FSB FINANCIAL STABILITY BOARD

IMF-FSB Synthesis Paper: Policies for Crypto-Assets

7 September 2023

Approved For Circulation By Tobias Adrian (IMF) and The FSB Plenary	Prepared by Staff of the IMF and FSB Secretariat: Arif Ismail and Yaiza Cabedo (MCM) and Peter Goodrich, Jun Wang and Michael Hatchett (FSB); in collaboration with Ruud De Mooij and Gerardo Una (FAD); Nadine Schwarz, Ke Chen and Marianne Bechara (LEG); Tommaso Mancini-Griffoli, Fabiana Melo, Nobuyasu Sugimoto, and Parma Bains (MCM); Soledad Martinez Peria, Itai Agur, and German Villegas Bauer (RES); Martin Cihak (SPR) and Padma Sandhya Hurree Gobin (STA). We are grateful for very helpful input from the FATF, IOSCO and the World Bank. Overall guidance was provided by Dong He (MCM), John Schindler and Rupert Thorne (FSB).

Copyright © 2023 Financial Stability Board and the International Monetary Fund. Please refer to the terms and conditions

Table of Contents

Executive summary 1

1. Introduction 3

2. Implications of crypto-assets 5

   2.1. Macroeconomic stability 5

   2.2. Financial stability implications and regulatory issues 10

   2.3. Other risks 13

3. Comprehensive policy and regulatory response 16

   3.2. Financial stability regulation 20

   3.3. Other policies and regulation 22

4. Policy implementation roadmap 24

   4.1. Implementation of policy frameworks by IO and SSB members 26

   4.2. Outreach beyond G20 members 28

   4.3. Global coordination, cooperation and information sharing 29

   4.4. Addressing data gaps 29

Annex 1: Recent publications from international organisations and standard-setting bodies 31

Annex 2: FSB high-level recommendations 33

Annex 3: Detailed shared FSB-SSB workplan 37

Glossary 42

References 46

Executive summary

The International Monetary Fund (IMF) and the Financial Stability Board (FSB) have advanced policy and regulatory recommendations to identify and respond to macroeconomic and financial stability risks associated with crypto-assets. The IMF has outlined key elements of an appropriate policy response including macroeconomic, legal and financial integrity considerations and implications for monetary and fiscal policies. In parallel, the FSB and standard-setting bodies (SSBs) have published regulatory and supervisory recommendations and standards to address financial stability, financial integrity, market integrity, investor protection, prudential and other risks derived from crypto-assets.

At the request of the Indian G20 Presidency, the IMF and the FSB have developed this paper to synthesise the IMF's and the FSB's (alongside SSBs') policy recommendations and standards. The collective recommendations provide comprehensive guidance to help authorities address the macroeconomic and financial stability risks posed by crypto-asset activities and markets, including those associated with stablecoins and those conducted through so-called decentralised finance (DeFi). This paper describes how the policy and regulatory frameworks developed by the IMF and the FSB (alongside SSBs) fit together and interact with each other, but it does not establish new policies, recommendations or expectations for relevant member authorities.

Crypto-assets have implications for macroeconomic and financial stability that are mutually interactive and reinforcing. Widespread adoption of crypto-assets could undermine the effectiveness of monetary policy, circumvent capital flow management measures, exacerbate fiscal risks, divert resources available for financing the real economy, and threaten global financial stability. These risks could reinforce each other, as financial instability can make maintaining price stability more difficult and vice versa; cause destabilising financial flows; and strain fiscal resources.

A comprehensive policy and regulatory response for crypto-assets is necessary to address the risks of crypto-assets to macroeconomic and financial stability. To address macroeconomic risks, jurisdictions should safeguard monetary sovereignty and strengthen monetary policy frameworks, guard against excessive capital flow volatility and adopt unambiguous tax treatment of crypto-assets. Comprehensive regulatory and supervisory oversight of crypto-assets can help to address financial stability and financial integrity risks while supporting macroeconomic policies.

Comprehensive regulatory and supervisory oversight of crypto-assets should be a baseline to address macroeconomic and financial stability risks. Regulation and supervision of licensed or registered crypto-asset issuers and service providers can support the functioning of capital flow measures, fiscal and tax policies, and financial integrity requirements. For example, licensed, regulated and supervised crypto-asset service providers and appropriate reporting requirements can reduce data gaps, which are particularly important for capital flow measures that rely on monitoring of cross-border transactions and capital flows.

The FSB (along with SSBs) has developed a global framework of recommendations and standards. This framework helps guide authorities' policy actions to address risks to financial

stability, financial integrity, market integrity, investor protection, prudential and other risks associated with crypto-assets. These recommendations and standards apply the principle of "same activity, same risk, same regulation", establish a minimum baseline that jurisdictions should meet, and aim to address the set of issues common across the majority of jurisdictions.

To address risks to financial integrity and mitigate criminal and terrorist misuse of the crypto-assets sector, jurisdictions should implement the Financial Action Task Force (FATF) anti-money laundering and counter-terrorist financing (AML/CFT) standards that apply to virtual assets (VAs) and virtual asset service providers (VASPs). Jurisdictions should identify and assess the money laundering and terrorist financing (ML/TF) risks associated with VAs and take appropriate steps to manage and mitigate those risks. Jurisdictions and VASPs should also refer to the FATF Guidance for a Risk-Based Approach to VAs to understand and effectively implement their anti-money laundering and counter-terrorist financing obligations. In February 2023, the FATF adopted a Roadmap to accelerate global implementation of AML/CFT controls and supervision in the crypto-asset sector, which will publicly identify the steps taken to implement the standard in jurisdictions with materially important crypto-asset activity in the first half of 2024.

Some jurisdictions, in particular emerging markets and developing economies (EMDEs), may want to take additional targeted measures that go beyond the global regulatory baseline to address specific risks. These jurisdictions may want to adapt these targeted measures to their country-specific circumstances, especially if they face elevated macro-financial risks from crypto-assets. Jurisdictional characteristics that may determine vulnerabilities to macro-financial risks of crypto-assets include: (i) size of the economy and financial system, (ii) regulatory priorities, (iii) institutional quality and capacity, and (iv) level of financial integration into the global economy. The implementation of these measures may vary across countries based on their unique circumstances and capacity constraints.

The IMF and the FSB, together with other international organisations (IOs) and SSBs, have set out a roadmap to ensure effective, flexible, and coordinated implementation of the comprehensive policy response for crypto-assets. The roadmap includes currently planned and ongoing work related to the implementation of policy frameworks, which taken together seek to: build institutional capacity beyond G20 jurisdictions; enhance global coordination, cooperation, and information sharing; and address data gaps necessary to understand the rapidly changing crypto-asset ecosystem.

1. Introduction

Crypto-assets have been in existence for more than a decade and have displayed significant volatility. Emerging in January 2009, shortly after the Global Financial Crisis, the value of crypto-assets has fluctuated dramatically with many episodes of sharp appreciation and subsequent steep price reversions. For example, in 2021, the total market value of crypto-assets grew 3.5 fold, and in the crypto-asset market turmoil that started in May 2022, the total market value shrank from a peak of $2.6 trillion to below $1 trillion (Graph 1).

Alongside their volatility, crypto-asset activities have also grown in complexity. Crypto-asset issuers and service providers are conducting a wide range of functions and activities, which increases crypto-asset markets' interconnectedness. Notably, so-called stablecoins, which purport to maintain a stable value, can be key points of interconnectedness between different crypto-asset activities. The crypto-asset market turmoil in May 2022, however, highlighted the vulnerability of stablecoins to deviation from their pegs, which can lead to declines in their market capitalisation and, given their extensive use in crypto-asset markets, to wider strain in the crypto-asset markets (Graph 2).

So far, direct connections between crypto-assets and systemically important financial institutions, core financial markets, and market infrastructures have been limited. Crypto-asset markets represent only a small portion of global financial assets. The impact of price volatility has been generally contained within crypto-asset markets, though recently in the US, the decline in crypto-asset prices and activity led to one bank that offered services to crypto-asset clients to close and may have contributed to the failure of another bank. Moreover, crypto-assets are currently not widely used in critical financial services (including payments) on which the real economy depends. The rate of crypto-asset adoption is generally higher in EMDEs relative to advanced economies (AEs) (Chainalysis 2022). So far, only two jurisdictions have granted legal tender status to crypto-assets, and one of them rescinded that status due to significant concerns about the implications for macroeconomic and financial stability.[1]

The emergence of clear risks necessitates appropriate policy responses. While crypto-assets are not yet a significant part of the global financial system, they have the potential to emerge as a source of systemic risk in specific jurisdictions if they gain traction for payments or retail investments. Moreover, if connectivity between crypto-assets and traditional finance were to grow further, spillovers from crypto-asset markets into the broader financial system could increase, potentially representing a systemic risk. Policymakers are taking action to protect consumers and investors, promote financial stability and integrity, and safeguard the financial system in the event of widespread adoption of crypto-assets.[2] In support, the FSB and the standard setting bodies such as the Basel Committee for Banking Supervision (BCBS), the Bank for International Settlements' Committee on Payments and Market Infrastructures (CPMI), the International Organization of Securities Commissions (IOSCO), and the FATF have taken the lead in championing and coordinating the global regulatory framework for crypto-assets. The

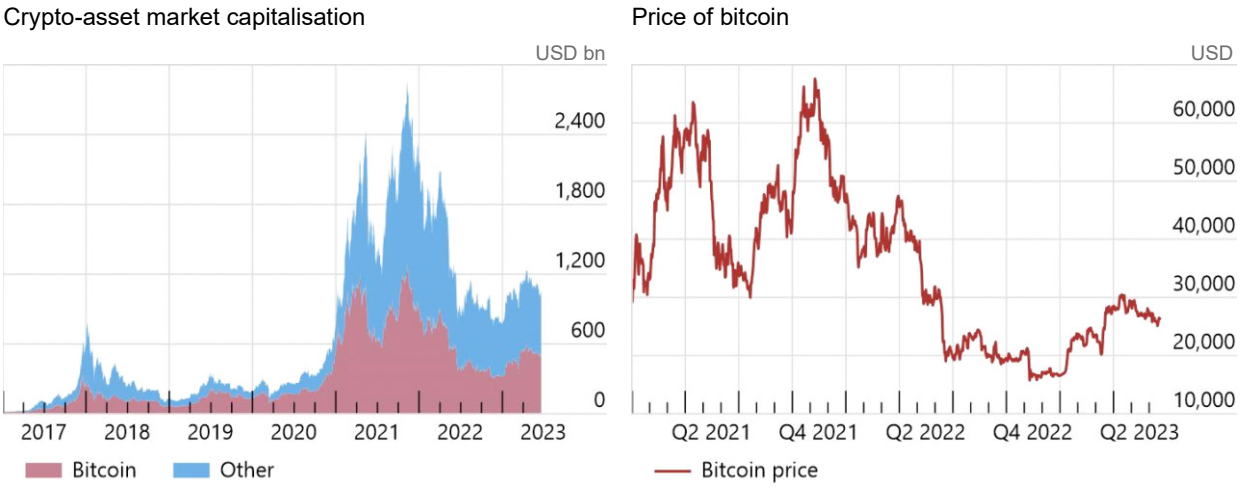
---

1 El Salvador and Central African Republic, although the latter is currently in the process of amending the law to repeal the legal tender status for crypto-assets. Marshall Islands issued a law to grant the crypto-asset SOV legal tender status, however, SOV was never issued (and the law did not cover other crypto-assets).

2 Examples of widespread adoption could be an extensive use of crypto-assets as means of payments or as investment instruments by retail investors.

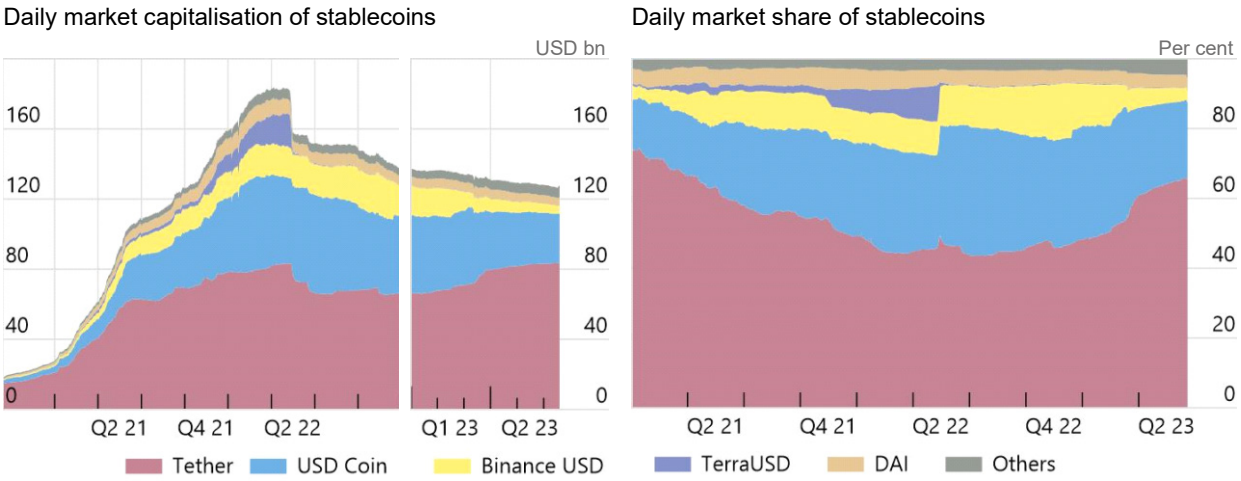
IMF has also recently published a framework to guide its members that sets out nine core elements of effective policies for crypto-assets (IMF 2023a).

Crypto-asset market capitalisation and price drivers **Graph 1**



Sources: Coin Dance, CoinGecko; FSB calculations.

Stablecoin market cap and market shares **Graph 2**



Sources: CoinGecko; FSB calculations.

This paper's key objective is to synthesise the work of the IMF and the FSB. It integrates the fundamental policy elements and recommendations from the IMF and the FSB to support a comprehensive and coordinated framework for analysing the implications of crypto-assets and for suggesting policy responses that can be further developed by the SSBs in accordance with their respective mandate. It covers all crypto-asset activities, including those conducted through DeFi protocols, and addresses the unique risks of stablecoins. This paper consolidates the key recommendations proposed by the IMF and the FSB to help authorities in identifying, assessing, and mitigating macro-economic and financial stability risks of crypto-assets. This paper does not establish new policies, recommendations, or expectations for relevant member authorities. Central bank digital currencies (CBDCs) are not within the scope of this report.

