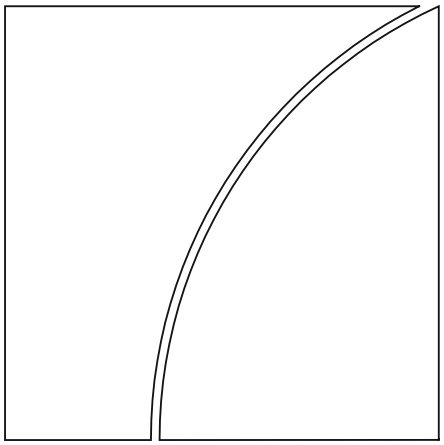
G7 Working Group on Stablecoins



Investigating the impact of global stablecoins

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Committee on Payments and Market Infrastructures

BANK FOR INTERNATIONAL SETTLEMENTS

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Investigating the impact of global stablecoins

A report by the G7 Working Group on Stablecoins

Executive summary

Technological innovation is transforming the provision of financial services and products. Payment services, in particular, have seen significant change in recent years through the introduction of new payment methods, platforms and interfaces. In fact, an increasing number of countries have payment systems that provide inexpensive and near instant domestic payments. However, challenges in current payment services remain. Above all, cross-border payments remain slow, expensive and opaque, especially for retail payments such as remittances. Moreover, there are 1.7 billion people globally who are unbanked or underserved with respect to financial services.

Given the innovative potential of the underlying technology, cryptoassets were originally envisioned to address some of these challenges. However, to date, they have suffered from a number of limitations, not least severe price volatility. Thus, cryptoassets have served as a highly speculative asset class for certain investors and those engaged in illicit activities, rather than as a means to make payments.

Stablecoins have many of the features of cryptoassets but seek to stabilise the price of the "coin" by linking its value to that of a pool of assets. Therefore, stablecoins might be more capable of serving as a means of payment and store of value, and they could potentially contribute to the development of global payment arrangements that are faster, cheaper and more inclusive than present arrangements. That said, stablecoins are just one of many initiatives that seek to address existing challenges in the payment system and, being a nascent technology, they are largely untested.

Yet these potential benefits can only be realised if significant risks are addressed. Stablecoins, regardless of size, pose legal, regulatory and oversight challenges and risks related to:

- Legal certainty
- Sound governance, including the investment rules of the stability mechanism
- Money laundering, terrorist financing and other forms of illicit finance
- Safety, efficiency and integrity of payment systems
- Cyber security and operational resilience
- Market integrity
- Data privacy, protection and portability
- Consumer/investor protection
- Tax compliance

Moreover, stablecoins that reach *global* scale could pose challenges and risks to:

- Monetary policy
- Financial stability
- The international monetary system
- Fair competition

Private sector entities that design stablecoin arrangements are expected to address a wide array of legal, regulatory and oversight challenges and risks. In particular, such arrangements will need to adhere to necessary standards and requirements and comply with the relevant laws and regulations of the various jurisdictions in which they will operate. They will also need to incorporate sound governance and appropriate end-to-end risk management practices to address risks before they materialise. The G7 believes that no global stablecoin project should begin operation until the legal, regulatory and oversight challenges and risks outlined above are adequately addressed, through appropriate designs and by adhering to regulation that is clear and proportionate to the risks. That said, depending on the unique design and details of each stablecoin arrangement, approval may be contingent on additional regulatory requirements and adherence to core public policy goals.

Some risks are amplified and new risks might arise if adoption is global in nature. Stablecoin initiatives built on an existing – large and/or cross-border – customer base may have the potential to scale rapidly to achieve a global or other substantial footprint. These are referred to as "global stablecoins" (GSCs).

GSCs could have significant adverse effects, both domestically and internationally, on the transmission of monetary policy, as well as financial stability, in addition to cross-jurisdictional efforts to combat money laundering and terrorist financing. They could also have implications for the international monetary system more generally, including currency substitution, and could therefore pose challenges to monetary sovereignty. GSCs also raise concerns around fair competition and anti-trust policy, including in relation to payments data. These risks, which are of a systemic nature, merit careful monitoring and further study. Both benefits and risks of GSCs may affect some countries more significantly than others, depending on the state of development of their existing financial and payment systems, the stability of their currencies and their level of financial inclusion, among other factors.

For stablecoin developers, a sound legal basis in all relevant jurisdictions – in particular, legal clarity on the nature of the claim to all participants in the stablecoin ecosystem, such as coin holders and issuers – is an absolute prerequisite. Ambiguous rights and obligations could make the stablecoin arrangement vulnerable to loss of confidence – an unacceptable risk, especially in a payment system of potentially global importance. Whether value stabilisation relies on market mechanisms, such as the existence of an active network of resellers, or a commitment by the issuer to redeem at a given price, it should be demonstrated that such arrangements will achieve their objectives at all times and for all customers. The governance structure of the arrangement as well as the investment rules of the stability mechanism must also be fully specified and understood by participants.

Public authorities must coordinate across agencies, sectors and jurisdictions, to support responsible innovation in payments while ensuring a globally consistent response to mitigating risks. To that end, some international organisations and standard-setting bodies have already issued guidance, principles and standards for the supervision and regulation of existing payment arrangements, including cryptoassets, which address many of the challenges listed above. This includes the Committee on Payments and Market Infrastructures (CPMI) and International Organization of Securities Commissions (IOSCO) *Principles for financial market infrastructures* (PFMI) for systemically important payments arrangements, as well as the recently strengthened Financial Action Task Force (FATF) *Recommendations for AML/CFT and countering the financing of proliferation of weapons of mass destruction* (which include standards relating to virtual assets and virtual asset service providers). Capital markets and banking regulations and standards may also apply to various aspects of the stablecoin arrangement. International organisations and standard-setting bodies should continue to assess the adequacy of their current frameworks to address any new issues and challenges that stablecoins could present.

Moreover, authorities in individual jurisdictions should aim for their regulations to adhere to these principles and standards and apply these regulations to stablecoin arrangements. Public authorities should apply a technology-neutral, functions-based regulatory approach, and should be

mindful to forestall harmful regulatory arbitrage and to ensure a level playing field that encourages competition.

Stablecoins may combine novel and untested technology and new entrants to financial services, and could thus pose risks that fall outside existing frameworks. This may also create new risks, which should be addressed by requiring compliance with the highest regulatory standards, potentially revising existing standards or creating new standards and regulations where needed and after a thorough assessment of potential regulatory gaps. The Financial Stability Board (FSB) and standard-setting bodies are intensifying their efforts to assess how their existing principles and standards could be applied to stablecoins, and/or developing new policy recommendations for stablecoin arrangements in a globally consistent and coordinated manner. In this regard, the G7 Working Group welcomes the FSB's plans to assess, in cooperation with standard-setting bodies, what key regulatory issues exist around global stablecoins, and to submit a consultative report to the G20 Finance Ministers and central bank Governors in April 2020, with a final report in July 2020.

Finally, it should be stressed that the advent of private sector innovations to payment arrangements does not mean that public authorities will cease their efforts to improve the current system. Finance ministries, central banks, standard-setting bodies such as the CPMI and relevant international organisations should continue their efforts to promote faster, more reliable and less costly payment systems for both domestic and cross-border purposes, using new technology where appropriate, and in a globally consistent and coordinated manner. In particular, the public sector should redouble its efforts to support measures to improve financial inclusion.

