, the lines of responsibility and accountability and the decision-making process, including any conflict of interest, should be clearly defined and documented. Also, the risk-management framework

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<sup>30</sup> CPMI-IOSCO (2022).

should be established and documented. The governance arrangements of other interdependent functions should not hinder observation of the relevant principles of the PFMI.

An adequate registration or licensing regime should apply to the entities involved in the transfer function of stablecoins. Registration or licensing allows the collection of information and data necessary for proper supervision and oversight and for monitoring potential financial stability risks while protecting individual user privacy. Such approaches should include a set of strict and comprehensive conditions and prudential requirements (such as initial capital and own-funds requirements) proportionate to the operational and financial risks faced by such entities in the course of their business.

The entity applying for authorization or licensing should comply with key requirements and conditions,<sup>31</sup> such as having (1) robust governance arrangements, which include a clear organizational structure with well-defined lines of responsibility, effective procedures to manage the risks to which it is or might be exposed, and adequate internal control mechanisms, procedures, and mechanisms proportionate to the nature, scale, and complexity of the payment services provided; (2) measures to safeguard payment service users' funds; (3) procedures to monitor, handle, report, and follow up on security incidents; (4) processes to file, monitor, track, and restrict access to sensitive payment data; (5) business continuity arrangements, which include identification of critical functions and contingency plans; (6) security policy and risk-management framework for payment services comprising security controls and mitigation measures; and (7) internal control mechanisms to comply with AML/CFT obligations.

To strengthen risk management, a robust risk-management strategy and review process must be in place for stablecoin arrangement. A systemically important stablecoin arrangement should develop appropriate risk-management frameworks and tools<sup>32</sup> by taking an integrated and comprehensive view of its risks. Risk-control policies and practices should include, but not be limited to, legal, credit, liquidity, general business, and operational resilience<sup>33</sup> (including outsourcing, fraud and cyber risk, risk of loss of data; and various nonfinancial risks, such as data integrity; operational resilience (i.e., operational reliability and capacity); third-party risk management and AML/CFT related risks.

To reduce settlement risk, there should be certainty on how finality and irrevocability is achieved. First, stablecoin arrangements should be transparent about the settlement methods in use. If settlement is probabilistic, then the exact moment when finality and irrevocability is reached should be defined. Second, the settlement method should be supported by an enforceable legal framework. Third, there should be defined risk-management processes to prevent misalignment between the operational and legal settlement processes. And finally, given that stablecoin arrangements may span multiple jurisdictions, there should be legal consistency regarding settlement finality across jurisdictions.

Stablecoin arrangements should determine whether the credit and liquidity risks are minimized and strictly controlled.<sup>34</sup> The CPMI-IOSCO guidance provides a list of factors to be considered by stablecoin arrangements to determine if the stablecoin is an acceptable alternative to central bank money. That includes clarity and enforceability of the legal claims, titles, interests, and other rights; the nature and

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<sup>31</sup> Example of requirements and conditions from the European Union regulatory framework on payment services directive.

<sup>32</sup> CPMI-IOSCO (2022).

<sup>33</sup> CPMI-IOSCO (2022).

<sup>34</sup> CPMI-IOSCO (2022).

sufficiency of reserve assets; clarity and robustness of conversion process of the stablecoin into liquid assets and several others.<sup>35</sup>

While the PFMI guidance is applicable to systemically important stablecoin arrangements, other nonsystemic arrangements are often encouraged to comply with the key requirements of the PFMI in a proportionate manner. For instance, requirements on clear and robust governance arrangements, finality of transfer, measures for safeguarding stablecoin service users' funds, and comprehensive and efficient risk-management frameworks, including for operational risk, would be critical and valid for any stablecoin arrangement that is used as a means of payment so as to ensure safe, sound, and reliable transfer of funds. Furthermore, a requirement for authorization or licensing or at least provision of information requirement for all stablecoin arrangement service providers can provide supervisors with the information needed to assess financial stability risks and implications.

Finally, authorities should consider appropriate policy and regulatory responses where stablecoin arrangements lead to additional friction and concentration, particularly where there are closed ecosystems or a lack of interoperability. Standards to promote interoperability should also be introduced to limit concentration risk and supplier lock-in to particular technologies.