The remainder of the paper is organised as follows. It begins with a discussion of key risks to macroeconomic stability, financial stability, and other areas (such as legal, financial integrity and market integrity related risks). It then presents policy responses to these risks in the areas

of: (i) macro-financial policies; (ii) financial stability regulation; and (iii) other policies and regulation. Finally, the paper concludes with an implementation roadmap.

A detailed summary of the publications recently delivered by the IMF, FSB, Bank for International Settlements (BIS), and SSBs is provided in Annex 1.

2. Implications of crypto-assets

This section outlines the risks and purported benefits presented by crypto-assets, the implications of which differ by jurisdictional circumstances. Crypto-assets pose risks to macroeconomic and financial stability, as well as risks involving financial integrity, consumer and investor protection, and market integrity. In some instances, these risks are exacerbated by non-compliance with existing laws. Like other financial activities, these risks can interact with and reinforce each other.

Crypto-assets are purported to bring a wide range of benefits, including cheaper and faster cross-border payments, increased financial inclusion and greater portfolio diversification. Greater operational resilience, and increased transparency and traceability of transactions, are also often presented as potential benefits.[3] Most crypto-assets are issued on permissionless blockchains, which act as an open-source settlement layer that allows for programmable and interoperable financial architecture to be built on top of it.

However, a consideration of these purported benefits suggests that many have not yet materialised (IMF 2023a). Authorities need to comprehensively assess the costs and benefits associated with crypto-assets to inform policy decisions. As such, the main purpose of this section is to highlight the risks that have become apparent and warrant policy responses at the international level.

2.1. Macroeconomic stability

2.1.1. Monetary policy

The widespread adoption of crypto-assets could threaten the effectiveness of monetary policy. The transmission of monetary policy would weaken if firms and households prefer to save and invest in crypto-assets that are not pegged to the domestic fiat currency or to use them as payment instruments or medium of account (IMF 2020).[4] The risk of currency substitution ("cryptoization") is particularly pertinent for countries with unstable currencies and weak monetary frameworks.[5,6] Cryptoization is more likely to be associated with the adoption of

[3] However, crypto-asset transactions often occur off-chain, hindering traceability and transparency.

[4] Monetary transmission refers to the extent to which policy-induced changes in monetary instruments (e.g., the nominal money stock or the short-term nominal interest rate) can affect macroeconomic variables.

[5] "Cryptoization" refers to both currency and asset substitution.

[6] The FSB has work underway to assess the impact of stablecoins on EMDEs with a focus on regulatory and supervisory cooperation.

stablecoins denominated in foreign currencies which, relative to other crypto-assets, purport to offer a less volatile alternative to the domestic currency.[7]

Crypto-assets could have significant implications for monetary stability, especially if they are granted official currency or legal tender status. Monetary policy effectiveness would be compromised since central banks lack the ability to adjust interest rates on a foreign currency. When a country adopts a foreign currency, it typically imports the credibility of the foreign jurisdiction's monetary policy, aiming to align its economy and interest rates with the foreign business cycle. However, widespread adoption of crypto-assets precludes both possibilities. Further, granting such status would require creditors to accept the crypto-asset as payment for monetary obligations, including taxes, similar to the currency issued by the central bank. If both an official currency and a crypto-asset are used for pricing goods and services, domestic prices could become highly unstable due to the corresponding volatility of the crypto-asset.[8] Even if all domestic prices were quoted in a specific crypto-asset, the prices of imported goods and services would still experience significant fluctuations based on market valuations of the crypto-asset.

2.1.2. Fiscal policy

The spread of crypto-assets can increase fiscal risks. New fiscal risks can arise from the financial sector's exposure to the crypto-asset ecosystem, the lack of clarity of tax regimes, and the cross-border nature of crypto-assets.[9] In turn, crypto-assets can affect tax revenue collection and compliance, even when not adopted as legal tender. Decentralised peer-to-peer (P2P) activities increase the reliance on voluntary compliance and self-reporting. Even if supervised institutions are required to report crypto-related activities to tax authorities they may not comply with existing regulations, and in other jurisdictions, some institutions may fall outside of the scope of such regulations. The implementation of the OECD's Crypto-asset Reporting Framework across jurisdictions will support tax authorities' efforts to collect revenues (OECD 2022a).

If crypto-assets are granted legal tender status or official currency status, government revenues could be exposed to exchange-rate risk. Such risks would be significant if taxes are quoted in advance in a crypto-asset while expenditures remained mostly in other local currency.[10] Moreover, contingent liabilities arise if convertibility of the crypto-asset to fiat currency is guaranteed by the government or if the financial sector becomes exposed. In addition, granting a crypto-asset legal tender or official currency status could negatively affect the government's social policy objectives, as high volatility in the price of such crypto-asset could affect poor households more. Public finances, too, could be at risk if tax proceeds and/or

---

7 Additional factors to contemplate within the context of extensive crypto-asset adoption, or cryptoization, encompass the possibilities of bank disintermediation. This could potentially influence the banking system's capacity to attract fiat currency deposits, generate credit, and may consequently undermine financial stability. Furthermore, there's the potential for a reduction in seigniorage revenue.

8 See Kubo (2017) for discussions on the broader considerations around multiple currency regimes, including the complex tradeoffs faced by agents and the added challenges for the operational conduct of monetary policy.

9 Fiscal risks are factors that may cause fiscal outcomes to deviate from expectations or forecasts. These factors comprise potential shocks to government revenues, expenditures, assets, or liabilities, which are not reflected in the government's fiscal forecasts or reports (IMF 2019a). An example of fiscal risks that may be heightened from a potential increase in the financial sector's exposure to the crypto-asset ecosystem include the explicit or implicit guarantees for too-big-to-fail financial institutions.

10 The adoption of a crypto-asset as a legal tender could also have a relevant impact on public financial management, including the functioning of the treasury single account (TSA), government cash practices and fiscal reporting.

spending were denominated in a volatile crypto-asset. Likewise, bond issuance denominated in crypto-assets could put a country's debt dynamics at risk.

Crypto-asset adoption can increase risks to public finances even without changing legal tender or official currency laws. Pseudonymous crypto-assets can undermine tax revenue collection and compliance since withholding taxes and third-party information could be challenging to collect. Finally, differences in cross-border tax treatment of crypto-assets may open loopholes for tax avoidance.

2.1.3. Capital flows and capital flow management measures (CFMs)

The adoption of crypto-assets could erode the effectiveness of CFMs if they are used in cross border transactions. Crypto-asset trading volumes are robustly higher in countries with tighter capital controls (Furceri and others forthcoming). CFM laws and regulations may need time to be modified to adequately address crypto-assets.[11] In the case of pseudonymous crypto-assets, enforcement may be difficult. Further, in some jurisdictions, certain crypto-asset activities may not involve any readily identifiable intermediaries or service providers that can be held responsible to comply with CFMs (He and others 2022).

Crypto-assets could drive higher gross foreign capital positions and more volatile capital flows. If crypto-assets were to achieve lower cross-border transaction costs than other types of assets, they may reduce frictions for investors to allocate capital across borders. Gross capital flows could increase as a result, as could capital flow volatility, given the large price volatility of crypto-assets and the potential for herding behaviour by investors across borders.[12] Rapid capital flight (or reversals) could materialise if foreign currency-denominated stablecoins became easier and cheaper to hold in large quantities relative to foreign currency bank accounts. Moreover, larger gross foreign asset positions may lead to higher leverage and greater valuation effects, increasing balance of payments vulnerabilities (Obstfeld 2012). Possible asymmetries in the evolution of gross foreign asset positions could be driven by the different regulatory treatment of crypto-assets.[13]

Widespread use of crypto-assets may lead to increased capital outflows, reducing domestic savings, or diverting foreign capital that could have been invested domestically. The potential for crypto-assets to erode the effectiveness of CFMs could facilitate capital outflows and create potential incentives to invest in the crypto-asset ecosystem. Forecasting the pattern of net capital flows related to crypto-assets requires additional analysis and improved data.

With larger and more volatile capital flows and potentially less effective CFMs, countries may find it harder to manage their financial conditions and choose their exchange rate regime. The presence of crypto-assets does not fundamentally affect the overall view on CFMs:

---

11 Crypto- asset markets are likely to respond quickly to such measures, with announcements of regulatory tightening leading to significant declines in crypto-asset trading volumes (Copestake and others 2023).

12 Stablecoin issuers and their custodians can move from one jurisdiction to another at a very low cost, potentially being an additional source of capital flows and volatility.

13 Current statistics on gross foreign asset positions may not reflect the risk of increasing balance of payment vulnerabilities as a result of larger gross foreign asset positions, as in most countries crypto-assets are not recorded in the balance of payments.

they are useful in certain circumstances but should not substitute for warranted macroeconomic adjustment (IMF 2022a). However, significant adoption of crypto-assets can result in a faster and stronger transmission of global financial conditions, complicating policy trade-offs.[14] This mainly follows from the potential of crypto-asset adoption to impair the effectiveness of CFMs even in cases when CFMs are useful. Countries managing their exchange rates could, without full capacity to balance exchange-rate stability, monetary policy independence, and tighter financial supervision and regulation, be pushed towards accepting excessive capital flow volatility.

In addition, emerging markets and developing economies (EMDEs) may face amplified macro-financial risks from crypto-assets.[15] Box 1 explains why.

Box 1: The case of crypto-assets and EMDEs: incentives and macro-financial risks

The macro-financial risks presented by crypto-assets are likely to be larger for EMDEs because the incentives to use crypto-assets in EMDEs are stronger for several reasons.

First, EMDEs have, on average, weaker monetary frameworks, higher inflation rates, and more unstable currencies. This reduces the ability of EMDEs' currencies to perform the main roles of money - store of value, medium of exchange, and unit of account - incentivising currency substitution, potentially towards crypto-assets.

Second, the share of the population that is unbanked is larger in most EMDEs. Also, given that financial development is generally lower among EMDEs, the lack of a diverse set of investment options might increase the incentives for crypto-asset use, even among those that are banked.

Third, financial education is generally lower in EMDEs and so is individuals' understanding of the potential risks of crypto-assets.

Fourth, cross-border transaction costs are typically larger for EMDEs. This means that crypto-assets have the potential to lower cross-border transaction costs for these countries, potentially leading to relatively larger gross balance of payment flows, and to higher valuation volatility.

Fifth, relative to AEs, emerging markets typically have in place a larger number of CFMs, which creates added incentives for crypto-asset adoption to achieve circumvention.

Beyond the factors that might explain higher use of crypto-assets and hence higher associated risks, EMDEs may face greater challenges in mitigating risks. Limited capacity and cross-border coordination issues contributes to these challenges. In many cases, resources are required to develop oversight frameworks, establish authorisation and licensing regimes, and foster cooperation. Jurisdictions with limited resources may struggle to expand authorities' scope for oversight and enforcement, leading to inconsistent implementation of standards. In several EMDEs, the regulators lack a clear legal basis for regulating crypto-assets, which moreover complicates gathering information and promoting change.

Furthermore, many EMDEs have less developed tax frameworks, and tax authorities may have lower capacity to enforce compliance. This makes it particularly challenging to prevent tax avoidance through use of crypto-assets. Cross-border coordination challenges further compound the difficulties faced by

[14] Crypto-asset prices are already correlated with the global financial cycle and are more responsive to changes in financial conditions than equities (Adrian, Iyer, and Qureshi 2022; Iyer 2022; Che and others 2023).

[15] Low-income countries (LICs) might also require tailored recommendations. Factors such as low public financial literacy, limited monetary and financial developments, higher dependence on remittances, and concerns over the credibility of the domestic currency may incentivise unsophisticated consumers to turn to crypto-assets as savings vehicles. For example, given LICs' vulnerability to crypto price shocks, it may be prudent to consider voicing the need for bolder consumer protection measures.

EMDEs, given the global nature of operations, foreign ownership, and opaque governance arrangements of many crypto-asset intermediaries.

The particularly strong risks faced by EMDEs related to the use of crypto-assets underscore the importance of implementing the sound economic policies and frameworks discussed in section 3. Due to a lower initial level of state and institutional capacity, as well as potentially more limited fiscal space, EMDEs may benefit from capacity development and policy advice provided by international institutions, including the IMF and the World Bank. Such capacity development could help with, e.g., the strengthening of monetary frameworks and tax compliance, improving domestic financial infrastructures as well as counteracting the erosion of CFMs through adjusted CFM laws and improved data collection. International institutions can also help to provide fora for improved collaboration on cross-border information sharing.

2.1.4. Global financial safety net (GFSN)

If a rapid and widespread adoption of crypto-assets materialised, it could require changes to central banks' reserve holdings, as well as to the GFSN, with potential instability along the transition. The IMF is mandated to oversee the functioning and stability of the International Monetary System (IMS), which has four elements: 1) the global payment system, 2) the Global Financial Safety Net, 3) policies around capital flow measures, and 4) exchange-rate regimes (IMF 2022a; 2023c). The GFSN refers to a set of mechanisms, resources, and arrangements established at the international level to provide financial assistance and stability to countries facing financial crises or systemic risks. It consists of various components, including international financial institutions (such as the International Monetary Fund), regional financial arrangements, bilateral swap lines, and other forms of liquidity support. The aim of the GFSN is to promote financial stability, maintain market confidence, and help countries overcome financial challenges by providing them with access to financial resources and policy advice.

2.1.5. Payment system fragmentation

Widespread use of stablecoins risks increasing fragmentation of global payments. Proponents of stablecoins argue they can potentially lower costs and improve access to and transparency of payments. They also argue that stablecoins may increase the cross-border flow of payments on permissionless blockchains which individually act as common settlement layers.[16] However, permissionless networks are not easily compatible with one another. In many instances, users are required to utilise a crypto-asset trading platform to facilitate the transfer of value across networks. This introduces additional costs and induces reliance on intermediaries. Also, users may use bridges, which may increase operational risks. Another approach is the use of closed-loop networks or permissioned ledgers, which can result in fragmented liquidity.[17]

---

[16] These purported benefits follow from the use of underlying technologies (such as DLT and smart contracts) and many of the benefits are yet to be realised. See also BIS 2023.

[17] A bridge is a technique used to transfer crypto-assets between blockchains by, typically, creating a synthetic representation of a blockchain-specific crypto-asset on a different blockchain.