We encourage central banks, finance ministries, standard-setting bodies such as the CPMI and relevant international organisations to develop road maps for improving the efficiency and lowering the cost of payments and financial services. Initial recommendations are outlined in the report. Additionally, central banks will continue to share knowledge of, and experience on, a variety of possible solutions to improving payment systems. Finally, central banks, individually and collectively, will assess the relevance of issuing central bank digital currencies (CBDCs) in view of the costs and benefits in their respective jurisdictions.

1. Introduction

Payments are in a state of flux, and innovation is extensive. Domestic payments, in most instances, are increasingly convenient, instantaneous and available 24/7. The traditional bank-based ecosystem is being disrupted from below by startups and from above by well established big techs. When asked in a recent survey about which financial products and services are most affected by technological developments and competition, banks and tech firms alike ranked payments the highest – both currently and over the next five years (Petralia et al (2019)).

Despite significant improvements in recent years, current payment systems still have two major failings: lack of universal *access* to financial services for a large share of the world's population and inefficient *cross-border retail payments*. Globally, 1.7 billion adults do not have access to a transaction account, even though 1.1 billion of them have a mobile phone (Demirgüç-Kunt et al (2018)). As transaction accounts are gateways to additional financial services such as credit, saving and insurance, the lack of access to such accounts impedes financial inclusion (Cœuré (2019a)).

The first wave of cryptoassets,[1] of which Bitcoin is the best known, have so far failed to provide a reliable and attractive means of payment or store of value. They have suffered from highly volatile prices, limits to scalability, complicated user interfaces and issues in governance and regulation, among other challenges. Thus, cryptoassets have served more as a highly speculative asset class for certain investors and those engaged in illicit activities rather than as a means to make payments.

At present, emerging stablecoins have many of the features of more traditional cryptoassets but seek to stabilise the price of the "coin" by linking its value to that of an asset or pool of assets. The term "stablecoin" has no established international classification, and such coins may not actually be stable and may pose risks that are similar to those of other cryptoassets. This report focuses on stablecoins that represent a claim, either on a specific issuer or on underlying assets or funds, or some other right or interest.[2]

These stablecoins might be more readily usable as a means of payment and store of value, and they could potentially foster the development of global payment arrangements that are faster, cheaper and more inclusive than present arrangements. Therefore, they may be able to address some of the shortcomings of existing payment systems and deliver greater benefits to users.

Stablecoins could be used by anyone (**retail** or **general purpose**) or only by a limited set of actors, ie financial institutions or selected clients of financial institutions (**wholesale**). This report covers issues that apply to all stablecoins, while at times drawing out issues of particular relevance to retail stablecoins.

Stablecoin arrangements are part of an ecosystem comprising multiple interdependent entities with different roles, technologies and governance structures. Appropriate regulation and accountability requires an understanding of the ecosystem as a whole, and how its parts interact. Stablecoin arrangements are expected to meet the same criteria and abide by the same requirements as traditional payment, clearing and settlement systems – that is, the same activities and the same risks should face the same regulations. Hence, stablecoin developers should work to ensure stablecoin ecosystems are appropriately designed and operate safely and efficiently in accordance with public policy.

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[1] A cryptoasset is a type of private asset that depends primarily on cryptography and distributed ledger or similar technology as part of its perceived or inherent value (FSB (2018)).

[2] Algorithmic stablecoins (explained in Annex A) lie outside the scope of this report.

Stablecoins present a host of potential challenges and risks for public policy, oversight and regulation, including legal certainty, sound governance, anti-money laundering and countering the financing of terrorism (AML/CFT) compliance, operational resilience (including for cyber security), consumer/investor and data protection, and tax compliance. These risks can partially be addressed within existing regulatory, supervisory and oversight frameworks, but there may be regulatory gaps to address as well. Regulatory and policy frameworks are expected to remain technology-neutral and not hinder innovation as long as it does not conflict with public policy goals, including monetary sovereignty.

Recently, a number of stablecoin initiatives have emerged, some of which are sponsored by large technology or financial firms. With their existing large customer base, which additionally may be cross-border, these new stablecoins have the potential to scale rapidly to achieve a global or other substantial footprint. These are referred to as "global stablecoins" (GSCs).

Due to their potentially large size and reach, GSCs could additionally pose challenges to fair competition, financial stability, monetary policy and, in the extreme, the international monetary system (Cœuré (2019c)). They may also impact the safety and efficiency of the overall payment system. These challenges stem, in part, from the fact that GSCs may transform from a cross-border payment solution to assets with money-like features.

At their meeting in Chantilly in July 2019, G7 Finance Ministers and central bank Governors agreed that stablecoins – in particular, projects with global and potentially systemic footprints – raise serious regulatory and systemic concerns. Furthermore, Ministers and Governors agreed that possible stablecoin initiatives and their operators must meet the highest standards and be subject to prudent supervision and oversight, and that possible regulatory gaps should, as a matter of priority, be assessed and addressed. The G7 Finance Ministers and central bank Governors asked for a report from the Working Group on Stablecoins, including its recommendations, by the time of the IMF-World Bank Annual Meetings in October 2019.[3] This report reflects the discussions of the Working Group.

The G7 believes that no global stablecoin project should begin operation until the legal, regulatory and oversight challenges and risks outlined above are adequately addressed, through appropriate designs and by adhering to regulation that is clear and proportional. That said, depending on the unique design and details of each stablecoin arrangement, approval may be contingent on additional regulatory requirements and adherence to core public policy goals.

This report is organised as follows. Section 1 provides an overview of the stablecoin ecosystem and the need to improve payment systems and services. Section 2 details the regulatory, oversight and policy issues associated with stablecoin initiatives, highlighting the particular challenges inherent in GSCs. Section 3 provides a preliminary review of existing regulatory and oversight regimes that may be applicable to stablecoins. Section 4 sets out the way forward, including improvements to cross-border payments.

1.1 The stablecoin ecosystem

- **Stablecoin arrangements are complex ecosystems and can differ markedly according to their design.**

Stablecoins generally function within a broader ecosystem delivering the following core functions:

(a) Issuance, redemption and stabilisation of the value of the coins.

(b) Transfer of coins among users.

[3] See Cœuré (2019b) for the July 2019 update from the Chair of the G7 Working Group on Stablecoins.

(c) Interaction with users (ie the user interface).

Each function generally involves some operational entities (such as a governing body, exchanges, wallet providers and payment system operators) and core technology infrastructure (such as distributed ledger technology (DLT) and smart contracts). In addition, standards could be imposed by the central governance entity or through automated technology protocols. See Annex A for a more detailed description of the stablecoin ecosystem.

The value of a stablecoin is typically related to an asset or portfolio of underlying assets. However, stablecoin designs differ markedly according to their exchange rate policy with respect to a sovereign currency (fixed or variable), the nature of the claim users have, the redemption pledge offered by the stablecoin providers and the type of assets used.

At least three design models have emerged. In the first, the stablecoin is issued with a face value expressed in a commonly used unit of account. Users have a direct claim on the issuer or the underlying assets, and the provider pledges to redeem coins at par in the same currency that was used to purchase the coins. Assets in this model are typically liquid. In the second model, the stablecoin is not issued with a specified face value, but constitutes a share of a portfolio of underlying assets, much like in an exchange-traded fund (ETF). In the third model, the coin is backed by a claim against the issuer.[4] The coin's value is rooted in the public's trust in the issuing institution (and, where relevant, those that regulate it).