### **Box 9. Cybersecurity and Operational Risk**

Cyber- and operational risks permeate all functions and components of the stablecoin ecosystem. While distributed ledger technology may be more resilient to certain operational threats and cyberthreats than traditional payment systems, cyber- and operational risks can still materialize in the various components of the stablecoin ecosystem. Network operations, exchanges, and wallets make alluring targets for cybercrime, but operational risks extend further than that and may affect the capacity of stablecoin arrangements to perform many of its functions, including transfer and redemption. To strengthen cyber- and operational resilience, stablecoin arrangements must ensure appropriate policies and controls are in place. Entities involved in stablecoin services should have robust operational risk-management frameworks with appropriate policies, procedures, and controls in place. Systems should be designed to ensure a high degree of security and operational reliability, including sufficient capacity. Business continuity procedures should be in place for timely recovery of operations. Operational interdependencies between the actors (such as technical service providers) involved in the arrangement should be identified and relevant risks properly managed. In addition, entities should observe other relevant international standards on operational and cyber-risks, such as International Organization for Standardization (ISO) standards for information security management or US National Institute for Standards and Technology standards, guidelines, and best practices for cybersecurity-related risks.

<sup>35</sup> CPMI-IOSCO (2022).

## IV. Access

An access point is needed for an interface with the stablecoin ecosystem. User interface consists of client software that connects the DLT network to a computer terminal. Some ecosystems offer more user-friendly wallets and websites that also provide additional services (such as storage of cryptographic keys, transaction initiation). These interfaces, such as wallets and exchanges, are vulnerable to various risks such as custodial operational, and concentration risks. See the companion Fintech note of *Regulating the Crypto Ecosystem: The Case of Unbacked Crypto Assets* (2022) for more details of the wallet service providers and exchanges and proposed considerations for regulatory framework, which include recommendations for governance requirements, asset segregation, operational and cyber-resilience, record keeping, AML-CFT controls, reporting and disclosure, and wind-down arrangements and resolution.

If the wallet is used to store and transfer stablecoins for payment purposes, those could be subject to additional regulations applicable to electronic payment instruments and further operating requirements. For example, Eurosystem has developed an oversight framework for electronic payment instruments, schemes, and arrangements (the Payment Instruments, Schemes and Arrangements (PISA) framework), which is based on the most relevant principles of the PFMI. A payment arrangement can be defined as “a set of operational functionalities which support the end users of multiple payment service providers in the use of electronic payment instruments” such as payment initiation and facilitation of transfers of value and “storage of personalized security credentials or data related to electronic payment instruments.”<sup>36</sup> The oversight activities should be proportionate to the level of importance of the arrangement and potential risks to the efficiency and safety of the overall payment system. Where the payment system becomes systemic, authorities might want to consider the implications of the failure of a wallet provider, including the merit and scope of user protection. In fact, some jurisdictions have implemented user protection schemes for e-money, and some jurisdictions may adopt a similar approach for crypto asset wallets if they become systemic. Moreover, additional operating rules and requirements may be needed for stablecoin wallet providers and/or merchants, because they access existing payment systems.<sup>37</sup>

## Conclusion

Stablecoins may play a role in the future of finance, but absent robust regulatory frameworks, they will introduce significant risks. If developed and implemented under appropriate regulation, stablecoins have the potential to reduce costs of cross-border remittances; complement and improve existing payments' infrastructure; provide competition in the payment space; and generate efficiencies when used for more wholesale or back-end functions involving large, regulated entities. However, without an appropriate

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<sup>36</sup> European Central Bank, *Eurosystem Oversight Framework for Electronic Payment Instruments, Schemes and Arrangements* (2021), 21.

<sup>37</sup> Some examples may include compliance to EMV (Europay, Mastercard, and Visa) standards, PCI DSS (Payment Card Industry Data Security Standard) requirements, and two-factor authentication.

regulatory framework in place, stablecoin issuers and arrangements could generate risks to consumers, markets, and—where systemic—financial stability. This may be the case particularly where reserve compositions are complex, less liquid, or opaque. It may also be true where key participants in the stablecoin arrangements—such as wallets and exchanges—are not appropriately regulated and there is little recourse for consumers in the event of operational failures, cyberattacks, or frauds and scams.

Developing such a robust and comprehensive regulatory framework for stablecoins will involve intense monitoring and a targeted approach and focus on all actors. An appropriate and consistent framework should provide a level playing field along the activity and risk spectrum and, given the rapid growth of stablecoins in some jurisdictions, authorities will have to move fast. This includes strengthening surveillance to monitor new developments and managing any data gaps to gather accurate insights and determine proportionate regulatory responses. Such regulation should be aimed at key participants of the stablecoin ecosystem, including issuers, wallets, exchanges, network providers, governance bodies, and reserve managers.