2.2. Financial stability implications and regulatory issues

Crypto-asset markets and the ecosystem are changing rapidly, and could, if they were to grow and become more interconnected with the traditional financial system, reach a point where they represent a threat to global financial stability. The crypto-asset market turmoil that started in May 2022 highlighted the complex interconnections in the crypto-asset ecosystem, along with some examples of spill-overs to traditional markets. The failure of a market player can quickly transmit shocks to other parts of crypto-asset markets. If interconnections between crypto-asset activities and the traditional financial system were to increase, the spill-over effects may impact important parts of traditional finance.

The crypto-asset ecosystem exhibits vulnerabilities similar to those found in the traditional financial system. The vulnerabilities in crypto-asset markets – related to leverage, liquidity and maturity mismatch, operational and technological fragilities, and interconnectedness – are similar to those in traditional finance. Recent events have further highlighted that many of the vulnerabilities in crypto-asset markets are exacerbated, because functions in crypto-asset markets are being carried out without appropriate governance structures, in non-compliance with existing rules, and/or outside the regulatory perimeter.

The IMF and the FSB have identified the following potential financial stability transmission channels:

- Financial sector exposures to crypto-assets: Volatility and risk contagion may be transmitted to the wider financial system through direct or indirect exposures of financial institutions to crypto-assets. For example, when crypto-asset investors suffer large losses, they may be forced to sell traditional financial assets to manage their liquidity positions.

- Wealth effects: If the breadth of crypto-asset investors were to increase, adverse asset value fluctuations could have correspondingly larger knock-on effects on the wider financial system and economy. For example, faced with large losses, retail investors in crypto-assets could curtail spending or reduce their investments in other assets.

- Confidence effects: Widespread holdings of crypto-assets by retail investors with limited knowledge of how the market functions could result in adverse confidence effects if there were to be market disruptions. This could be made worse should crypto-asset issuers and service providers fail to comply with applicable investor-protection requirements and recovery and resolution frameworks.

- Use in payments and settlements. If crypto-assets are adopted widely as a payment instrument (including as a settlement asset), their interaction with the financial system and the broader economy could contribute to faster and more material shock transmission in the event of market stress. Furthermore, permissionless blockchains present some characteristics that could pose financial stability risks, notably related to

settlement finality and governance.[18] This channel could be particularly pronounced in some EMDEs where crypto-assets have become a prevalent payment instrument.

The purported stability of stablecoins could enhance interconnectivity between crypto-asset markets, traditional financial institutions, and retail market participants. Stablecoins may facilitate a wide range of transactions in the crypto-asset ecosystem. They have the potential to quickly scale and could pose specific risks to financial stability if they were to enter the mainstream of the financial system in multiple jurisdictions or if they are broadly adopted as payment instruments.

Stablecoins are also vulnerable to distinct risks due to their intended stability and the mechanisms stablecoin issuers claim they use to maintain stable values. These features may lead to risks unique to stablecoins and distinguish them from other crypto-assets. They are notably vulnerable to sudden loss of confidence, similar to bank runs. In particular an issuer's failure to back up its promise of a stable value and timely redemption could cause stablecoin users to lose confidence, leading to a run on the stablecoin. Traditional financial risks – market, liquidity and credit risks – may be more acute and complex in a stablecoin arrangement depending on, among other things, the choice and management of the stablecoin reserve assets. Fragilities in the governance, design, and reserve management of the stablecoin arrangement's infrastructure, among other factors, could lead the stablecoin to de-peg. Operational incidents that occur in key parts of a stablecoin arrangements may result in the failure of the stablecoin to maintain a stable value (Bains and others 2022). Stablecoins are also exposed to adverse confidence effects, such as when a financial institution that acts as reseller/market-maker of the stablecoin arrangement is in financial distress. The different activities, such as the management of reserves, within a stablecoin arrangement may considerably increase linkages to the existing financial system and create run risk.

Global Stablecoins (GSCs) may transmit volatility more abruptly than other crypto-assets and may cause significant risk to financial stability. A GSC is a stablecoin distinguished by its potential reach and adoption across multiple jurisdictions. Macroeconomic risks associated with GSCs may be higher than for other stablecoins. These risks may arise particularly if, over time, households and businesses in some economies come to hold substantial portions of their wealth in GSCs, rather than in local currencies. In addition, uncertainty about, or large fluctuations in, the value of instruments being used as settlement assets in systemic payment or securities settlement systems could give rise to risks to financial stability associated with the operational or financial failure of the payment or settlement system itself.

DeFi is a segment of the crypto-asset ecosystem. While the processes used to provide services may differ from those of the traditional financial system, DeFi does not differ substantially from the traditional financial system in the functions it performs. In attempting to replicate some of the functions of the traditional financial system, DeFi inherits and may amplify vulnerabilities, including operational fragilities, liquidity and maturity mismatches, leverage and interconnectedness. Claims of decentralisation often do not hold up to scrutiny. Presently, DeFi

[18] In particular, clearly defining and implementing the point at which settlement is final may be challenging for certain types of blockchains that feature probabilistic settlement, thereby creating settlement risk. In addition, due to the decentralised nature of these networks, governance arrangements may be opaque or inadequate, with no clear allocation of responsibility and accountability. In light of these challenges, permissionless blockchains may therefore pose significant risks to financial stability if operating at scale, in the absence of effective mitigants.

may exhibit unclear, opaque, untested or easy-to-manipulate governance frameworks that may expose users to risks. FSB (2023a) presents a comprehensive assessment of certain vulnerabilities associated with DeFi.

The rapid evolution and international nature of crypto-asset markets also raises the potential for regulatory gaps, fragmentation and arbitrage. Box 2 summarises a list of key regulatory and supervisory issues and challenges that should be considered in developing a regulatory framework.

Box 2: Regulatory and supervisory issues and challenges

Regulatory powers and coverage

Crypto-assets can pose challenges to legal, regulatory, and enforcement frameworks. In some jurisdictions, crypto-asset activities are conducted in non-compliance with applicable domestic regulations and may lead to enforcement and supervisory challenges for authorities. In some other jurisdictions, crypto-assets may fall outside of the existing regulatory perimeter, leading to regulatory gaps.

Governance

Many organisers of crypto-asset activities structure themselves in ways that result in opaque governance in an attempt to evade regulation and accountability. As a result of these efforts, regulators may face challenges in identifying the entity responsible for the actual governance. Such challenges can be more pronounced within the DeFi ecosystem. Some stablecoin arrangements also purport to apply a decentralised governance structure that potentially gives rise to challenges in identifying the entity that exercises actual control over the governance.

Cross-border cooperation

Crypto-assets are regulated differently across jurisdictions. Crypto-asset issuers and service providers could migrate to places where regulation is lighter, and existing regulatory cooperation arrangements may not effectively capture all aspects of a specific crypto-asset activity. This may amplify contagion when a crypto-asset service provider is in distress or failure.

Data management and disclosure

Data gaps are a key concern in the regulation, supervision and oversight of crypto-assets. Some entities do not disclose or report reliable data in compliance with existing requirements. Many crypto-asset service providers extensively conduct activities “off-chain”, meaning that a large part of the relevant data is neither publicly available on blockchains nor properly disclosed. On-chain data is typically pseudonymous and may be difficult to interpret. In some cases, regulated traditional financial entities lack specific reporting requirements concerning their participation in crypto-asset activities.

Combination of multiple functions within a single service provider

Crypto-asset service providers often combine a wide range of functions, including trading platform, custody, brokerage, lending, deposit gathering, market-making, settlement and clearing, issuance, distribution, and promotion. The combination of some functions poses additional risks originating from mutual reinforcement and interaction of individual risks. It may also give rise to conflicts of interest. In certain jurisdictions, some combinations of functions are not permitted or are subject to special regulatory regimes. Without appropriate controls, such as when entities are in non-compliance with existing requirements or there is a lack of comprehensive regulation or legal segregation of certain functions, crypto-asset service providers that combine certain functions could become key central points for amplifying and transmitting risks. The combination of various activities could support the growth of such providers, and if they became sufficiently large, could represent a single-point of failure with implications from a systemic risk perspective.

Regulatory and supervisory challenges for EMDEs

EMDEs could face particular regulatory and supervisory challenges when implementing their policy frameworks with respect to crypto-assets. EMDEs often face capacity constraints that lead to limitations in ensuring adequate regulatory resources in response to their needs, including regular monitoring, policy formulation, proportionate supervision and enforcement, and sufficient coordination across borders.

Some EMDEs may act as "hosts" to crypto-asset service providers and stablecoin arrangements, and residents in EMDEs may also rely on exchange and custody functions from cross-border crypto-asset service providers. This dynamic could put greater pressure on effective cross-border regulatory and supervisory coordination and cooperation arrangements. For example, capital controls are imposed on the traditional banking and payments sector through local licensing or subsidiarisation requirements (e.g., onshore banks or payments providers). However, if not adequately regulated and supervised among cross-border stakeholders, crypto-asset service providers and stablecoin arrangements could more easily evade these local regulatory requirements while offering their services to EMDEs from offshore or virtual locations, requiring greater consideration of effective cross-border cooperation and coordination arrangements.

EMDEs could also face challenges to obtaining adequate information to monitor financial stability risks from crypto-asset service providers and stablecoins operating or used by residents in their jurisdiction.

The FSB is exploring how to address the cross-border risks specific to EMDEs posed by GSCs.

2.3. Other risks

2.3.1. Legal risks

If crypto-assets are granted official currency or legal tender status, they could raise significant macro-critical legal issues.[19] Legal tender status is often given to means of payment that are widely accessible like physical currency. However, internet access and technology needed to transfer crypto-assets remains scarce in many countries, raising practical challenges over the accessibility of crypto-assets. Moreover, the official monetary unit must be sufficiently stable in value to facilitate its use for medium- to long-term monetary obligations.[20] And changes to a country's legal tender status and monetary unit typically require complex and widespread changes to monetary law to avoid creating a disjointed legal system.

The varying legal treatment of crypto-assets across jurisdictions may lead to potential legal risks. Uncertainties in some jurisdictions in the application of private laws (e.g., insolvency law) and financial laws could result in the parties to a crypto-asset arrangement facing risks unforeseen at the time of the transaction.[21] Efforts by crypto-asset service providers and issuers to seek to take advantage of these uncertainties may amplify the risks. Regulatory authorities may face legal challenges in their enforcement actions. Finally, legal risks, including conflict-of-

[19] Macro-critical legal issues refer to legal challenges and concerns that have a significant impact on macroeconomic stability and the functioning of an economy as a whole.

[20] This raises several critical macro issues. For stablecoins, what would be the effect on the discharge of monetary debt when the stablecoin is delivered in payment and its market value is "below par"? And what happens with debt discharge if the stablecoin subsequently ceases to exist? For other crypto-assets, how can monetary obligations be expressed in a monetary unit with high volatility?

[21] These risks are even more evident in fragile states with high levels of corruption and weak rule of law, where institutions often lack the capacity to properly enforce and protect contractual and property rights.

law challenges, are heightened in cross-border transactions due to differences in the legal treatment of crypto-assets across countries.

2.3.2. Financial integrity

Due to their claimed pseudonymous nature, speed, global reach, and evidence of weak implementation of relevant AML/CFT requirements, crypto-assets can be attractive to criminals, raising financial integrity risks. Crypto-assets can be misused to commit a range of crimes (e.g., ransomware, fraud, tax evasion, money-laundering, financing the proliferation of weapons of mass destruction, and terrorist financing) (FATF 2023). Although most distributed ledger technology (DLT) networks transactions purport to be public and therefore visible, linking an address or wallet to an individual can be challenging and resource-intensive. The speed of transactions and borderless nature provide opportunities for criminals to quickly exchange between different crypto-assets and transfer funds across borders. In addition, crypto-asset providers can market their activities globally and choose to operate from jurisdictions with weak (or non-existent) AML/CFT frameworks.

The borderless nature of crypto-assets also heightens financial integrity risks. Crypto-assets can be easily accessed and used to make cross-border payments. They commonly rely on complex infrastructures, often spread across several jurisdictions, to effect payments. This segmentation of services can make AML/CFT supervision and enforcement challenging, because many components of the crypto-asset system, such as "exchanges" and trading platforms, are created or located in jurisdictions that have not implemented AML/CFT regulations for crypto-assets in line with the FATF Standards.[22]

Some elements in the crypto-asset ecosystem can make traceability more challenging. Anonymising services, commonly referred to as "mixers" and "tumblers", and anonymity-enhanced crypto-assets can make it more difficult to trace and attribute transactions using public blockchain data.

Risks posed by DeFi and peer-to-peer (P2P) transactions, which refers to transactions in which no intermediaries are involved, could increase if such channels are mass-adopted and more commonly used for payments. In the case of DeFi, some jurisdictions report challenges in identifying specific natural or legal persons responsible for VASP obligations in DeFi arrangements, which can complicate effective supervision and enforcement of covered DeFi arrangements. With regards to P2P transactions, the lack of intermediaries means that the traditional approach to AML/CFT regulation, in which AML/CFT requirements are imposed on a private sector entity and compliance is monitored by supervisors, cannot be applied.

Criminals will continue to target perceived weaknesses in AML/CFT frameworks, especially as further new illicit financing typologies continue to emerge. Without the implementation of regulation and enforcement in line with the FATF Standards (notably through effective regulation of VASPs or enforcement of a prohibition on all or certain VA activities), criminals will continue to exploit gaps created by inconsistent or weak AML/CFT frameworks,

[22] Importantly, many components of the crypto-asset system, such as trading platforms, are located in jurisdictions that do not apply AML/CFT controls.

and crypto-assets could become an even greater threat to the integrity of the global financial system. To limit these opportunities, crypto-asset service providers should be licensed or registered and comply with all applicable requirements. Even when the standards are effectively implemented, regulators will need to actively monitor market developments and emerging vulnerabilities, as well as assess illicit finance risks.

Financial integrity is also relevant to financial stability. In traditional financial sectors, money laundering, terrorist financing, and various other forms of financial abuse may undermine domestic or balance of payments stability. While such impacts have not been studied specifically in relation to crypto-assets, the same underlying factors are relevant (IMF 2019b): Specifically, the actual or perceived failure of a crypto-asset trading platform to deal effectively with ML or TF can impact its relationships and access to other platforms across both the crypto-asset and traditional finance space. Systemic misuse of a jurisdiction's financial system for ML and TF may also be an indicator of underlying problems such as weak financial sector supervision, which can also negatively affect financial stability.