1.2 Improving payment systems and services

- **Stablecoin initiatives have highlighted shortcomings in cross-border payments and access to transaction accounts.**
- **Depending on their design, stablecoin arrangements may increase efficiency of payments, provided they are interoperable and benefit from a level playing field.**

Domestic payments, in most instances, are increasingly convenient, instantaneous and available 24/7. Cross-border payments, however, remain slow, expensive and opaque, especially for retail payments such as remittances. Box 1 describes the current challenges in cross-border payments.[5]

Recent stablecoin initiatives have highlighted these shortcomings and emphasised the importance of improving the access to financial services and cross-border retail payments. In principle, retail stablecoins could enable a wide range of payments and serve as a gateway to other financial services. In doing so, they could replicate the role of transaction accounts, which are a stepping stone to broader financial inclusion. Stablecoin initiatives also have the potential to increase competition by challenging the market dominance of incumbent financial institutions. However, the positive impact on competition is predicated on there being a level playing field and interoperability of systems to avoid introducing new barriers to entry.

However, for stablecoins to meet the needs of the unbanked and underserved, they must first prove to be a safe store of value, ensure high levels of protection and legal certainty for their users, and be compliant with relevant regulations. Furthermore, they would have to overcome the barriers that currently restrict access to and use of transaction accounts.

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[4] The issuer may be a regulated bank whose traditional banking operations benefit from public backstops such as deposit insurance and lender of last resort.

[5] See also CPMI (2018).

Box 1

Challenges in cross-border payments

A number of cost factors and other challenges influence the provision of cross-border retail payments. These cost factors include correspondent banking fees, FX costs, telecommunication costs, scheme fees and interchange fees. Additionally, legal, regulatory and compliance costs are perceived as being significantly higher than for domestic retail payments.

AML/CFT and sanction compliance are critical to maintaining financial integrity and protecting the global financial system from abuse by money launderers, terrorists and other bad actors. However, they may thereby add significant costs to cross-border payments, especially if there are differences in rules or requirements across the jurisdictions involved and if the required preventive measures (customer due diligence, sanctions screening, etc) are completed multiple times at different steps in the transaction chain. While it is important that rules accommodate differences among jurisdictions appropriately, greater harmonisation of these detailed requirements and improved international cooperation and information-sharing could help reduce this pain point. While not specific to cross-border payments, money laundering and financing of terrorism risks are typically considered to be higher in the cross-border context since more complexities are involved.

Additionally, payment service providers (PSPs) may struggle to interoperate due to a lack of standardisation. Standardisation and interoperability are important catalysts in the quest to increase efficiency and realise economies of scale and network effects in cross-border retail payments. Some initiatives, such as the development of ISO 20022, aim to achieve this. However, although international standards can enhance efficiency and interoperability, their full benefits cannot be reaped if they are interpreted and implemented differently across jurisdictions. Just as PSPs may struggle to interoperate due to a lack of standardisation of messaging formats, back-end service providers may struggle to transmit and reconcile transactions for the same reason. Messaging can give rise to challenges for cross-border retail payments if the information originated by the payer's PSP does not tally, in content or format, with the information required by the payee's PSP.

The need to conduct foreign exchange transactions adds complexity and risk for PSPs and back-end service providers. These additional complexities need to be managed and the risks mitigated, which can increase costs (in ways that are neither transparent nor predictable) and reduce the speed of an overall transaction. Another factor that poses challenges to the fast and efficient processing of cross-border retail payments is the different time zones and resulting diverging opening hours of payment systems around the world.

A major obstacle to the interlinking of domestic payment systems and/or the development of shared global payment platforms is differing legal frameworks across jurisdictions and the associated uncertainty about the enforceability of contractual obligations resulting from participation in interlinked or shared payment platforms operating across borders.

Improving domestic payments infrastructure can remove many of the pain points that users and businesses currently experience. Still, significant challenges will remain that make the cross-border payments costlier, slower and less transparent.

Many public sector projects are attempting to ease some of these pain points to make international payments as seamless as domestic. The primary goals of the official sector projects tend to focus on improving efficiency and interoperability, enriching data, expanding functionality, increasing operating hours and access, and introducing a faster (real-time) retail payments rail. For example, the use of the Legal Entity Identifier (LEI) aids in quickly identifying parties in a transaction and reducing AML/CFT compliance costs.

2. Challenges and risks for public policy, oversight and regulation

- **Stablecoins pose a number of challenges and risks to public policy objectives and the supporting regulatory and oversight frameworks.**
- **Public authorities expect stablecoin developers to adopt the highest standards to address risks before their arrangements are operational.**

Stablecoins introduce a host of potential challenges and risks from a public policy, oversight and regulatory perspective. A fundamental challenge is that stablecoin arrangements are not all the same, and the opportunities and risks they present depend on the structure and design underlying each stablecoin arrangement. That said, there are some commonalities among them.

Some of the risks – for example, regarding the safety and efficiency of payment systems, money laundering and terrorist financing, consumer/investor protection and data protection – are familiar and could be addressed, at least partially, within existing regulatory, supervisory and oversight frameworks. However, their implementation and enforcement may involve additional complexity given the nature of certain stablecoins. Stablecoin arrangements are expected to meet the same criteria and abide by the same robust requirements as traditional payment systems, payment schemes or providers of payment services (ie same activities, same risks, same regulations) in order to ensure they are appropriately designed and operate safely and effectively in accordance with public policy objectives. Additionally, some of the economic characteristics of stablecoin arrangements resemble conventional activities conducted by payment systems, ETFs, money market funds (MMFs) and banks which could be useful to understanding possible risks of stablecoin functions. Public authorities expect stablecoin developers to address such risks before their projects are operational.

Stablecoin arrangements may also pose risks that fall outside existing legal or regulatory frameworks. Stablecoins may combine new technology, new entrants to financial services and new service offerings. Retail stablecoins, given their public nature, likely use for high-volume, small-value payments and potentially high adoption rate, may give rise to different risks than wholesale stablecoins available to a restricted group of users. Policymakers recognise their responsibility to adjust existing rules and introduce new regulation where needed.

Stablecoins offered by large existing platforms (such as big techs) could scale rapidly due to their established global customer bases and links to platforms that offer an easily accessible interface. Such arrangements that have the potential to become *global* pose risks beyond those of small-scale stablecoin arrangements and therefore present additional public policy challenges – including those to the safety and efficiency of the overall payment system, competition policy, financial stability, monetary policy transmission and longer term implications for the international monetary system (see Annex B for an analysis of big techs and payments).

2.1 Legal, regulatory, oversight and public policy issues regardless of scale

2.1.1 Legal certainty

- **A well founded, clear and transparent legal basis in all relevant jurisdictions is a prerequisite for any stablecoin arrangement.**

Having a well founded, clear and transparent legal basis is a core element of payment, clearing and settlement arrangements. A stablecoin must be underpinned by clear legal terms that define and govern, with certainty and predictability, material aspects of how the underlying technical arrangements are utilised by parties. However, stablecoins and the underlying technical and contractual arrangements may vary significantly, and the applicable legal regime depends crucially on the particular design and

characterisation. Ambiguous rights and obligations could make the stablecoin arrangement vulnerable to loss of confidence (with implications for financial stability). Users must be given confidence that stablecoins will in practice be as stable as advertised. If value stabilisation relies on market mechanisms, then legal obligations of market-makers must be defined so as to ensure liquidity at all times to all customers.

As regards the legal characterisation of stablecoins, the most relevant determinative factors are whether or not they are considered as a money equivalent; categorised as contractual claims or property rights; or entail a right against an issuer or against underlying assets. In some jurisdictions, stablecoins may constitute a security or financial instrument, such as a debt instrument, or represent an interest in a fund or collective investment vehicle and be subject to applicable laws relating to securities and financial instruments.