Yet developing a regulatory framework for stablecoins is likely to face some challenges that are similar to those associated with broader crypto asset regulation. Data availability and extra territorial oversight are common challenges across the crypto asset ecosystem, including stablecoins. The notion of known entities does not make effective supervisory oversight easier, as many entities may operate from offshore financial centers. The cross-sector and cross-border dimensions of stablecoins make domestic and international coordination and cooperation key. Activities related to stablecoins already are, and will continue to be, more cross-border and cross-sectoral than many traditional financial activities. This requires close international cooperation and coordination<sup>38</sup> to address regulatory gaps and prevent potential regulatory arbitrage. Consistent regulatory approaches can prevent the potential risk of a race to the bottom by regulators and policymakers and address regulatory arbitrage by financial entities.

Where a regulatory framework for stablecoins is deemed necessary, it can take cues from similar products and business in the market, such as commercial banking, e-money, FIMs, and MMFs, while addressing novel risks. A combination of conduct, payment, and prudential regulation that takes cues from similar products and activities in the market might be a sensible approach to regulating crypto assets, including stablecoins. Such an approach should focus on key components and their functions and risks, to ensure those entities are licensed and authorized. This provides for a "same risk, same regulation" approach. To ensure same risk, same regulatory outcome, authorities might also want to consider any unique risks from the underlying technology, volatility, market awareness, and product knowledge/understanding, and how the stablecoins are being used. While a technology-neutral approach to regulation might be considered, supervisory approaches should consider the unique risks of different methods of delivery and operation, and authorities should be confident in identifying where particular types of technologies might challenge (or support) their objectives. Regulators may also want to consider cross-sectoral issues that may need bespoke responses.

The regulatory, supervisory, and oversight approaches used for existing payments could apply, to some extent, to stablecoins that are intended to create means of payment and enable transfer of coins between users. While existing e-money regulation might not be fit for purpose for all aspects of stablecoin

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<sup>38</sup> While data, privacy, and tax issues are outside the scope of this note, it is important to address those issues regarding cross-border cooperation and cross-agency coordination.



arrangements, the existing regulatory requirements or adjusted frameworks that take their cues from such regulation could cover some of the risks associated with stablecoins or entities active in these arrangements. Similarly, existing regulatory approaches for payment service providers and payment institutions could also be relevant for certain services provided by stablecoin arrangements.

The transfer function of systemic stablecoins must adhere to the PFMI, especially if they integrate with existing payment systems. Because the transfer function of a systemic stablecoin is comparable to the transfer function performed by other types of systemic financial market infrastructures, the CPMI-IOSCO guidance has established that the PFMI and the additional guidance on specific principles apply to systemically important stablecoin arrangements. However, the risks and their mitigation measures described in the PFMI could also be relevant for other nonsystemically important stablecoins, although applied in a proportionate manner. More specifically, risks related to legal certainty, governance, settlement finality, and operational risk warrant added attention because of the decentralized nature of stablecoin arrangements.

In jurisdictions where stablecoins are systemic, immediate policy action may be warranted, albeit broad-based restrictions are unlikely to be a long-term solution. In the short term, in some emerging markets and developing economies where crypto assets such as stablecoins already generate risks to financial stability, waiting for global regulatory standards might not be an option. In these jurisdictions, authorities should use existing regulatory powers to best manage any risks and gain time to develop more comprehensive regulations. At the same time, in jurisdictions where users move to stablecoins as a way of hedging against inflation or currency devaluation risk, implementing stronger domestic macroeconomic policies, such as strengthening monetary policy credibility, safeguarding the independence of central banks, and maintaining a sound fiscal position, may dampen incentives. Restricting the use of crypto assets for certain activities—such as restricting derivatives linked to or payments in crypto assets—could be a short-term solution to dampen crypto asset growth. Broadly banning the use of crypto assets, however, would likely stifle innovation and could trigger even stronger incentives for regulatory arbitrage and circumvention—and enforcing broad bans would be extremely difficult.

Finally, robust international standards are indispensable to ensuring effective and efficient cross-sectoral and cross-border cooperation. Relevant SSBs are undertaking significant effort to develop their own standards according to their mandates. While these are important steps, the economic functions of stablecoins are likely to change over time, changing the suitability of sector-specific regulations. Against this background, it is important for the FSB to take a leading role in coordinating efforts across sectoral SSBs. The FSB is well placed to take a leading role in coordinating and establishing global standards for the regulation of stablecoins, taking into account sector-specific standards developed by other SSBs. Use cases also vary among the jurisdictions, so the home authority where an entity carrying out core functions for stablecoins is domiciled needs to coordinate with other relevant authorities where the users of the stablecoins are located. IMF staff are actively contributing to the SSBs' activities to facilitate the development and implementation of robust international standards.

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