2.3.3. Market integrity

Non-compliance with or lack of regulation for crypto-asset activities can impair market integrity and the interests of market participants. Common market integrity concerns include insider trading, fraud, wash trading, and market manipulation, conflicts of interest arising from vertical integration of activities and functions comingling of client funds, lack of client asset protection in custody or any activities involving the safeguarding of clients, and lack of fair access, suitability, and distribution to retail customer.[23]

Examples of fraud and manipulation are prevalent within crypto-asset markets. On distributed ledgers, users generally can set the fees for their own transactions to rank higher in the settlement queue and obtain financial gains. Validators' ability to arbitrarily include, exclude, or re-order transactions within the blocks they produce (so called maximal extractable value - MEV) can lead to profits for them and losses to parties involved in the crypto-asset transfers. Certain forms of MEV are the result of practices that if adopted with regard to financial securities would be illegal in certain jurisdictions.[24] Large validators could congest the blockchain with artificial trades (Bains 2022), raising the fees that other users pay them (Aramonte, Huang, and Schrimpf 2021). Moreover, the illiquidity of certain exchanges or crypto-assets may facilitate price manipulations. Some participants may seek to trigger liquidations by other parties and create opportunities to purchase liquidated collateral at a discounted price or short the collateral asset (Werner and others 2021).[25]

---

[23] FTX is a major crypto-asset trading platform, and as noted in public reports engaged in allegedly fraudulent activities, including with respect to their customers' assets. FTX collapsed in November 2022 and filed for bankruptcy and insolvency in the United States and in the Bahamas. The FTX collapse had contagion effects throughout crypto-asset markets. Though spillovers to wider financial markets was limited, the losses suffered by investors exposed to FTX and the broader crypto-asset ecosystem were significant, and FTX's collapse served as warning that other crypto trading firms may be vulnerable to runs which could implicate many other parts of the crypto universe.

[24] MEV arises from 'front' and 'back-running' as well from sandwich trades, all schemes which are illegal under market abuse regulation. Estimations indicate that since 2020, total MEV has amounted to USD 635 million on just the Ethereum network. MEV increases exponentially with the augmentation of transaction number/volume.550-650 (Auer and others 2022).

[25] Other examples include matching orders, that is, the buying and selling of the same asset to increase trading volume and interest in the asset. DeFi allows for other forms of attacks, including attacks exploiting smart contract vulnerabilities and attacks executed within a single transaction (Werner and others 2021).

Crypto-asset networks can give rise to competition issues. The nature of network effects and economies of scale in crypto-asset markets increase the likelihood of concentration risks and potential abuses of market power.

2.3.4. Environmental risks

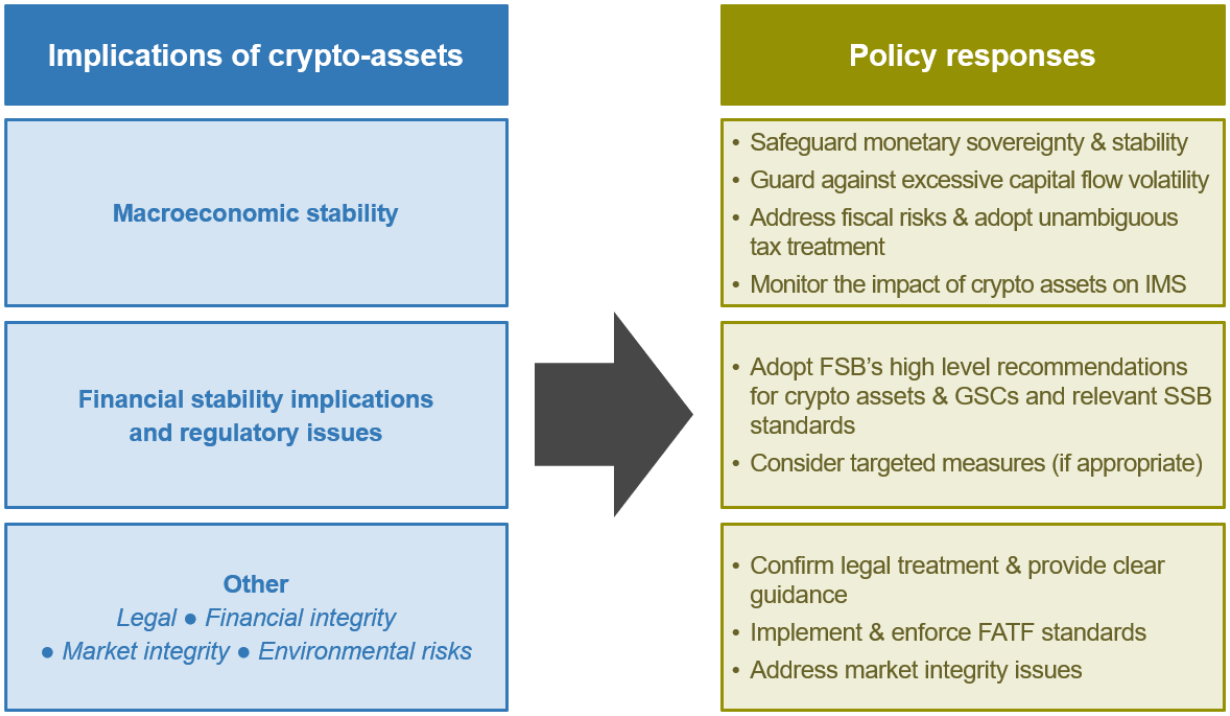
Two design elements of the supporting distributed ledger network have key implications for the energy consumption of crypto-assets. The first element is the consensus mechanism used for network agreement. Energy needs range from vastly high in proof-of-work (PoW) algorithms like Bitcoin to significantly lower in non-PoW mechanisms. Crypto-assets based on PoW consensus mechanisms are highly energy intensive and generate large amounts of electronic waste (De Vries and Stoll 2021).[26] The second element is the level of control over the underlying architecture, such as the number and location of nodes, participant roles, and code updates. Permissioned networks offer stronger controls on parameters influencing energy consumption compared to permissionless systems.

3. Comprehensive policy and regulatory response

This section presents the responses to the risks identified in the previous section. It is important to note that this paper does not introduce new policies, recommendations, or expectations for member authorities. Instead, it draws upon the existing policy recommendations and guidelines from the IMF, FSB, IOs and SSBs. Macro-financial policies, financial regulation, and additional policy and regulatory considerations to address legal risks, financial integrity, market integrity, and investor protection are all essential elements of an effective policy framework for crypto-assets. The section concludes with additional policy considerations for targeted measures that may be appropriate under specific conditions for jurisdictions with heightened macroeconomic risks, such as some emerging markets and developing economies.

[26] Other consensus mechanisms can be more energy efficient than PoW, and if properly designed, digital currencies may be more energy efficient than existing payment systems (Agur and others 2023).

Linking implications to responses **Figure 1**



Source: IMF/FSB authors

3.1. Macro-economic stability policies

3.1.1. Safeguard monetary sovereignty and stability

Developing effective frameworks and policies is the best way to limit substitution into crypto-assets. Robust macroeconomic policies and credible institutional frameworks are fundamental to protect monetary sovereignty. Weak monetary policy frameworks, combined with fiscal deficits and pressures for central bank financing, undermine monetary credibility and instigate currency substitution (Adrian and others 2021; IMF 2020).

An effective monetary-policy framework (MPF) safeguards monetary sovereignty through transparency, coherence and consistency. It encompasses policy design, implementation, communication and legal foundations for central bank independence. A transparent, coherent and consistent MPF enhances understanding, market expectations and policy effectiveness (IMF 2015; IMF 2021; Unsal, Papageorgiou, and Garbers 2022).

Avoiding large deficits and high debt levels is important to protect monetary sovereignty, especially when monetary policy frameworks are weak. Pressure on central banks to finance deficits instead of tightening policy can lead to inflationary consequences and increase pressures toward currency substitution, which, in turn, could encourage the use of crypto-assets as means of payment.

To protect monetary stability, crypto-assets should not be granted official currency or legal tender status. Official means of payment should be limited to public currencies issued by the state. Crypto-assets pose fundamental risks and should not be considered as "currency", as

they do not fulfil the three basic conditions thereof (unit of account, means of exchange and store of value).[27] Due to the risks and concerns about destabilising impacts on the international monetary system (IMS), central banks should also avoid holding crypto-assets in their official reserve assets.

Governments should minimise fiscal and operational risks in cases of official crypto-asset use. Official payment use should be limited, to avoid exposing government revenues to variations in crypto-asset prices. Convertibility guarantees should be avoided to prevent the Treasury from accruing contingent liabilities, and risks to fiscal management operations should be managed with safeguards and controls.[28]

3.1.2. Guard against excessive capital flow volatility

Policy makers should take steps to counter the potential erosion of CFMs caused by the adoption of crypto-assets. Possible policy steps include clarifying the legal status of crypto-assets, if necessary, and ensuring that CFM laws cover them and are effectively enforced. Addressing data gaps and leveraging technology can help authorities monitor risks and implement CFMs more effectively.[29]

If CFMs become less effective, as a result of crypto-asset adoption, jurisdictions may need to consider greater exchange-rate flexibility, balancing the three competing objectives of monetary autonomy, exchange rate stability and financial openness. Managing increased risks of capital outflows may involve adjusting international reserves, considering the benefits they provide as a buffer against balance of payments crises. In such cases, macroeconomic policy adjustments, like tighter monetary, macroprudential or fiscal policies, may be necessary.

3.1.3. Address fiscal risks and adopt unambiguous tax treatment

Fiscal risks arising from widespread adoption of crypto-assets including those resulting from granting legal-tender or official currency status should be identified, analysed, and disclosed. The government's exposure to fiscal risks related to crypto-assets should be assessed, quantified (to the extent possible), and monitored in a timely manner. The widespread use of crypto-assets in a weakly regulated environment can increase the government's exposure to explicit and implicit fiscal risks from the financial sector.

Identifying and monitoring risks associated with crypto-assets can enhance the government's ability to mitigate and address them, promoting fiscal credibility and

---

27 Almost all monetary laws recognise that the issuance of officially recognised means of payment is a task of the State, and therefore only recognise “high quality” public means of payment as “currency” (Bossu and others 2020). Considering the key risks they pose, crypto-asset assets and stablecoins should not be recognised as “currency”.

28 Including fiscal operations related to budget execution, treasury management, fiscal reporting, internal/external audits, and rent seeking. For more detail see IMF (2023a).

29 Data is essential to better understand adoption and use patterns, as well as implications, and to prioritise and design policies. Also, data should be collected across countries, and in a consistent manner, to evaluate for instance spillover effects, policy leakage, and currency substitution (IMF 2023b).

sustainable public finances. These risks to the public finance should be included in the government's fiscal risk statement to promote fiscal transparency (IMF 2019a).

Tax policies should ensure the unambiguous tax treatment of crypto-assets, and tax administrations should strengthen compliance efforts. Legal provisions should clearly reflect policy decisions on the tax treatment of crypto--assets, including income/wealth and value-added taxes, as discussed in detail in Baer and others (2023). Tax administrations should leverage third-party information, especially when intermediaries such as crypto-asset trading platforms, broker-dealers, and other intermediaries are involved, to enhance tax compliance.[30]

Collaboration on cross-border information sharing and financial regulation is crucial for effective tax compliance. The adoption of frameworks like the Crypto-asset Reporting Framework (CARF) proposed by the OECD (2022b) can be beneficial. Improving institutional capacity, investing in specialised data infrastructure and analytics and prioritising training for tax administration staff are essential to support risk analysis and tax audits related to crypto-asset operations.

3.1.4. Monitor the impact of crypto-assets on the International Monetary System (IMS)

The IMS may face new challenges, such as increased fragmentation, large and volatile capital flows, and new risks to financial stability and integrity. Crypto-assets could amplify existing vulnerabilities and pose new risks to global financial stability and the IMS on multiple fronts (IMF 2023c).

The IMF's primary role, as spelled out in its Articles of Agreement, is to ensure the stability and efficiency of the IMS. The Fund actively engages with member countries, including through multilateral and bilateral surveillance, capacity development, and lending. In the context of crypto-assets, an important part of the Fund's efforts involves assessing the macrofinancial and spillover risks.

Ongoing analysis, review of rules and monitoring are imperative.[31] The areas that need close and ongoing monitoring include: (i) crypto-assets' impacts on gross and net cross-border capital flows; (ii) changes in financial intermediation, currency substitution, and international currency use; (iii) effects on exchange-rate and capital-account regimes, as well as capital flow management measures; (iv) financial integrity risks; and (v) demand for and supply of Global Financial Safety Net resources. Close monitoring will help inform appropriate regulation and cross-border cooperation among policymakers and international standard-setting bodies and institutions.

---

[30] Crypto-asset transactions when parties operate off-chain, peer to peer or through unhosted or cold wallets, may be more difficult to bring into the tax system.

[31] Rules include those rules contained in the IMFs Institutional View on Liberalization of Capital Flows that may need to be amended depending on the impacts on the IMS.

3.2. Financial stability regulation

3.2.1. The FSB's global framework for crypto-asset activities

The FSB recommendations, as set out in Annex 2, provide a global framework for the effective regulation, supervision and oversight of crypto-asset activities and markets and global stablecoin arrangements. The framework is based on the principle of 'same activity, same risk, same regulation' and provides a strong basis for ensuring that crypto-asset activities and stablecoins are subject to consistent and comprehensive regulation, commensurate to the risks they pose.

The FSB framework consists of two distinct sets of recommendations. The recommendations for crypto-assets and markets apply to any type of crypto-asset activity, including stablecoins and those conducted through DeFi. However, those stablecoins that could be widely used as a means of payment and/or store of value across multiple jurisdictions – GSCs – could pose particular risks to financial stability. Therefore, separate and complementary recommendations for crypto-asset activities that meet the definition of a GSC have been published to reflect their particular risks and heightened regulatory and supervisory requirements.

The FSB recommendations are high-level. They allow for sufficient flexibility for jurisdictional authorities to implement them, by applying relevant current regulations or developing new domestic regulatory frameworks, and to adapt to a rapidly evolving environment. This approach also leaves adequate room for SSBs to develop additional guidance that address sectoral issues within their respective mandates.