Particular issues may arise in a cross-jurisdictional context, as there is a need to determine which jurisdiction's law applies to individual elements in the overall design and which jurisdiction's courts have competency to settle disputes. There is also a potential for conflicts of law, given the different treatments in different jurisdictions. The applicable financial sector law in certain jurisdictions may not be keeping pace with new business models and market activity such as stablecoins. A number of recent initiatives by national authorities are seeking to address this uncertainty.[6]

Where an arrangement relies on DLT to record and transfer monetary value, careful consideration must be given to the legal underpinning of such an arrangement which must be at least as robust as traditional systems. For example, the legal basis regarding the rights and obligations of the relevant parties and settlement finality must always be clear.

2.1.2 Sound governance

- **Sound governance must be clearly established prior to live operations.**

Sound and efficient governance promotes the safety and efficiency of payments and related services. The governance structure of the arrangement must also be clearly defined and conveyed to all ecosystem participants. Good governance can also support the stability of the broader financial system as well as other relevant public interest considerations (eg by enhancing decision-making pertaining to the arrangement's design or through the involvement of a broad spectrum of stakeholders).

Arrangements that rely on intermediaries and third-party providers should be in a position to review and control the risks they bear from and pose to other entities. This could be particularly important if the arrangement involves a variety of entities with specialised tasks and responsibilities not necessarily falling within the regulatory perimeter. These entities may still depend on each other, and some of them are likely to be interconnected with the overall financial system.

Where DLT is used in the arrangement, lines of responsibility and accountability as well as recovery procedures need to be carefully calibrated. Sound governance may be especially challenging in the case of permissionless DLT systems – a decentralised system with no responsible entity may be unable to fulfil regulatory and oversight requirements. On the other hand, a highly complex governance structure could hamper the decision-making on the arrangement's design and technological evolution or could slow down incident responses related to operational issues.

If the reserve assets are not segregated from the equity of the stablecoin issuer, then the investment policy could be misused to privatise returns from the assets whereas losses of the assets would be socialised to the coin holders.

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[6] See IMF (2018, 2019).

2.1.3 Financial integrity (AML/CFT)

- **Public authorities will apply the highest international standards relating to virtual assets and their providers with regard to AML/CFT.**[7]
- **The G7 will lead by example to swiftly and effectively implement the amended FATF standards relating to virtual assets.**

If not effectively regulated and supervised, cryptoassets, including stablecoins, can pose significant risks to financial integrity and may create new opportunities for money laundering, terrorist financing and other illicit financing activities. To mitigate these risks, providers of stablecoins and other entities that are part of a stablecoin ecosystem should comply with the highest international standards for AML/CFT and countering the financing of the proliferation of weapons of mass destruction (CPF). The possibility of peer-to-peer transactions, in some stablecoin arrangements, is an additional risk that should be considered.

The Financial Action Task Force (FATF) is the international standard-setting body for AML/CFT/CPF. The FATF provides a robust and comprehensive framework to combat money laundering, terrorist financing, finance of proliferation and other illicit finance for countries, financial institutions and designated non-financial businesses and professions. While recognising the importance of responsible innovation, the FATF is also committed to ensuring that its standards are in line with emerging risks. In October 2018, the FATF adopted changes to its recommendations to clarify that they apply to financial activities involving virtual assets and virtual asset service providers. The changes were supplemented with an Interpretative Note and updated guidance in June 2019.[8]

It is of vital importance that international standard setters, including the FATF, continue to engage with market participants to stay apprised of developments and stand ready to review their recommendations to ensure that all illicit financing risks are appropriately mitigated. The G7 supports the FATF framework as well as the FATF's ongoing review of countries' implementation of the FATF standards and its continuous efforts to ensure that the FATF standards require countries and financial institutions to understand and mitigate the risks associated with new technologies, including new financial products or services. Additional work may be needed to further clarify the extent to which the various activities within stablecoin ecosystems are covered by regulatory requirements.

2.1.4 Safety, efficiency and integrity of payment systems

- **Effective regulation and oversight of stablecoin arrangements is critical to achieve the public policy goals of payment system safety and efficiency.**
- **Regulatory and policy frameworks are expected to remain technology-neutral and not hinder innovation, while ensuring that it is safe and robust.**

The smooth functioning of payment systems is vital to the financial system and the wider economy. Individuals and firms need accessible and cost-effective means of payment. The system facilitates commercial activities and fosters economic growth, thereby benefiting society as a whole. Financial markets rely on dependable clearing and settlement arrangements to allocate capital and to manage liquidity.

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[7] The FATF uses the terms "virtual assets" and "virtual asset service providers", respectively. A virtual asset is defined as a digital representation of value that can be digitally traded or transferred and can be used for payment or investment purposes. Virtual assets do not include digital representations of fiat currencies, securities and other financial assets that are already covered elsewhere in the FATF Recommendations. See FATF (2019a, b).

[8] Once these changes are fully incorporated into the FATF assessment methodology, implementation in over 200 countries across the FATF and its global network will be assessed against the standards.

However, inadequately designed and operated payment systems can be a source of systemic risk, and disruptions may adversely impact the real economy. If not properly managed, problems at a payment system can cause or exacerbate financial shocks – such as liquidity dislocation or credit losses – that affect the stability of the financial system more broadly. Interdependencies can also present an important source of systemic risk.

For these reasons, central banks and a number of other relevant authorities have mandates to ensure that payment systems function in a safe and efficient manner at all times. These public policy objectives are embodied in the *Principles for financial market infrastructures* (PFMI), which have been developed by the Committee on Payments and Market Infrastructures (CPMI) and the International Organization of Securities Commissions (IOSCO) (CPMI-IOSCO (2012)). Legal, governance and operational risk (including cyber) are all relevant to payment systems and other types of financial market infrastructures (FMIs). Among other things, the PFMI provide guidance for addressing these risks and ensuring efficiency in FMIs (including systemically important payment systems). The PFMI also cover credit and liquidity risk, which are particularly important when considering the design of wholesale payment arrangements.

Regulatory and policy frameworks are expected to remain technology-neutral and not hinder innovation, while ensuring that it is safe and robust. Stablecoin arrangements are expected to meet the same criteria and abide by the same requirements as traditional payment systems, payment schemes or providers of payment services (ie same activities, same risks, same regulations). Innovation should support interoperability and seek to mitigate systemic interdependencies.

2.1.5 Cyber and other operational risk considerations

- **Public authorities will require that operational and cyber risks from stablecoins be mitigated through the use of appropriate systems, policies, procedures and controls.**

Cyber and other operational risks could materialise in the different components of a stablecoin ecosystem, including the technical infrastructure for the transfer of value. Operational resilience and cyber security are core aspects concerning the safety of payment systems. For consumers, some cryptoasset wallets and trading platforms have proven susceptible to fraud, theft or other cyber incidents. Cyber incidents, including those targeting cryptoasset trading platforms, are on the rise, resulting in significant losses for customers. While distributed ledgers may have availability and integrity features that make them more resilient to certain operational and cyber risks than centrally managed ledger systems, the structure of a distributed ledger system might also be compromised, potentially undermining the system. Moreover, new technologies could be subject to operational risks not yet identified.

Stablecoins may be subject to laws, regulations and guidance, and may also fall within the scope of international standards on operational risk. For instance, the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC) provide standards for information security management. National frameworks such as the Cybersecurity Framework published by the US National Institute for Standards and Technology (NIST) provide standards, guidelines and best practices to manage cyber security-related risks, which could be applicable to stablecoin and other cryptoasset ecosystems.[9]

[9] See also CPMI-IOSCO (2016).

Where stablecoin arrangements use DLT, the potential benefits and drawbacks inherent in any distributed setup come into play. The use of multiple synchronised ledgers and multiple processing nodes can reduce the risk from a single point-of-failure.[10]

However, the complexity of distributed ledgers may be a hindrance to the scalability of operations. Payment arrangements typically need to handle significant fluctuations in transaction volumes and, as a consequence, need to be operationally scalable. The use of multiple synchronised ledgers and multiple processing nodes could be a limitation when it comes to ensuring real-time processing of transactions on a distributed ledger.

2.1.6 Market integrity

- **A stablecoin arrangement must ensure fair and transparent pricing in both primary and secondary markets.**

Market integrity is a concept that defines fairness, or transparency, of price formation in financial markets – a critical foundation of protection for investors and consumers as well as competition. As stablecoins aim to reduce the volatility of their prices relative to fiat currencies, there could be fewer opportunities for price manipulation than in other cryptoassets.[11] However, it is still unclear how prices of some stablecoins would be determined, and much depends on the specific design of the stablecoin arrangement. In some designs, agents such as designated market-makers may have significant market power and ability to determine stablecoin prices, with the potential for market abuse.

The stability of the stablecoin price in secondary markets depends, inter alia, on the level of trust that market participants place in the issuer's ability and willingness to exchange it for fiat at a value consistent with reasonable user expectations.[12] Additional risks may arise for stablecoins that are linked to a portfolio of assets, the composition of which can be changed over time by the issuers. If investors knew (or speculated about) the stablecoin issuer's intention to rebalance the basket of assets, they could front-run their purchases by buying and selling different assets in tandem with their stablecoin investment/redemption requests.

Finally, in a manner akin to what may occur with some existing cryptoasset trading platforms, businesses in the stablecoin ecosystem could face a conflict of interest. For example, they may have an incentive to disclose untruthful information on their activities, such as the number of customers and trading volume for advertising and other purposes. Alternatively, stablecoin issuers could intentionally (or unintentionally) mislead their customers on the critical functions they perform, such as the way they manage collateral assets. These types of untruthful information could cause mispricing and market dysfunction. Given that a single entity could play multiple roles such as market-maker, trading platform and custodial wallet within the ecosystem in a way not seen in other markets, the risks and effects of market misconduct in that entity may be amplified.

2.1.7 Data protection

- **Authorities will apply appropriate data privacy and protection rules to stablecoin operators, including how data will be used by the participants in the ecosystem and shared between the participants and/or with third parties.**

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[10] Spreading operations geographically and multiplying the number of synchronised copies of the ledger could, in principle, be an effective way to mitigate operational disruptions: if a node in the arrangement is inoperable or compromised, the other nodes can allow the continued processing of transactions.

[11] For research on the use of an existing stablecoin to influence market prices of bitcoin, see Griffin and Shams (2018).

[12] The expected redemption value is: (i) the face value of the reference currency, for stablecoins issued one-to-one with respect to a single fiat currency; or (ii) the market value of the reference portfolio, for stablecoins linked to a basket of assets.

Policy issues around personal and financial data protection and privacy will grow increasingly important as more data are collected and used in the provision of financial services and machine learning and artificial intelligence techniques advance. Data policies are difficult to coordinate across borders, especially with disparate laws and regulations across jurisdictions as well as differing cultural views on data protection and privacy. The 2019 Japanese Presidency of the G20 identified the importance of establishing global standards on how to define, protect, store, exchange and trade data (G20 (2019)). The International Conference of Data Protection and Privacy Commissioners provides a forum for discussions between national data protection authorities. Data privacy laws should aim to address critical technical issues, such as: (i) the definition and treatment of de-identified data; (ii) the scope of entities covered by the law; and (iii) the method of consent, the right to data portability and the right to correct inaccurate data (Petralia et al (2019)).[13]

Stablecoin users may not have clear information about how their personal data will be used by the participants in the ecosystem and how they will be shared between the participants or with third parties. The collection of different categories of data by the operators of stablecoins and the further processing of users' personal data may give rise to additional privacy considerations. Finally, some data protection issues may also arise from the use of technologies that make the exercise of certain consumer rights, such as the right to remove consumer data or to seek recourse for unauthorised transactions, more difficult. For example, the use of DLT should be compatible with legal principles such as the "right to be forgotten" (where it exists) (Finck (2018)).

2.1.8 Consumer/investor protection

- **As with any nascent technology, additional work may be required to ensure that consumers and investors are informed of all material risks as well as their individual obligations.**
- **If a stablecoin is considered to be a security or a financial instrument, market participants must adhere to relevant capital market laws and frameworks.**

Given the complexity and novelty of stablecoin arrangements, users (particularly retail) might not fully comprehend the risks. Accordingly, regulators should consider the extent to which existing consumer protection or investor protection legislation is applicable and, if it is not, ensure that all the actors involved in an ecosystem guarantee basic consumer and investor rights.

To make informed purchasing decisions, consumers/investors should be given sufficient and understandable information and disclosures about the nature of the stablecoins, the rights associated with them and the risks they present. Therefore, regulatory (as well as legal) clarity is needed to protect consumers and investors and see that sufficient information and disclosures are available. For example, if a stablecoin constitutes a security or a financial instrument, then the relevant securities laws will apply and it may not be possible for the issuer to issue and subsequently legally trade the stablecoin without a prospectus or similar disclosure document describing the issuer, its operations and its risks. Similarly, parties engaged in the clearing and settlement of the stablecoin may be subject to requirements relating to custodians and clearing agencies.

If there are unauthorised payments from a stablecoin account, there should be clarity on what rights the holder has to claim a refund and clear instructions on how to obtain a refund. Concerns over information and consumer understanding could be exacerbated by misleading marketing and the potential for misselling, as has been observed in the wider cryptoasset market.

[13] Data should be both protected and available to their owners (end users) at such time as they deem necessary. In this regard, data ownership and portability are important issues. Moreover, data portability could promote greater competition.

2.1.9 Tax compliance

- **Stablecoin operators and users and other relevant parties are expected to comply with applicable tax laws and mitigate potential avoidance of tax obligations.**

Stablecoins, like other cryptoassets, may pose two types of challenge for tax administration authorities. First, there is uncertainty about the legal status of stablecoins, and therefore the tax treatment of transactions using stablecoins. For example, stablecoin transactions could be treated akin to payments in foreign currencies, with the transaction attracting sales tax. Alternatively, stablecoins could be treated as a security, with a tax liability when the underlying value of the stablecoin fluctuates relative to the fiat currency. In this case, tax could become payable on redemption of the stablecoin for fiat currency. Several countries have issued guidance for taxpayers that transact in cryptoassets; however, the guidance differs in terms of its comprehensiveness. The tax treatment of stablecoins is further complicated by divergent tax treatments across jurisdictions.

The second challenge for tax administration authorities is that stablecoins (as with other cryptoassets) could also facilitate an avoidance of tax obligations. Jurisdictions could apply the provisions and obligations of financial institutions to the operators of stablecoin arrangements, but the lack of a central intermediary in a DLT system could make this difficult to enforce. Furthermore, the degree of anonymity provided by the stablecoin arrangement may make it more difficult for authorities to track transactions and to identify the beneficial owners of stablecoins, making identifying tax evasion more difficult.