3.2.2. The FSB's high-level recommendations for crypto-assets

Relevant authorities should have appropriate regulatory powers and should apply comprehensive and effective regulation, supervision, and oversight requirements. Authorities should have and utilise the necessary or appropriate powers, tools and adequate resources to regulate, supervise, and oversee crypto-asset activities and markets and to enforce relevant laws and regulations effectively. These should be applied proportionate to the risks posed and consistent with international standards and with authorities' respective mandates.

To foster efficient and effective communication, information sharing, and consultation, authorities should cooperate and coordinate with each other, both domestically and internationally. Cooperation and coordination should support different authorities in fulfilling their respective mandates and should encourage consistency of regulatory and supervisory outcomes.

Crypto-asset issuers and service providers should have in place comprehensive governance frameworks. This includes having clear and direct lines of responsibility and accountability for all functions and activities being conducted.

Effective risk management frameworks should be in place that comprehensively address all material risks associated with the functions and activities that are being performed.

This should include addressing such risks that stem from operational resilience, cyber security safeguards and AML/CFT measures, as well as having “fit and proper” requirements.

Robust data frameworks are needed to ensure proper regulation, supervision and oversight. Data frameworks should include systems and processes for the collecting, storing, safeguarding and timely and accurate reporting of data. Authorities should have access to the data as appropriate.

Users and relevant stakeholders should be provided with comprehensive, clear and transparent information about crypto-asset markets and services. This information should cover governance frameworks, operations, risk profiles and financial conditions,

Authorities should identify and monitor the relevant interconnections, both within the crypto-asset ecosystem and between the crypto-asset ecosystem and the wider financial system – and address financial stability risks.

Crypto-asset service providers that combine multiple functions and activities when permissible, should be subject to appropriate regulation, supervision and oversight. This should comprehensively address the risks associated with individual functions and the risks arising from the combination of functions, including conflicts of interest and separation of certain functions. In some jurisdictions, such combinations are not permitted, and in such instances, authorities should apply robust measures such as legal disaggregation and separation of certain functions.

3.2.3. The FSB’s high-level recommendations for GSCs

The FSB high-level recommendations take a broad approach to global stablecoins. International standards designed for specific sectors focus on distinct functions within the remit of the relevant standard setting bodies. Where international sectoral standards apply to a GSC for a particular economic function, those standards will address risks specific to the economic function and, as such, authorities should implement those international standards.

The FSB GSC recommendations are complementary to those for other crypto-assets, while reflecting the particular risks and heightened regulatory and supervisory requirements of GSCs. The relevant authorities should utilise the appropriate regulatory powers to provide comprehensive oversight of GSC activities and functions. The recommendations promote cross-border cooperation and information sharing, robust data frameworks, and effective risk management frameworks for GSC arrangements. The recommendations include additional requirements to address GSCs’ particular risks.

GSC arrangements should have appropriate recovery and resolution plans. Authorities should require that GSC arrangements have in place appropriate planning to support a recovery, resolution, or orderly wind down under the applicable legal (or insolvency) frameworks.

GSC issuers and, where applicable, other participants in the GSC arrangements should provide all users and relevant stakeholders with comprehensive and transparent information to understand the functioning of the GSC arrangement. This information should include the governance framework, any conflicts of interest and their management, redemption rights, stabilisation mechanism, operations, risk management framework and financial condition.

GSC arrangements should be subject to robust redemption rights, stabilisation, and prudential requirements to maintain a stable value at all times and to mitigate the risk of runs. Authorities should require that GSC arrangements provide a robust legal claim to all users against the issuer and/or underlying reserve assets and guarantee timely redemption. For GSCs referenced to a single fiat currency, redemption should be at par into that fiat currency.

3.3. Other policies and regulation

3.3.1. Legal considerations

In some jurisdictions, it may be important to clarify the application of existing laws or assess the need for new ones. Where such legal certainty does not yet exist, jurisdictions should consider taking three actions that are not mutually exclusive and may involve law reforms, to be developed with private sector involvement and in line with international organisations' guidance:[32]

- **Modernise private law through targeted legislative reforms, where necessary** (Garrido and others 2022). In some jurisdictions, private law may need to be modernised to clarify the classification of crypto-assets and the rules governing their transactions. To the extent there are gaps in the existing framework, legislative reforms could focus on areas where friction between private law and new technologies exists, as seen, for example, in Switzerland, Liechtenstein and Germany, to avoid delays and inconsistencies with the broader legal framework (Allen and others 2020).[33]

- **Clarify the financial law application and treatment of crypto-assets, where necessary.** This can be achieved through various approaches (Blandin and others 2019). Existing legal and regulatory frameworks can be enforced when crypto-asset activities fall within established legal categories (e.g., the application of securities laws to crypto-assets). To the extent there are gaps and the existing framework does not already apply, jurisdictions can amend existing laws to explicitly cover specific activities related to crypto-assets (e.g., Japan) or to issue bespoke laws on crypto-assets (e.g., the EU's Markets in Crypto-Assets regulation) or on financial technologies ("fintech"), of which crypto-asset activities are a subset (e.g., Mexico).[34]

- **Mitigate problems associated with under-assessing or under-collecting tax on transactions involving crypto-assets.** This requires a transparent and predictable tax law framework, coupled with international cooperation. While tax laws generally apply to crypto-assets based on their legal characterisation, adjustments may be needed to provide clarity and certainty and to achieve a country's specific policy objectives. Tax administrations should complement existing frameworks with timely and comprehensive guidance to taxpayers to promote transparency and predictability of

[32] One example of international cooperation is the Digital Assets and Private Law Principles of the International Institute for the Unification of Private Law (UNIDROIT).

[33] Targeted legal amendments are often more desirable than a complete overhaul of the private law system. However, it is important for jurisdictions undergoing a major overhaul to also consider the inclusion of provisions for crypto-assets.

[34] Some countries have banned crypto-assets, see The Law Library of Congress (2021).

treatment. Additionally, countries should clarify payment and reporting obligations, including by crypto-asset service providers.

3.3.2. Financial integrity regulation

Jurisdictions should implement the FATF Standards in the virtual-asset sector to protect their financial systems and the global economy from threats of money laundering, and the financing of terrorism and of proliferation of weapons of mass destruction. Consistent with the FATF Standards on virtual assets service providers adopted in 2019, jurisdictions should assess the risks of money laundering and terrorist financing associated with virtual asset activity and take appropriate steps to mitigate those risks; license or register virtual asset service providers; and supervise the sector in the same way they supervise other financial institutions. At the same time, virtual-asset service providers should be required to implement risk mitigation measures, including customer due diligence, record keeping and reporting of suspicious transactions and implementation of targeted financial sanctions. They should be required to apply the "travel rule" for payment transparency and obtain, hold and securely transmit originator and beneficiary information when making transfers. The FATF adopted revised guidance for a risk-based approach to virtual assets in 2021, which helps jurisdictions and VASPs understand their AML/CFT obligations, and effectively implement the FATF's Standards (FATF 2021).

The borderless nature of the crypto-assets ecosystem limits the effectiveness of individual national regulation. Given that specific VASPs may be subject to the AML/CFT framework of multiple jurisdictions, cooperation and sharing of information among jurisdictions is critical for improving understanding of ML/TF risks related to crypto-assets at the global and jurisdiction levels. The inconsistent implementation of the FATF Standards also creates opportunities for regulatory arbitrage. Collective action and broad implementation of AML/CFT frameworks in line with the FATF Standards are therefore essential in order to mitigate the illicit finance risks in the crypto-asset sector. Recognising the urgent need to address these geographic gaps, the FATF adopted a roadmap in February 2023 to accelerate global implementation of AML/CFT controls and supervision in the crypto-asset sector.

Financial integrity is one of the key objectives of an effective policy framework (IMF 2023a). Jurisdictions should consistently implement the FATF Standards as well as pursue effective international cooperation. The IMF should continue its efforts to advise members on crypto-related financial integrity issues in its surveillance, lending, and assessment work, and to support its members to implement effective AML/CFT frameworks through its capacity building activities.

3.3.3. Market integrity regulation

Jurisdictions should implement and apply the IOSCO Principles and Standards to economically equivalent crypto-assets and activities to address the sizeable and proximate market integrity and investor protection risks in the sector, covering conflicts of interest, client asset protection, market manipulation, operational risk, retail access suitability, and cross-border issues, among others (IOSCO 2023).

3.3.4. Additional targeted measures

In addition to implementing the IMF, FSB, FATF, and SSB policy recommendations and standards, some authorities might consider implementing targeted or time-bound broad restrictions to manage the risks from crypto-assets. Blanket bans that make all crypto-asset activities (e.g., trading and mining) illegal can be costly and technically demanding to enforce. They also tend to increase the incentives for circumvention due to the inherent borderless nature of crypto- assets, resulting in potentially heightened financial integrity risks, and can also create inefficiencies. Bans in one jurisdiction could also lead to activity migrating to other jurisdictions, creating spillover risks. A decision to ban is not an "easy option" and should be informed by an assessment of money laundering and terrorist financing (ML/TF) risks and other considerations, such as large capital outflows and other public policy aims.

In some situations, targeted restrictions could be justified to manage specific risks for resource-constrained authorities or to support regulatory frameworks. For instance, where countries experience large capital outflows, significant currency substitution, an unacceptable level of ML/TF risk, and/or risks to consumers and markets, targeted restrictions might be useful. These restrictions might be targeted to certain products (e.g., privacy tokens), activities (e.g., payments in Ukraine, financial promotions in Singapore, Spain, U.K.), or entities (e.g., banks in Nigeria). Targeted restrictions might be warranted in the short run while countries increase internal capacity (including knowledge and awareness) in anticipation of regulation.

Even when jurisdictions contemplate a temporary imposition of restrictions, such restrictions should be considered as part of a larger policy response. Restrictions should not substitute for robust macroeconomic policies, credible institutional frameworks, and comprehensive regulation and oversight, which are the first line of defence against the macroeconomic and financial risks posed by crypto-assets.

4. Policy implementation roadmap

The growing use and integration of crypto-assets in the global financial system has necessitated a coordinated set of international standards that form a comprehensive policy toolkit, as well as the effective implementation of these standards. The IMF and the FSB, together with the SSBs, have delivered a set of policy approaches to crypto-asset activities. These approaches seek to ensure that the steps taken by jurisdictions are comprehensive, internationally consistent, and complementary. The approaches also aim at promoting and monitoring the effective implementation of these standards.

The IMF and the FSB, together with other international organisations (IOs) and SSBs, have developed a roadmap to ensure effective, flexible, and coordinated implementation of the comprehensive policy framework for crypto-assets. [35] The IMF and FSB will coordinate and work with all relevant IOs and SSBs to implement the roadmap. The road map includes (i) implementation of policy frameworks; (ii) outreach beyondG20 jurisdictions; (iii) global coordination, cooperation, and information sharing; and (iv) addressing data gaps.

[35] The roadmap described in this section reflects the key elements included in the Indian G20 Presidency note, "Presidency note as an input for a roadmap on Establishing a Global Framework for Crypto assets,"

Progress should be reported to the Finance Ministers and Central Bank Governors (FMCBG) meetings along with FATF on AML/CFT.

Table 1: Policy Implementation Roadmap

Action	Responsible organisation	Timeline
Implementation of policy frameworks		
• FSB policy work on DeFi and multifunction crypto-asset intermediaries	FSB	• See Annex 3
• SSBs continue to examine how their standards apply to crypto-assets and stablecoin arrangements	SSBs, see Annex 3	• See Annex 3
• Monitoring of risks posed by crypto-assets and stablecoin arrangements	IMF, FSB, SSBs	• Ongoing, See Annex 3
• Implementation of FATF standards for virtual assets	FATF	• See Virtual Assets: Targeted Update on Implementation of the FATF Standards on Virtual Assets and Virtual Asset Service Providers (FATF 2023)
• IMF to integrate crypto-asset policies into Article IV assessments and FSAP where suitable[36]	IMF	• 8-12 months
• IMF and World Bank to integrate recommendations for a comprehensive framework for crypto-assets as part of technical assistance and capacity building	IMF, World Bank	• 8-12 months
Outreach beyond G20 jurisdictions		
• IMF and FSB to engage with a wider set of jurisdictions	IMF and FSB	• Ongoing
• IMF to prepare a program for outreach through IMF regional training centres	IMF	• 8-12 months
• FATF support, guidance, and training for countries where implementation is lagging, publicly identify steps taken to implement the standard in jurisdictions with materially important crypto-asset activity.	FATF	• See Virtual Assets: Targeted Update on Implementation of the FATF Standards on Virtual Assets and

[36] For FSAPs in EMDEs the exploration of the inclusion of crypto assets will be done jointly with the World Bank.

		Virtual Asset Service Providers (FATF 2023)
Global coordination, cooperation, and information sharing		
• FSB to continue to act as a hub for information sharing and regulatory and supervisory coordination for crypto-asset activities and global stablecoin arrangements	FSB, together with all IOs and SSBs	• Ongoing
• Cross-border regulatory coordination for GSCs in EMDEs	FSB	• See Annex 3
• Authorities' responsibilities for stablecoin arrangements under the Principles for Financial Market Infrastructure (PFMI)	CPMI-IOSCO	• See Annex 3
Addressing data gaps		
• IMF, with support of other IOs and SSBs, to develop a common framework for addressing data gaps and collect "test data" on crypto-assets	IMF	• By end-2025

4.1. Implementation of policy frameworks by IO and SSB members

Following the G20 endorsement of the FSB's high-level recommendation in July 2023, the FSB will promote implementation of the recommendations. The FSB will, by end-2025, conduct a review of the status of the implementation of the two sets of high-level recommendations at the jurisdictional level. As the FSB recommendations are deliberately high-level and principles-based, the FSB will also consider whether additional guidance or recommendations are necessary, taking into account relevant international sectoral standards and guidance that have been or can be developed by SSBs. Currently, the FSB is conducting follow-up policy work on regulatory implications of DeFi, multifunction crypto-asset intermediaries, and cross-border coordination and cooperation specific to EMDEs, to assess if additional guidance or recommendations are necessary. The FSB will also continue to assess the implications of crypto-assets for financial stability, including through ongoing monitoring, analysis of emerging themes or material incidents, and deep dives on particular issues.

The IMF will continue its ongoing effort of assessing the macroeconomic implications and risks of crypto-assets also considering the specific case of EMDEs. This will allow the IMF's work to inform, where necessary, the ongoing work of the FSB and SSBs. As part of this process, an impact analysis on the potential implications for the international monetary system will be developed over time.