2.2 Public policy challenges inherent in potential *global* stablecoins (GSCs)

- **The public policy challenges discussed are amplified if a stablecoin reaches global scale.**
- **Additional public policy challenges arise if a stablecoin achieves global scale.**

Some of the risks above are amplified as a stablecoin grows and reaches global scale. Given that a GSC is likely to be systemically important and concentrate risks, the safety, efficiency and integrity of the payment system is paramount. A GSC arrangement would be expected to have contingency arrangements that support continuity of services. Additionally, GSC arrangements that serve as a system for large-value payments may pose additional credit and liquidity risk over central bank real-time gross settlement payment systems. The potential for stablecoins to scale as a means of payment heightens money laundering and other illicit financing risks. The possibility of peer-to-peer transactions in some GSC arrangements is an additional risk that should be considered. Cyber risks could be amplified, as a GSC is likely to offer a larger attack surface for potential malicious actors to compromise the confidentiality, integrity and availability of the ledger. Data privacy and protection concerns are heightened, as the organisation behind a GSC could rapidly become the custodian of millions of users' personal information. Providing appropriate levels of consumer/investor protection becomes more challenging, as the cross-border nature of a GSC means it is subject to a variety of regulatory frameworks in different jurisdictions.

2.2.1 Fair competition in financial markets

- **From a competition point of view, innovation in financial services is expected to lead to enhanced user experiences and broader access to financial services.**
- **The emergence of certain GSC arrangements, however, could undermine competition in financial markets.**
- **GSCs should support competition and interoperability with other payment systems.**

Competition policy aims to promote innovation and efficiency in markets. To meet these objectives, authorities monitor markets for signs of anti-competitive conduct and aim to detect, investigate and address cartels, abuses of dominance, or monopolisation and anti-competitive mergers.

The introduction of innovative financial products may promote competition and more choices for consumers by challenging the market dominance of incumbent financial institutions. However, GSCs may pose challenges for competition and anti-trust policies, especially if a GSC arrangement were to lead to significant market concentration (BIS (2019)).

GSC arrangements may achieve market dominance due to the strong network effects that initially spurred their adoption, the large fixed costs needed to establish operations at scale and the exponential benefits of access to data. GSCs may impact market competition and a level playing field if the GSC arrangement is based on a proprietary system, as this could be used to prohibit entry or increase barriers to entry to such system. This may be the case where enterprises that govern the stablecoin arrangements control the key channels that consumers and businesses use to access a range of services.

Competition authorities are working to coordinate across jurisdictions and markets on individual cases as well as, on occasion, general policy stances. In June 2019, the competition authorities of the G7 jurisdictions published a "common understanding" document on "competition and the digital economy" acknowledging that the benefits of the digital economy will be maximised in competitive markets (G7 (2019b)).[14] Robust competition frameworks can help promote the benefits of the digital transformation while safeguarding consumer trust in the marketplace. Antitrust and enforcement heads have come together in various international forums to discuss how traditional competition enforcement tools can adapt to tackle issues involving technology and the digital environment.

2.2.2 Financial stability implications

- **Within each GSC and its ecosystem, there may be fragilities such as credit risk, maturity and liquidity mismatch, or operational risks.**
- **It is important to look at a stablecoin arrangement as a whole as well as at its individual components.**
- **GSCs could potentially affect financial stability by increasing fragilities in the conventional domestic currency financial sector and facilitating the cross-border transmission of shocks.**
- **A disruption to a GSC may ultimately affect the real economy in multiple countries.**

Fragilities within particular components of a GSC

The mechanism used to stabilise the value of a GSC would need to incorporate high standards of financial risk management to address market, credit and liquidity risk. If risks were not addressed adequately, this could undermine confidence and trigger a run akin to standard runs on bank deposits where users would all attempt to redeem their GSCs at the reference value.

A GSC's credibility is highly dependent on the arrangement's own credibility, meaning that an event which damages the GSC arrangement's reputation could lead to sudden selling flows out of the GSC. GSCs that rely on market-makers to stabilise the price of the GSC in the open market may be fragile if those market-makers are not obliged to stabilise the price in all circumstances and could exit the

[14] They acknowledged more specifically that: "The challenges of digital transformation require competition authorities to ensure that their specific tools, resources and skills are fit for purpose. Governments should assess whether policies or regulations unnecessarily restrict competition in digital markets. Given the borderless nature of the digital economy, competition authorities must emphasize cooperation with their international counterparts."

market when the GSC comes under strong selling pressure. Even if a GSC is committed to honouring redemptions, it may be vulnerable to a loss of confidence and a run could result. Such a scenario would be more likely if, for example, the GSC issuer is not transparent about its reserve holdings or if the GSC's reporting lacks credibility. Poor governance, such as non-segregated funds in the reserve, ambiguous or misunderstood legal obligations of the issuer, or weak mechanisms to allow stablecoin holders to realise or redeem value from the issuer, may result in the GSC being vulnerable to runs or loss of confidence.

GSCs whose reference assets include bank deposits may be exposed to the credit risk and liquidity risk of the underlying bank. A default or liquidity problem at that bank may mean that the GSC is unable to meet redemption requests. GSCs that hold a wider range of assets, including bonds, may be exposed to the market and liquidity risk of those assets and the credit risk of their issuers. A fall in the value of the reserve assets triggered either by overall market conditions or by an idiosyncratic change in the fundamental value of the asset could reduce the value of the GSC. Furthermore, if the GSC were to have a notional value, falling reserve asset values could result in a gap between the notional and reserve values. This gap could trigger a run where users try to redeem their GSCs for the underlying assets, potentially requiring the issuer to liquidate its assets at below market value (fire sales). GSCs that hold a wider range of assets will require liquidity arrangements to ensure they always have funds available to meet redemptions, even in times when the stablecoin is under significant selling pressure.

Fragilities within stablecoin systems as a whole

It is important to consider stablecoin arrangements as a whole, as well as looking at their individual components. The governance of and relationships between components may be complex. Consequently, fragilities may emerge if the obligations between different components (such as between the issuer and market-makers) and responsibilities are unclear.

There may also be unpredictable interactions between components following a disruption to any individual component. Such complexity may make end-to-end risk management difficult and obfuscate the level of financial risk-taking in the system as a whole without the appropriate controls (eg between the central governance body, the reserve manager and the wallets). Furthermore, the location, extent and transferability of loss-absorbing capacity between the different components may not be clear or may run into legal or operational difficulties in a crisis situation.[15]

Effect on fragilities in the broader financial system

GSCs could increase vulnerabilities in the broader financial system through several channels. First, if users hold GSCs permanently in deposit-like accounts, retail deposits at banks may decline, increasing bank dependence on more costly and volatile sources of funding, including wholesale funding. In those countries whose currencies are part of the reserve, a portion of deposits drained from the banking system (when retail users buy GSCs) may revert to domestic bank deposits and short-term government securities. This implies that some banks may have larger wholesale deposits from stablecoin issuers rather than numerous small retail deposits.[16]

Second, easy availability of GSCs may exacerbate bank runs in times when confidence in one or more banks erodes. Also, depending on where and how the reserve deposits funds among banks,

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[15] For example, some GSCs distinguish between tokens and coins, where the tokens are available to early investors into the GSC that receive a stake in the profits. While the tokens entitle early investors to a flow of the profit, it is not clear whether they are part of the loss-absorbing capacity of the GSC ecosystem, or if this loss absorbency could be used to stem the drop in value and the risk of a run.

[16] Of course, banks may in the future offer deposit products (and even credit) denominated in the GSC. This could mitigate the decline in deposits, but may lead to new forms of foreign exchange risk and operational dependencies.

some banks could experience distributional changes in funding (ie higher or lower overall deposits), with effects difficult to predict.

Third, if new financial intermediaries in the GSC ecosystem captured a significant fraction of financial intermediation activity, this could further reduce bank profitability, potentially leading banks to take on more risks or to contract lending to the real economy. This is likely to especially affect smaller banks and banks in countries with non-basket currencies. While it is not up to public authorities to protect banks from competition or technological advances, these risks need to be assessed and managed.

Fourth, depending on levels of uptake, purchases of safe assets for a stablecoin reserve could cause a shortage of high-quality liquid assets (HQLA) in some markets, potentially affecting financial stability.

In many countries, a stablecoin linked to a basket of foreign currencies might prove more stable than the domestic currency. Stablecoins that are claims on or are linked to underlying assets may provide access to major currencies and developed market assets that can be perceived to be more stable than the domestic one. As a result, in times of domestic financial instability, citizens may run to a particular GSC (akin to sudden dollarisation). A transfer from a domestic bank account to a GSC arrangement with primarily foreign assets (depending on its location) could entail a capital flow out of the country. The speed of GSC transactions, which may be a desirable feature during normal times, could prove to be disruptive in periods of turmoil.[17] Authorities may lack the time needed to intervene efficiently to stop this disruptive process, and GSCs may serve as a highway for capital outflows.

Transmission of risks to the real economy

If a GSC became a widely used means of payment, any disruption to payments may ultimately harm real economic activity. If the GSC were used as a means of settlement within financial markets, such delays could create additional financial stability risks. The impact would depend on the extent to which other payment systems (including cash) were sufficient substitutes.[18]

If a GSC were used as a store of value, and unbanked or underserved populations (in particular) were to use a GSC as a form of savings account, then any shock to the value of that GSC would have a wealth effect on its holders. This could have a wider effect on the economy as people adjust their spending plans accordingly. Moreover, if there was borrowing denominated in a GSC, fluctuations in its value could also exert balance sheet effects on firms.

Banks and other financial institutions directly exposed to a GSC – for example, because they hold the GSC to provide services to their customers – could suffer a loss if the value of the GSC decreased. These intermediaries would be more vulnerable to runs in the absence of deposit insurance and lender of last resort functions. Moreover, disruptions at these intermediaries could undermine confidence in the GSC system as a whole.

A GSC's reserve assets may be very large, with significant implications for financial markets. Large purchases or sales of other assets (such as bonds) could move prices (and yields) in those markets. In extreme scenarios, if the issuer must sell assets quickly in order to meet redemption requests in a run on the GSC, fire sales may result, and potentially disrupt the funding of the custodian banks. Finally, in times of stress, if a GSC provides a substitute for a fiat currency, it may undermine monetary sovereignty.

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[17] A GSC is also likely to affect capital controls, which some countries deploy to manage domestic interest rates in the face of international capital flows.

[18] Several of these channels are similar to those for cryptoassets generally. See FSB (2018) and FSB (2019)

2.2.3 Monetary policy transmission

- **The impact of GSCs on monetary policy transmission will depend on the use of a stablecoin as a means of payment, store of value and/or unit of account as well as the role of a specific currency in the stability mechanism.**
- **If a GSC was widely used as a store of value, it could weaken the effect of monetary policy on domestic interest rates and credit conditions, particularly in countries whose currencies are not part of the reserve assets.**
- **A GSC may increase cross-border capital mobility and affect monetary policy transmission.**
- **Currency substitution to GSCs may have different implications than to foreign fiat currency (classic dollarisation), given the inability to hold sovereign-to-sovereign discussions on the public policy implications of such substitution.**

Effect of monetary policy on domestic interest rates and credit conditions

Use of GSCs as a store of value[19]

If GSCs were widely held as a store of value, GSC-denominated assets would remain on the balance sheets of corporations and households. In such a case, the effect of domestic monetary policy may become weaker, as it may have a more limited impact on the returns on the portion of assets held in GSCs. This effect will depend on the design of the GSC and the extent of GSC holdings, as well as whether there is financial intermediation denominated in GSCs (discussed below).

If a GSC pays a return, any effects on monetary policy transmission through interest rates would depend on how the rate of return is determined. This return might reflect the return on the assets included in the reserve basket. In this case, if the domestic currency were the only asset in the basket, returns on GSC holdings would be equal to interest rates on domestic currency deposits (potentially minus some fees). Thus, domestic monetary policy transmission through interest rates might be minimally affected, if at all. Conversely, if there were multiple currencies in the basket, the return on GSC holdings could be a weighted average of interest rates on the GSC reserve currencies, attenuating the link between domestic monetary policy and interest rates on GSC-denominated deposits. This would be especially true when the domestic currency is not included in the basket of reserve assets at all, as would probably be the case for most economies in the world.

This effect is likely to be larger in countries where the value of the domestic currency is not stable and payment infrastructures are not well developed. In these countries, GSCs pegged to assets in currencies other than the domestic currency could become widely used as payment and savings instruments even if the GSC paid no return, thereby reducing the effectiveness of monetary policy. This would also lead to a reduction in seigniorage revenue for the central bank (and the associated fiscal revenue of the governments). These effects would be similar to those already seen in countries where cash usage has declined due to dollarisation. However, currency substitution to GSCs may have different implications than to foreign fiat currency (classic dollarisation), given the inability to hold sovereign-to-sovereign discussions on the public policy implications of such substitution.

Additionally, because domestic savers will be able to switch between domestic currency deposits and GSC holdings, the return on a GSC may affect the amount of domestic currency deposits and thus deposit and loan interest rates in the domestic currency financial system, further diluting the effectiveness of the interest rate channel of monetary policy. This is similar to the effect already induced

[19] Note that if a GSC was used strictly as a transitory means of domestic payment (ie GSCs are continuously created and destroyed and balances held in GSCs are minimal), the effectiveness of monetary policy is unlikely to be lessened.

by dollarisation in some countries, but may materialise for other countries not currently subject to dollarisation.

If GSC users were to hold GSCs permanently in deposit-like accounts, bank retail deposits might decline, increasing bank dependence on wholesale funding. This might amplify monetary policy transmission because wholesale deposits are generally more interest rate-sensitive than "sticky" retail deposits. Heavier reliance on wholesale funding might, however, make banks, which are facing a more volatile deposit base, more cautious about lending, especially at longer maturities.[20]

Use of GSCs in financial intermediation

In the discussion above, a GSC is assumed to be held as a form of savings, but intermediation between savers and borrowers continues to take place in domestic currency and within the domestic financial system. However, it is possible that intermediaries may emerge that borrow (or take deposits) in GSCs and lend the coins to borrowers (thereby "creating" money). This would further weaken domestic monetary policy transmission, as the returns to domestic savers and the interest rate paid by domestic borrowers would both be less responsive to monetary policy.[21]

International capital flows and cross-border transmission of monetary policy

By facilitating cross-border payments, a GSC might increase cross-border capital mobility and the substitutability of domestic and foreign assets, thereby amplifying the responsiveness of domestic interest rates to foreign rates and undermining domestic monetary control.[22]

Use of GSCs as an international payment unit of account

The use of GSCs as a means of international payment per se will not necessarily alter the response of international trade to exchange rates as long as trade continues to be denominated in conventional currencies. However, if a GSC were to become a unit of account for international trade and trade were invoiced in that GSC, international prices in that GSC could become sticky. Then, the terms of trade would depend on the value of the GSC against the domestic currency and not on bilateral exchange rates between the domestic currencies of the trading partners. As a result, the effect of exchange rates on trade and economic activity could be muted – an outcome similar to that often attributed to the pricing of international trade in US dollars.[23]

GSCs and international asset holdings

If a GSC were to become widely used globally, the demand for those assets included in the reserve basket is likely to increase in the longer term. This could entail capital outflows from countries whose assets are not included in the GSC's reserve basket and capital inflows into countries whose assets are included. This could raise market interest rates in the former countries and lower them in the latter. Any resulting shortage of HQLA could impair open market operations as eligible collateral became scarce.