The FSB and the SSBs have developed a shared workplan for 2023 and beyond (see Annex 3), through which they will continue to coordinate work, under their respective mandates, to promote the development of a comprehensive and coherent global regulatory framework commensurate with the risks crypto-asset markets and activities may pose to jurisdictions

worldwide, including through the provision of more granular guidance by SSBs, monitoring and public reporting.

The SSBs will, within their respective mandates, continue to examine how their standards apply to crypto-assets and stablecoin arrangements. They will make revisions, as needed, to their sectoral international standards and guidance or provide detailed guidance building on existing standards and principles in light of the FSB recommendations. The more granular guidance from SSBs will further articulate regulatory expectations at the global level, contributing to consistent outcomes under respective mandates while mitigating the risk of regulatory arbitrage. The FSB and SSBs have developed a shared workplan on crypto-assets (see Annex 3), setting out in a single place the various interrelated international workstreams on crypto-assets being taken forward by the FSB and the SSBs. The FSB will continue to serve as the coordinating body, working with the SSBs regarding strategic direction to ongoing work on crypto-asset activities, and the shared workplan supports the FSB in this coordinating role. Annex 3 provides a summary of ongoing and planned initiatives to develop standards of SSBs.

The IOSCO Board agreed to the establishment of a Board-level Fintech Taskforce (FTF) at its meeting in March 2022 to develop, oversee, deliver and implement IOSCO's regulatory agenda with respect to fintech and crypto-assets. In May 2023, IOSCO published a consultation report for Crypto and Digital Assets with the aim of finalising IOSCO's policy recommendations to address market integrity and investor protection issues in crypto-asset markets in early-Q4 2023. The FTF DeFi workstream is considering issues in relation to DeFi and will publish a consultation report with proposed recommendations in Q3 2023.

The CPMI and IOSCO are analysing issues for multicurrency or asset-linked stablecoins that may arise from their particular features, focusing on any issues that may require additional clarifications or additions to the CPMI-IOSCO guidance on the Application of the Principles for Financial Market Infrastructures (PFMI) to stablecoin arrangements , published in July 2022 (CPMI-IOSCO, 2022). [37,38]

In December 2022, The Group of Central Bank Governors and Heads of Supervision (GHOS), the oversight body of the Basel Committee on Banking Supervision, endorsed a global prudential standard for banks' exposures to crypto-assets, for implementation by January 2025. Furthermore, the GHOS tasked the BCBS with continuing to assess bank-related developments in crypto-asset markets, including the role of banks as stablecoin issuers, custodians of crypto-assets and broader potential channels of interconnections.

The FATF will, in line with its mandate, promote and monitor global implementation of the FATF Standards for the Crypto-Asset Sector. In February 2023 the FATF adopted a Roadmap to accelerate implementation of the Standards, in light of the slow and uneven progress related to crypto-assets globally (FATF 2023). This will include identification of jurisdictions with materially significant crypto-asset activity; provision of additional support through its guidance and training; and monitoring of the actions taken and the state of

---

[37] The CPMI-IOSCO is examining several types of multicurrency stablecoins arrangements, including those with stablecoins denominated in or pegged to a basket of multiple currencies, those with multiple single-currency stablecoins, and those with reserve assets denominated in multiple currencies.

[38] The CPMI-IOSCO is examining stablecoin arrangements that are denominated in a single currency and whose reserve assets include non-cash assets.

implementation. In order to facilitate this roadmap, jurisdictions with experience of regulating the crypto-sector are encouraged to share their experience, and also to provide technical assistance on a bilateral basis. The FATF expects to publish a table in the first half of 2024 setting out progress and will consider further action as needed. The FATF published a Targeted Update on implementation of the FATF standards on virtual assets in June 2023 and will continue to intensively monitor the implementation of AML/CFT controls in the sector. The FATF (along with the IMF and other assessment bodies) will carry out in-depth reviews that analyse the implementation and effectiveness of measures to combat ML/TF, including those related to crypto-assets. The FATF will also monitor market developments, including activities by sanctioned actors, DeFi, and P2P transactions that may necessitate further FATF work.

The IMF will incorporate, where appropriate, the FSB recommendations, SSB standards and guidance, and the elements for a comprehensive framework for crypto-assets in its surveillance program. The IMF will use the elements and recommendations stemming from the IMF and the FSB work on crypto-assets, to incorporate policy steps into its surveillance program, such as Article IV assessments and the Financial Sector Assessment Program (FSAP). When crypto-assets fall within the scope of these programs as a result of their potential systemic impact in a specific jurisdiction, the implementation of corresponding recommendations will be evaluated, with a focus on highlighting any existing implementation gaps.

The IMF will integrate its ongoing policy work on crypto-assets and the FSB recommendations as part of its capacity building-programs. The IMF, subject to the IMF members' demand and available resources, will provide training and technical support to its members, as part of its mandate. This support will aim at promoting and facilitating the implementation of policy recommendations for crypto-assets.

4.2. Outreach beyond G20 members

FSB members will lead by example in implementing the FSB framework in a full and timely manner in order to encourage jurisdictions beyond the FSB's membership to implement the two sets of high-level recommendations.

The IMF, with its near global membership, will continue to encourage the implementation of the high-level recommendations for crypto-assets and the SSB standards and guidance through capacity development activities and the FSAP.

The IMF will prepare an outreach program, including through its regional training centres, to promote awareness and implementation of IMF and FSB work on crypto-assets.[39] Leveraging on its extensive membership and network across continents, the IMF will develop a program to promote the IMF and FSB recommendations for a comprehensive policy framework for crypto-assets.

[39] The IMF training centres are located across continents, including: Africa Training Institute (ATI), IMF-Middle East Centre for Economics and Finance (CEF), Joint Vienna Institute (JVI), South Asia Regional Training and Technical Assistance Centre (SARTTAC), The IMF-Middle East Centre for Economics and Finance (CEF), The Joint Regional Training Centre for Latin America (Brazil Training Centre, BTC).

Considering that many crypto-asset activities are taking place or are licensed or registered in non-FSB member jurisdictions, the FSB will, alongside the SSBs and other international organisations, take steps to promote the effective implementation in jurisdictions beyond the FSB's membership. As part of this work, the FSB will:

- engage with a wider set of jurisdictions to encourage implementation of the FSB recommendations and international standards,
- take stock of regulatory progress and challenges among non-FSB member jurisdictions through the FSB's Regional Consultative Groups, and
- monitor and assess cross-border issues related to stablecoins and other crypto-assets.

The FATF, through its global network, is supporting the implementation of AML/CFT controls for crypto-assets in all jurisdictions, with a particular focus on those with materially significant crypto-asset activity. The FATF roadmap to accelerate implementation of its standards for the crypto-asset sector will identify the jurisdictions in addition to the FATF membership that have materially important crypto-asset activity, in order to target jurisdictions where implementation is lagging with additional support and advice and assist them to promptly establish effective preventive measures and supervision.

4.3. Global coordination, cooperation and information sharing

The FSB will continue to act as a hub for information sharing and regulatory and supervisory coordination for crypto-asset activities and global stablecoin arrangements, including exploring how to address the cross-border risks specific to EMDEs and considering ways to enhance supervisory and regulatory coordination. The FSB will also consider how to address the regulatory issues posed by stablecoin arrangements operating in jurisdictions that lack a robust regulatory and supervisory framework consistent with the FSB recommendations. The FSB and the SSBs' shared workplan (see Annex 3) also reflects the coordinated work under their respective mandates to promote the development and implementation of a consistent cross-sectoral international response to risks (and potential risks) in the crypto-asset markets, including through the provision of more granular guidance by SSBs, monitoring and public reporting.

The IMF will continue to coordinate with its members to promote the IMF and FSB framework for crypto-assets (including the SSB standards and guidance) and will continue to monitor macrofinancial risks and vulnerabilities in crypto-assets.

4.4. Addressing data gaps

The growing presence of new forms of crypto-assets used as a means of payment poses various potential challenges for data collection and analysis such as cross-border usage and currency substitution. Rapid cryptoization can have an impact on the monetary independence and financial stability of economies. Yet, the data to measure crypto-assets, and their impact are scarce. In view of these concerns, the G20 Finance Ministers and Central Bank Governors in November 2022 welcomed the new Data Gaps Initiative-3 (DGI-3), which amongst others, addresses priority policy needs related to financial innovation.

Recommendation 11 of the DGI-3 on "Digital Money" aims to develop a common framework and collect "test data" on digital money and crypto-assets used as a means of payment enabled by Fintech. [40] The recommendation, therefore, aims to expand macroeconomic statistics (both monetary and external-sector statistics) to cover crypto-assets including stablecoins, the latter being potentially used as means of payments, to ensure the proper measurement of monetary aggregates and international capital flows, also offering critical inputs for financial stability analysis. The IMF leads the implementation of this recommendation with the BIS, ECB, and FSB. The expected outcome is to have, by Q4 2025, test estimates of flows and stocks of crypto-assets used as means of payments broken down by type, sector, and counterpart country.

This work will draw on methodological guidance being developed in the context of the update of the international statistical standards (ISS) (FITT 2022) while continuously monitoring the evolving landscape of crypto-assets and making necessary adjustments to ensure the relevance and reliability of the macroeconomic framework. Acknowledging the limitations of traditional data collection, the Task Team will explore alternative sources, particularly partnering with industry players to gather data on crypto-assets as payment methods. These discussions within the G20 could also facilitate collaboration of statistical agencies with regulatory bodies to influence regulations regarding data requirements for crypto-assets.

[40] Currently, crypto-assets do not meet the definition of money, and in the context of this "IMF-FSB Synthesis Paper: Policies for Crypto-Assets", the DGI-3 recommendation only refers to crypto-assets.

Annex 1: Recent publications from international organisations and standard-setting bodies

In February 2023, the IMF proposed Elements for effective policies for crypto-assets (IMF 2023a). The paper aims to address IMF members' questions on how to respond to the rise of crypto-assets and the associated risks. The paper defines and classifies crypto-assets based on their underlying features and describes their purported benefits and potential risks. The paper presents a policy framework for crypto-assets that aims to achieve key policy objectives such as macroeconomic stability, financial stability, consumer protection, and market and financial integrity. The framework outlines nine key elements that are necessary to ensure that these objectives are met.

At the same time, IMF delivered a G20 Note on the Macrofinancial Implications of Crypto-assets (IMF 2023b). The paper on the macrofinancial implications of crypto-assets focuses on unbacked crypto-assets, such as bitcoin, and stablecoins, which may have stark implications for macrofinancial stability if widely adopted. It limits the analysis to potential costs and benefits as well as it raises open questions and data needs, with the intention to spur further discussion on policy responses. The paper considers three types of implications, to (1) domestic stability, (2) external stability, and (3) the structure of financial systems. The paper argues that purported benefits of crypto-assets include cheaper and faster cross-border payments, more integrated financial markets, and increased financial inclusion, but these are yet to be realised. The underlying technologies could prove useful, including for the public sector.

In February 2022, the FSB published its Assessment of Risks to Financial Stability from Crypto-assets (FSB 2022a). This report examines developments and associated vulnerabilities relating to three segments of the crypto-asset markets: unbacked crypto-assets (such as Bitcoin); stablecoins; and DeFi and other platforms on which crypto-assets trade. The report notes that although the extent and nature of the use of crypto-assets varies somewhat across jurisdictions, financial stability risks could rapidly escalate, underscoring the need for timely and pre-emptive evaluation of possible policy responses.

Against the backdrop of the May 2022 turmoil in crypto-asset markets, in July 2022 the FSB issued a statement reaffirming that crypto-assets and markets must be subject to effective regulation and oversight commensurate to the risks they pose, both at the domestic and international level (FSB 2022b).

In July 2023, the FSB finalised a comprehensive framework for the international regulation of crypto-asset activities from a financial risk perspective (FSB 2023b). The core components of this framework are recommendations that promote the consistency and comprehensiveness of regulatory, supervisory and oversight approaches to crypto-asset activities and markets and that strengthen international cooperation, coordination and information sharing and revised high-level recommendations for the regulation, supervision, and oversight of "global stablecoin" arrangements to address associated financial stability risks more effectively.

In July 2023, the Bank for International Settlements delivered to G20 a report on analytical and conceptual issues and proposed possible risk mitigation strategies related to crypto-assets (BIS 2023).

In June 2023, the FATF adopted a targeted review of implementation of the FATF's Standards on Virtual assets and Virtual asset service providers, including the Travel Rule, and an update on emerging risks and market developments in this area. The report finds that global implementation of these strengthened measures remains relatively poor. The lack of regulation creates significant loopholes for criminals to exploit. Closing the gaps in global regulation of virtual assets is an urgent priority, to be addressed through the FATF's Roadmap.

The international standard-setting bodies have taken forward more granular analytic and policy work by exploring issues unique to each SSB's mandate.

In March 2022, IOSCO published a detailed report setting out how DeFi is quickly evolving to mirror conventional financial markets (IOSCO 2022). The report offers a comprehensive review of the fast-evolving DeFi market, including its products, services and principal participants. It identifies some aspects that are novel, but concludes that most DeFi products, services and activities replicate more traditional financial products, services and activities, but with participants acting outside of, or in non-compliance with applicable regulatory frameworks, creating risks for investors. Following the IOSCO report, in February 2023, the FSB published a report on the financial stability risks of DeFi (FSB 2023a). The report concludes that while the processes to provide services are in many cases novel, DeFi does not differ substantially from traditional finance in the functions it performs or the vulnerabilities to which it is exposed. The extent to which these vulnerabilities can lead to financial stability concerns largely depends on the interlinkages and transmission channels between DeFi, traditional finance and the real economy. To date, these interlinkages are limited. However, if the DeFi ecosystem were to grow significantly, then the scope for spillovers would increase. The report identifies indicators that can be used to monitor DeFi vulnerabilities and transmission channels.

In July 2022, the CPMI-IOSCO published their guidance on the application of the PFMI to systemically important stablecoin arrangements (CPMI-IOSCO 2022).

In December 2022, the Group of Central Bank Governors and Heads of Supervision (GHOS), the oversight body of the Basel Committee on Banking Supervision, endorsed a finalised prudential standard on banks' crypto-asset exposures. The standard provides a robust and prudent global regulatory framework for internationally active banks' exposures to crypto-assets that promotes responsible innovation while preserving financial stability.

In May 2023, IOSCO issued for consultation detailed policy recommendations to jurisdictions across the globe as to how to regulate crypto-assets service providers (IOSCO 2023). The Recommendations in IOSCO's Consultation Report set expectations and guardrails to regulate and supervise crypto-asset markets, which are inherently cross-border in nature.

Annex 2: FSB high-level recommendations

High-level recommendations for the regulation, supervision, and oversight of crypto-asset activities and markets

Recommendation 1: Regulatory powers and tools

Authorities should have and utilise the appropriate powers and tools, and adequate resources to regulate, supervise, and oversee crypto-asset activities and markets, and enforce relevant laws and regulations effectively, as appropriate.

Recommendation 2: General regulatory framework

Authorities should apply comprehensive and effective regulation, supervision, and oversight to crypto-asset activities and markets – including crypto-asset issuers and service providers – on a functional basis and proportionate to the financial stability risk they pose, or potentially pose, and consistent with authorities' respective mandates in line with the principle "same activity, same risk, same regulation".

Recommendation 3: Cross-border cooperation, coordination, and information sharing

Authorities should cooperate and coordinate with each other, both domestically and internationally, to foster efficient and effective communication, information sharing and consultation in order to support each other as appropriate in fulfilling their respective mandates and to encourage consistency of regulatory and supervisory outcomes.

Recommendation 4: Governance

Authorities, as appropriate, should require that crypto-asset issuers and service providers have in place and disclose a comprehensive governance framework with clear and direct lines of responsibility and accountability for all functions and activities they are conducting. The governance framework should be proportionate to their risk, size, complexity and systemic importance, and to the financial stability risk that may be posed by activity or market in which the crypto-asset issuers and service providers are participating. It should provide for clear and direct lines of responsibility and accountability for the functions and activities they are conducting.

Recommendation 5: Risk management

Authorities, as appropriate, should require crypto-asset service providers to have an effective risk management framework in place that comprehensively addresses all material risks associated with their activities. The framework should be proportionate to the risk, size, complexity, and systemic importance, and to the financial stability risk that may be posed by the activity or market in which they are participating. Authorities should, to the extent necessary to achieve regulatory outcomes comparable to those in traditional finance, require crypto-asset issuers to address the financial stability risk that may be posed by the activity or market in which they are participating.

Recommendation 6: Data collection, recording and reporting

Authorities, as appropriate, should require that crypto-asset issuers and service providers have in place robust frameworks, including systems and processes, for collecting, storing, safeguarding, and the timely and accurate reporting of data, including relevant policies, procedures and infrastructures needed, in each case proportionate to their risk, size, complexity and systemic importance. Authorities should have access to the data as necessary and appropriate to fulfil their regulatory, supervisory and oversight mandates.

Recommendation 7: Disclosures

Authorities should require that crypto-asset issuers and service providers disclose to users and relevant stakeholders comprehensive, clear and transparent information regarding their governance framework, operations, risk profiles and financial conditions, as well as the products they provide and activities they conduct.

Recommendation 8: Addressing financial stability risks arising from interconnections and interdependencies

Authorities should identify and monitor the relevant interconnections, both within the crypto-asset ecosystem, as well as between the crypto-asset ecosystem and the wider financial system. Authorities should address financial stability risks that arise from these interconnections and interdependencies.

Recommendation 9: Comprehensive regulation of crypto-asset service providers with multiple functions

Authorities should ensure that crypto-asset service providers and their affiliates that combine multiple functions and activities, where permissible, are subject to appropriate regulation, supervision and oversight that comprehensively address the risks associated with individual functions and the risks arising from the combination of functions, including but not limited to requirements regarding conflicts of interest and separation of certain functions, activities, or incorporation, as appropriate.

High-level recommendations for the regulation, supervision, and oversight of global stablecoin arrangements

Recommendation 1: Authorities' readiness to regulate and supervise global stablecoin arrangements

Authorities should have and utilise the appropriate powers and tools, and adequate resources, to comprehensively regulate, supervise, and oversee a GSC arrangement and its associated functions and activities, and enforce relevant laws and regulations effectively.

Recommendation 2: Comprehensive oversight of GSC activities and functions

Authorities should apply comprehensive and effective regulatory, supervisory and oversight requirements consistent with international standards to GSC arrangements on a functional basis and proportionate to their risks insofar as such requirements are consistent with their respective mandates.

Recommendation 3: cross-border cooperation, coordination and information sharing

Authorities should cooperate and coordinate with each other, both domestically and internationally, to foster efficient and effective communication, information sharing and consultation in order to support each other in fulfilling their respective mandates and to ensure comprehensive regulation, supervision, and oversight of a GSC arrangement 6 across borders and sectors, and to encourage consistency of regulatory and supervisory outcomes.

Recommendation 4: Governance structures and decentralised operations

Authorities should require that GSC arrangements have in place and disclose a comprehensive governance framework with clear and direct lines of responsibility and accountability for all functions and activities within the GSC arrangement.

Recommendation 5: Risk management

Authorities should require that GSC arrangements have effective risk management frameworks in place that comprehensively address all material risks associated with their functions and activities, especially with regard to operational resilience, cyber security safeguards and AML/CFT measures, as well as “fit and proper” requirements, if applicable, and consistent with jurisdictions’ laws and regulations.

Recommendation 6: Data storage and access to data

Authorities should require that GSC arrangements have in place robust frameworks, including systems and processes for the collecting, storing, safeguarding and timely and accurate reporting of data. Authorities should have access to the data as necessary and appropriate to fulfil their regulatory, supervisory and oversight mandates.

Recommendation 7: Recovery and resolution of the GSC

Authorities should require that GSC arrangements have appropriate recovery and resolution plans.

Recommendation 8: Disclosures

Authorities should require that GSC issuers and, where applicable, other participants in the GSC arrangements provide all users and relevant stakeholders with comprehensive and transparent information to understand the functioning of the GSC arrangement, including with respect to the

governance framework, any conflicts of interest and their management, redemption rights, stabilisation mechanism, operations, risk management framework and financial condition.

Recommendation 9: Redemption rights, stabilisation, and prudential requirements

Authorities should require that GSC arrangements provide a robust legal claim to all users against the issuer and/or underlying reserve assets and guarantee timely redemption. For GSCs referenced to a single fiat currency, redemption should be at par 10 into fiat. To maintain a stable value at all times and mitigate the risks of runs, authorities should require GSC arrangements to have an effective stabilisation mechanism, clear redemption rights and meet prudential requirements.

Recommendation 10: Conformance with regulatory, supervisory and oversight requirements before commencing operations

Authorities should require that GSC arrangements meet all applicable regulatory, supervisory and oversight requirements of a particular jurisdiction before commencing any operations in that jurisdiction and adapt to new regulatory requirements as necessary and as appropriate.

Annex 3: Detailed shared FSB-SSB workplan

Initiative (Responsible Body)	Objective/Scope	Status/Timeline
Risks and regulation of crypto-assets and markets		
Finalisation of FSB high-level recommendations for regulation, supervision and oversight of crypto-assets and markets (FSB)	Recommendations to address financial stability risks of crypto-asset markets and activities, including issuers and service providers. They cover regulatory power, cross-border cooperation, governance, risk management, data, disclosure, systemic risk and multi-function intermediaries.	Publication of finalised high-level recommendations in July 2023 (G20), review of the status of implementation at a jurisdictional level by end-2025.
Crypto-Assets and Digital Assets Recommendations (IOSCO)	Apply IOSCO Principles and Standards to economically equivalent crypto-assets and activities to address the sizeable and proximate market integrity and investor protection risks in the sector, covering conflicts of interest, client asset protection, market manipulation, operational risk, retail access suitability, and cross-border issues, among others. Together with the IOSCO DeFi Recommendations and Guidance (see below), this will promote greater consistency with respect to how IOSCO members approach the regulation and oversight of crypto-asset activities, given the cross-border nature of the markets, the risks of regulatory arbitrage and the significant risk of harm to which retail investors continue to be exposed.	IOSCO Fintech Task Force (FTF) issued a consultation on proposed CDA policy recommendations in May 2023, focusing on crypto-asset service providers (CASPs). Following the consultation period, IOSCO will review feedback and finalise policy recommendations to address investor protection and market integrity risks in crypto-asset markets. The CDA policy recommendations will be finalised by end of 2023.
Financial stability risks of decentralised finance (FSB)	To assess financial stability implications of DeFi (and associated trading, lending, and borrowing practices, services and platforms, protocols, and market participants) and draw policy implications that SRC could consider.	Report published and submitted to G20FMCBG in February.

Policy implications of DeFi (FSB)	To consider regulatory implications of DeFi and assess whether additional policy work is warranted.	Preliminary work underway and is expected to be completed by end-2024.
DeFi Recommendations (IOSCO)	Updates on the state of the DeFi market and provide recommendations on applying existing IOSCO principles to DeFi by mapping them against key aspects of DeFi activities and protocols, covering emerging issues, risks and considerations.	The IOSCO FTF, through its DeFi workstream, will consult on proposed DeFi policy recommendations during Q3 2023. Following the consultation period, IOSCO will review the feedback and finalise policy recommendations to address investor protection and market integrity risks in DeFi. The DeFi policy recommendations will be finalised by end-2023.
Exploratory work on DeFi in the insurance sector (IAIS)	To explore recent developments in the area of Decentralised Insurance, analyse supervisory challenges and identify areas of future work.	Following initial analysis during 2021-2022, the IAIS Fintech Forum will continue analysis of developments related to decentralized insurance business models. Non-public note to be finalised in 2023. FSI-IAIS-EIOPA joint webinar in October 2023.
Multifunction crypto-asset intermediaries (FSB)	To assess financial stability implications of multifunction crypto-asset intermediaries, building on the lessons learnt from recent failures of such intermediaries, and draw policy implications that the FSB could consider.	Work underway.
Policy implications of multi-function crypto-asset intermediaries (FSB)	Consider regulatory implications and assess whether additional policy work is warranted arising from multifunction crypto-asset intermediaries that may give rise to compounded risks, conflict of interests, and opaque transactions with related parties that may not typically be allowed in traditional financial companies.	Work to begin depending on the outcome of the FSB's analytic work and will be completed by end-2024.
Regular monitoring and assessment of vulnerabilities in crypto-asset markets (FSB)	To keep track of crypto-asset market developments (including stablecoins and DeFi) and assess their financial stability implications and conduct on-the-spot analysis of major crypto-asset market events.	Work underway.
Risks and regulation of Stablecoins		

Finalisation of FSB high-level recommendations for global stablecoins (GSCs) (FSB)	The FSB's recommendations for GSCs seek to promote consistent and effective regulation, supervision and oversight of GSCs across jurisdictions to address the potential financial stability risks posed by GSCs.	Publication of finalised high-level recommendations in July 2023 (G20), review of the status of implementation at a jurisdictional level by end-2025.
Authorities' responsibilities for stablecoin arrangements under the Principles for financial market infrastructure (PFMI) (CPMI-IOSCO)	To analyse challenges for relevant regulatory, supervisory and oversight authorities in implementing their PFMI Responsibilities for stablecoin arrangements, especially on Responsibility E (cooperation with other authorities) and identify potential approaches to addressing these challenges.	As appropriate, the key findings of the report will be shared with the wider international regulatory community.
Risks associated with multi-currency and asset-linked stablecoins (CPMI-IOSCO)	To identify issues for multicurrency or asset-linked stablecoins that may require additional clarifications or additions to the July 2022 CPMI-IOSCO guidance on the application of the PFMI to SAs, including notable features of such stablecoin arrangements that might affect their compliance with the PFMI.	Publication on issues potentially requiring further clarifications related to multicurrency stablecoins used as a settlement asset is envisaged for H2 2023. The work on the asset-linked stablecoins is in the early stage.
Cross-border regulatory coordination for GSCs in emerging market and developing economies (EMDEs) (FSB)	To explore how to address the unique cross-border financial stability risks posed by GSCs, including risks specific to EMDEs, and consider ways to enhance supervisory and regulatory coordination.	Work to begin in late Q3 2023 and continue into 2024.
Banks' stablecoin exposures and related activities (BCBS)	See related BCBS activities in the section on financial sector exposures to crypto-assets. In particular: criteria to identify stablecoins eligible for "Group 1b" prudential treatment, the composition of stablecoin reserve assets and banks as stablecoin issuers.	Ongoing as part of the BCBS 2023-24 work programme.
Regular monitoring of developments in stablecoins (CPMI secretariat)	To monitor the key trends in the stablecoin market, e.g., market capitalisation, deviations from peg and composition of backing assets.	Data being collected on an ongoing basis to support the work of the CPMI, BIS and the FSB.

Potential of SAs for cross-border payments as part of Building block 18 in the cross-border payments programme (CPMI)	To help central banks and regulatory authorities to better understand how SAs, if properly designed and regulated, could contribute to the objective of making cross-border payments faster, cheaper, more transparent and more inclusive. To analyse potential benefits and challenges from cross-border use of SAs, as well as potential implications for central banks' key functions.	The report is envisaged for publication in September 2023.
Financial sector exposures to crypto-assets		
Banks' exposures to crypto-assets (BCBS)	Monitor the implementation of BCBS's prudential treatment of banks' crypto-asset exposures. Review by end-2023 the treatment of permissionless blockchains with additional safeguards and the criteria to identify stablecoins eligible for the "Group 1b" prudential treatment, including the appropriate composition of reserve assets and the effectiveness of statistical tests.	Ongoing as part of the BCBS 2023-24 work programme.
Assessment of bank-related developments and activities in crypto-asset markets (BCBS)	To assess bank-related developments and activities in crypto-asset markets, – including the role of banks as stablecoin issuers, custodians of crypto-assets and broader potential channels of interconnections with the crypto-asset ecosystem – and develop proposals to address any risks that are not adequately captured.	Ongoing as part of the BCBS 2023-24 work programme.
Monitoring of insurer-related developments in crypto-asset markets (IAIS)	To monitor the extent to which developments in crypto-asset markets may impact the insurance sector.	The IAIS Fintech Forum and IAIS Macroprudential Supervision Working Group undertook initial monitoring during 2022 – and concluded that the usage of and exposure to crypto-assets in the insurance sector is currently very limited. Further monitoring is planned for 2023. Next Fintech Forum roundtable on crypto-assets is planned for H2 2023.
Implications of distributed ledger technology (DLT) and DeFi for	To identify emerging risks associated with the use of DLT by FMIs and interaction between FMIs and Defi.	A workshop with industry and academics is envisaged for H2 2023.

financial market infrastructures (FMIs) (CPMI-IOSCO)		
Other areas of related work		
Tokenisation (FSB)	To take stock of recent developments, including ongoing or planned projects, regarding tokenisation of assets with the aim of identifying potential financial stability implications and exploring policy implications that warrant further consideration by the SCAV, SRC and other relevant bodies.	Work is underway, expected completion in 2024.
Future of Payments - Tokenisation (CPMI)	Analytical exploration of the characteristics of tokenisation of money and payments, and the benefits, risks and challenges to central banks of a tokenised financial ecosystem.	The work is at an early stage. Deliverables to be determined.
Annual CBDC and crypto-asset survey (CPMI)	To monitor the central banks' involvement in CBDC work as well as their perceptions regarding usage of stablecoins and other crypto-assets in their jurisdictions.	6th survey conducted with responses from over 80 central banks. Published in July 2023.

Glossary

Algorithmic stablecoin

A stablecoin that purports to maintain a stable value via protocols that provide for the increase or decrease of the supply of the stablecoin in response to changes in demand.

Blockchain

A form of distributed ledger in which details of transactions are held in the ledger in the form of blocks of information. A block of new information is appended to the chain of pre-existing blocks via a computerised process by which transactions are validated.

Crypto-asset

A digital asset (issued by the private sector) that depends primarily on cryptography and distributed ledger or similar technology.

Crypto-asset ecosystem

The entire ecosystem that encompasses all crypto-asset activities, market and participants.

Crypto-asset issuer

An entity, person, or other structure that creates new crypto-assets.

Crypto-asset market

Any place or system that provides buyers and sellers the means to trade crypto-assets and the associated instruments, including lending, structured investment products, and derivatives. Crypto-asset markets facilitate the interaction between those who wish to offer and sell and those who wish to invest.

Crypto-asset services

Services relating to crypto-assets that may include, but are not limited to, distribution, placement, facilitating exchange between crypto-assets or against fiat currencies, custody, provisioning of non-custodial wallets, facilitating crypto-asset trading, borrowing or lending, and acting as a broker-dealer or investment adviser.

Crypto-asset service providers

Individuals and entities that provide crypto-asset services.

Crypto-asset activities

Activities serviced by a crypto-asset issuer or crypto-asset service provider.

Crypto-asset trading platform

Any platform where crypto-assets can be bought and sold, regardless of the platform's legal status.

Decentralised Finance (DeFi)

A set of alternative financial markets, products and systems that operate using crypto-assets and 'smart contracts' (software) built using distributed ledger or similar technology.

DeFi protocols

A specialized autonomous system of rules that creates a program designed to perform financial functions.

Digital asset

A digital representation of value or contractual rights which can be used for payment or investment purposes.

Global stablecoin (GSC)

A stablecoin with an existing or potential reach and use across multiple jurisdictions and which could become systemically important in and across one or many jurisdictions, including as a means of making payments and/or store of value.

Smart contract

Code deployed in a distributed ledger technology environment that is self-executing and can be used to automate the performance of agreement between entities. The execution of a smart contract is triggered when that smart contract is "called" by a transaction on the blockchain. If triggered, the smart contract will be executed through the blockchain's network of computers and will produce a change in the blockchain's "state" (for example, ownership of a crypto-asset will transfer between market participants).[41]

Stablecoin

A crypto-asset that aims to maintain a stable value relative to a specified asset, or a pool or basket of assets.

Stablecoin arrangement

An arrangement that combines a range of functions (and related activities) that aims to maintain a stable value relative to a specified asset, or a pool or basket of assets. When discussing a stablecoin arrangement, reference is made to:

- Activity

[41] There are unresolved questions regarding the legal status and enforceability of smart contracts.

Typical activities in a stablecoin arrangement are: (i) establishing rules governing the stablecoin arrangement; (ii) issuing, creating and destroying stablecoins; (iii) managing reserve assets; (iv) providing custody/trust services for reserve assets; (v) operating the infrastructure; (vi) validating transactions; (vii) storing the private keys providing access to stablecoins (e.g., using a wallet); and (viii) exchanging, trading, reselling, and market making of stablecoins.

- Function

Functions in a stablecoin arrangement are: (i) governing the arrangement; (ii) issuance, redemption and stabilisation of the value of coins; (iii) transfer of coins; and (iv) interaction with users for storing and exchanging coins.

- Governance body

A body responsible for establishing and monitoring the rules governing the stablecoin arrangement which would cover, among other issues, the types of entities that could be involved in the arrangement, the protocol for validating transactions, and the manner in which the stablecoin is "stabilised".

- Provider of function/activity

An entity that provides a particular function or activity associated with that function in a stablecoin arrangement.

- User

A person or entity that uses a stablecoin, e.g., for speculative trading, lending, borrowing, or as a means of payment or store of value.

- Validator node

An entity that participates in the consensus mechanism in a distributed ledger or similar network. In the context of distributed ledger technology, a validator node will commit transaction blocks to the ledger once they are validated.

Wallet

An application or device for storing the cryptographic keys providing access to crypto-assets. A hot wallet is connected to the internet and usually takes the form of software for the user, while a cold wallet is a hardware that is not connected to the internet and stores the cryptographic keys.

Custodial wallet

A service in which crypto-assets are held by a service provider. A user interacts with the service provider to manage the user's crypto-assets. A custodial wallet is also known as a "hosted wallet".

Non-custodial wallet

Software or hardware that stores cryptographic keys for a user, making the user's crypto-assets accessible only to the user, and allowing the user to interact directly with the blockchain and the blockchain-based finance applications. A non-custodial wallet is also known as an "unhosted wallet".

References

Adrian, T., C. J. Erceg, S. T. Gray, and R. Sahay. 2021. “Asset Purchases and Direct Financing: Guiding Principles for Emerging Markets and Developing Economies during COVID-19 and Beyond.” Departmental Paper No 2021/023. Washington, DC: International Monetary Fund.

Adrian, T., T. Iyer, and M. Qureshi. 2022. “Crypto Prices Move More in Sync With Stocks, Posing New Risks.” IMF Blog. Washington, DC: International Monetary Fund.

Agur, I., X. Lavayssière, G. Villegas Bauer, J. Deodoro, S. Martinez Peria, D. Sandri, and H. Tourpe. “Lessons from crypto assets for the design of energy efficient digital currencies.” *Ecological Economics* 212 (October): 107888.

Allen, J. and others. 2020. “Legal and Regulatory Considerations for Digital Assets.” University of Cambridge.

Aramonte, S., W. Huang, and A. Schrimpf. 2021. “DeFi Risks and the Decentralisation Illusion.” *BIS Quarterly Review* (December): 21-36.

Auer, R., J. Frost, and J. M. Vidal Pastor. 2022. “Miners as Intermediaries: Extractable Value and Market Manipulation in Crypto and DeFi.” BIS Bulletin No 58. Basel: Bank for International Settlements.

Bains, P. 2022. “Blockchain Consensus Mechanisms: A Primer for Supervisors.” Fintech Note No 2022/003. Washington, DC: International Monetary Fund.

Bains, P., A. Ismail, F. Melo, and N. Sugimoto. 2022. “Regulating the Crypto Ecosystem: The Case of Stablecoins and Arrangements.” Fintech Note No 2022/008. Washington, DC: International Monetary Fund.

Baer, K., R. de Mooij, S. Hebous, and M. Keen. 2023. “Taxing Cryptocurrencies.” Working Paper No 2023/144. Washington, DC: International Monetary Fund.

BIS (Bank for International Settlements). 2023. “The Crypto Ecosystem: Key Elements and Risks.” Report submitted to the G20 Finance Ministers and Central Bank Governors. Basel: Bank for International Settlements.

Blandin, A., A. S. Cloots, H. Hussain, M. Rauchs, R. Saleuddin, J. G. Allen, B. Zhang, and K. Cloud. 2019. “Global Cryptoasset Regulatory Landscape Study.” University of Cambridge and Nomura Research Institute.

Boissay, F., G. Cornelli, S. Doerr, and J. Frost. 2022. “Blockchain Scalability and the Fragmentation of Crypto.” BIS Bulletin No 56. Basel: Bank for International Settlements.

Bossu, W., M. Itatani, C. Margulis, A. D. P. Rossi, H. Weenink, and A. Yoshinaga. 2020. “Legal Aspects of Central Bank Digital Currency: Central Bank and Monetary Law Considerations.” Working Paper 2020/254. Washington, DC: International Monetary Fund.

Chainanalysis. 2022. “The 2022 Geography of Cryptocurrency Report.”

Che, K., A. Copestake, D. Furceri, and T. Terracciano. 2023. “The Crypto Cycle and US Monetary Policy.” Working Paper No 2023/163. Washington, DC: International Monetary Fund.

Copestake, A., D. Furceri, and P. Gonzalez-Dominguez. 2023. “Crypto Market Responses to Digital Asset Policies.” Economics Letters 222 (January): 110949.

CPMI-IOSCO (Committee on Payments and Market Infrastructures - International Organization of Securities Commissions). 2022. “Application of the Principles for Financial Market Infrastructures to stablecoin arrangements.” Basel: Bank for International Settlements.

De Vries, A., and C. Stoll. 2021. “Bitcoin’s Growing E-waste Problem.” *Resources, Conservation, and Recycling* 175 (December): 105901

FATF (Financial Action Task Force). 2021. “Updated Guidance for a Risk-Based Approach to Virtual Assets and Virtual Asset Service Providers.” Paris: Financial Action Task Force.

FATF (Financial Action Task Force). 2023. “Targeted Update on Implementation of the FATF Standards on Virtual Assets/VASPs.” Paris: Financial Action Task Force.

FITT (Financial and Payments Systems Task Team). 2022. “F.18 The Recording of Crypto Assets in Macroeconomic Statistics.” Inter-secretariat Working Group on National Accounts.

FSB (Financial Stability Board). 2022a. “Assessment of Risks to Financial Stability from Crypto-assets.” Basel: Financial Stability Board.

FSB (Financial Stability Board). 2022b. “FSB Statement on International Regulation and Supervision of Crypto-asset Activities.” Basel: Financial Stability Board.

FSB (Financial Stability Board). 2023a. “The Financial Stability Risks of Decentralised Finance.” Report to the G20. Basel: Financial Stability Board.

FSB (Financial Stability Board). 2023b. “High-level Recommendations for the Regulation, Supervision and Oversight of Crypto-Asset Activities and Markets.” Final Report. Basel: Financial Stability Board.

Furceri, D., P. Gonzalez-Dominguez, and N. Tawk. “Determinants of Crypto Asset Adoption.” Working Paper forthcoming. Washington, DC: International Monetary Fund.

Garrido, J., Y. Liu, J. Sommer, and J. Viancha. 2022b. “Keeping Pace with Change: Fintech and the Evolution of Commercial Law.” Fintech Note 2022/001. Washington, DC: International Monetary Fund.

He, D., A. Kokenyne, X. Lavayssière, I. Lukonga, N. Schwarz, N. Sugimoto, and J. Verrier. 2022. “Capital Flow Management Measures in the Digital Age: Challenges of Crypto Assets.” Fintech Note 2022/005. Washington, DC: International Monetary Fund.IMF (International Monetary Fund). 2015. “Monetary Policy and Financial Stability.” Policy Paper. Washington, DC: International Monetary Fund.

IMF (International Monetary Fund). 2019a. “The Fiscal Transparency Code.” Washington, DC: International Monetary Fund.

IMF (International Monetary Fund). 2019b. “Review of the Fund’s Strategy on Anti-Money Laundering and Combating the Financing of Terrorism.” Policy paper. Washington, DC: International Monetary Fund.

IMF (International Monetary Fund). 2020. “Digital Money Across Borders: Macro-Financial Implications.” Policy Paper No 2020/050. Washington, DC: International Monetary Fund.

IMF (International Monetary Fund). 2021. “The Rise of Digital Money: A Strategic Plan to Continue Delivering On The IMF’s Mandate.” Policy Paper No 2021/054. Washington, DC: International Monetary Fund.

IMF (International Monetary Fund). 2022a. “Review of The Institutional View on The Liberalization and Management of Capital Flows.” Policy Paper No 2022/008. Washington, DC: International Monetary Fund.

IMF (International Monetary Fund). 2023a. “Elements of effective policies for crypto assets.” Policy Paper No 2023/004. Washington, DC: International Monetary Fund.

IMF (International Monetary Fund). 2023b. “G20 Note on the Macrofinancial Implications of Crypto Assets.” Washington, DC: International Monetary Fund.

IMF (International Monetary Fund). 2023c. “Digital Money and the International Monetary System.” Board Paper, forthcoming. Washington, DC: International Monetary Fund.

Indian G20 Presidency. 2023. “Presidency note as an input for a Roadmap on Establishing a Global Framework for Crypto assets.”

IOSCO (International Organization of Securities Commissions). 2022. “IOSCO Decentralized Finance Report.” Public Report. Madrid: IOSCO.

IOSCO (International Organization of Securities Commissions). 2023. “Policy Recommendations for Crypto and Digital Asset Markets.” Consultation Report. Madrid: IOSCO.

Iyer, T. 2022. “Cryptic Connections: Spillovers Between Crypto and Equity Markets.” Global Financial Stability Note No 2022/001. Washington, DC: International Monetary Fund.

Kubo, K. 2017. “Dollarization and De-dollarization in Transitional Economies of Southeast Asia.” Springer International Publishing.

Obstfeld, M. 2012. “Does the Current Account Still Matter?” Richard T. Ely Lecture, American Economic Association Annual Meeting, Chicago, IL, January 6, 2012.

OECD (Organisation for Economic Co-operation and Development). 2022a. “Crypto asset Reporting Framework and Amendments to the Common Reporting Standard.” Paris: OECD.

OECD (Organisation for Economic Co-operation and Development). 2022b. “Public Consultation on the Crypto asset Reporting Framework and Amendments to the Common Reporting Standard: Comments by B. Michel and T. Falcao.” Paris: OECD.

The Law Library of Congress. 2021. “Regulation of Cryptocurrency Around the World.” Global Legal Research Directorate, November 2021 Update. LL File No 2021-020594 LRA-D-PUB-002568.

Unsal, F. D., C. Papageorgiou, and H. Garbers. 2022. “Monetary Policy Frameworks: An Index and New Evidence.” Working Paper No 2022/022. Washington, DC: International Monetary Fund.

Werner, S. M., D. Perez, L. Gudgeon, A. Klages-Mundt, D. Harz, and W. J. Knottenbelt. 2021. “SoK: Decentralized Finance (DeFi).”