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[20] Banks' lending behaviour could also become riskier if they are searching for yield.

[21] Similarly to the discussion above, the magnitude of this effect would depend on the extent of GSC-denominated borrowing and lending in the domestic economy. And it would also depend on the share of the domestic currency in a GSC reserve basket, as saving and lending rates on a GSC are likely to be correlated with interest rates in the currencies included in a GSC reserve basket, via arbitrage.

[22] Higher substitutability could potentially increase the responsiveness of exchange rates to domestic monetary policy, although this rather uncertain effect is unlikely to outweigh the loss of control over domestic interest rates.

[23] According to Gopinath (2015), for a panel of 44 countries, at least 40% of their exports were denominated in the US dollar.

3. Legal, regulatory and oversight frameworks applicable to GSCs

- **Standard-setting bodies are intensifying their efforts to assess how their existing principles and standards could be applied to, and/or developing new policy recommendations for, stablecoin arrangements.**

Because the associated technology, governance arrangements and use cases for GSCs are at an early stage of development, it is not yet clear what design choices will be made for specific GSC arrangements. In several cases, more information is needed from GSC developers to fully assess how regulation will apply. Yet the functions performed by the ecosystem – ie the issuance and stabilisation of the coin, transfer of the coin and the user interface – will be comparable to existing regulated financial activities, and they will be performed by individual entities that will be subject to specific regulations in different jurisdictions. While the novelty of their design means that they may not fit easily into existing regulatory definitions and structures, authorities are expected to require that GSCs be subject to one or more regulatory frameworks.

It is clear that the existing regulatory frameworks for financial integrity, data protection, and consumer and investor protection will apply to GSCs. However, the components of GSC arrangements may fall under different types of regulatory and prudential bodies and/or regimes.[24] Those providing payment services, custody, issuance and trading could fall within the scope of different regulatory categories (Box 2).[25] A GSC could also qualify as a unit in a collective investment scheme or as electronic money (e-money). Whether or not GSCs constitute securities or financial instruments in a particular jurisdiction will depend on the features of the GSC and applicable legislation.

Thus, the appropriate regulatory approach is likely to require both cross-border and cross-agency collaboration. Accordingly, authorities are giving careful consideration to the most appropriate regulatory treatment and how existing financial regulatory and oversight frameworks can and should be applied, as well as assessing the economic and technological features of stablecoins. Beyond the regulation of the individual components, the GSC ecosystem as a whole could potentially become systemically important. If so, it will be important to consider how regulatory frameworks can be applied to the ecosystem as a whole. For example, the entirety of a GSC arrangement may constitute a payment system, critical infrastructure or financial service provider coupled with additional regulated services, necessitating oversight or supervision by central banks and other public authorities in different jurisdictions.

Currently, a number of existing standards and practices would apply to systemically important GSCs. The CPMI-IOSCO PFMI aim to promote the safety and efficiency of payment and settlement arrangements and include assessment and oversight methodology. The PFMI articulate high-level principles (as well as some specific quantitative minimum requirements) for identifying and managing risks in multilateral systems among participants, including system operators, used for the purposes of clearing, settling or recording payment, securities, derivatives or other financial transactions. The PFMI are jurisdiction-, organisation- and technology-neutral (CPMI-IOSCO (2012), CPMI (2017)). The CPMI-IOSCO have also established Guidance on Cyber Resilience for Financial Market Infrastructures that would be relevant to GSCs (CPMI-IOSCO (2016)).

[24] Depending on the structure of the GSC arrangement, some of its components may qualify as a regulated instrument (ie financial instruments, securities or e-money) and the GSC arrangement itself as a payment system. Thus, the components and arrangement may fall under different regulatory and oversight regimes (and jurisdictions) and under the oversight of different bodies.

[25] For instance, a cryptoasset wallet provider may be a money transmission service under US law, as it could be considered to be accepting or transmitting value substituting for currency (FinCEN (2019)). In the European Union, wallet providers performing conversion between cryptoassets and fiat currencies would fall under the remit of the Fifth Anti-Money Laundering Directive.

The FATF provides a robust and comprehensive framework to combat money laundering, terrorist financing, financing of proliferation and other illicit finance for countries, their financial institutions and designated non-financial businesses and professions. Additional work may be needed to further clarify the extent to which the various activities within stablecoin ecosystems are covered by regulatory requirements.

In order to mitigate risks of cross-border regulatory arbitrage, it is important for authorities to enhance cross-border cooperation and to assess the applicability of existing international standards, such as the FATF standards, the PFMI, the Basel III standards, and relevant IOSCO standards for securities markets.

Standard-setting bodies are intensifying their efforts to assess how their existing principles and standards could be applied to, and/or developing new policy recommendations, for stablecoin arrangements. The Basel Committee on Banking Supervision's work on cryptoassets includes: (i) the development of high-level supervisory expectations on banks' exposures and services related to cryptoassets (BCBS (2019)); (ii) ongoing measurement of banks' exposures to cryptoassets; and (iii) the potential specification of a prudential treatment for banks' cryptoasset exposures. IOSCO's work includes assessing which of the IOSCO principles and standards might apply to stablecoin proposals, particularly GSCs, including: its policy recommendations for money market funds; principles for ETFs; protection of client assets; regulatory considerations relating to cryptoasset trading platforms; and cooperation and mitigating market fragmentation. The CPMI is currently considering how private digital token arrangements could potentially be used for the settlement of wholesale transactions and seeking to understand the uncertainties in the legal treatment of cryptoassets. Importantly, however, some participants in the GSC arrangement may or may not be covered by existing financial regulatory frameworks even if other parts of the arrangement are technically covered by existing frameworks. Thus, a thorough assessment of regulatory gaps is warranted prior to the launch of a potential GSC.[26]

The Financial Stability Board (FSB) plans to assess, in cooperation with standard-setting bodies, whether there may be regulatory gaps around GSCs, and to deliver its findings to the G20. The work will include a stocktake of relevant authorities' effective regulatory and supervisory approaches and emerging practices, and views on the need for cross-border coordination and cooperation. The FSB will also gather information on specific aspects of the functioning of GSCs and cross-border issues related to their operation, review potential regulatory and supervisory approaches to address financial stability and systemic risk concerns, and advise on additional multilateral responses as needed.

Overall, it will be important for authorities to examine what legal status should be granted to relevant legal entities within their respective regulatory frameworks, upon fully understanding the details of the roles such entities play within the GSC ecosystem. While these assessments could naturally differ in each jurisdiction depending on existing financial regulatory and supervisory frameworks, all or some of these entities may be subject to one or more of the existing frameworks. Cross-border and cross-agency cooperation can help to better capture risks and ensure consistent regulation of comparable entities.

[26] The recent statement from the Swiss Financial Market Supervisory Authority (FINMA) regarding Libra appears to be consistent with the above, highlighting in particular the need to ensure the correct degree of international coordination, to tackle issues from a global perspective and to ensure that all services offered on top of those of a payment system are subject to the appropriate prudential requirements: "The planned international scope of the project requires an internationally coordinated approach" and "all additional services that increase the risks of a payment system must be subject to corresponding additional requirements […] by imposing appropriate requirements in line with the maxim 'same risks, same rules'. Due to the issuance of Libra payment tokens, the services planned by the Libra project would clearly go beyond those of a pure payment system and therefore be subject to such additional requirements." See Swiss Financial Market Supervisory Authority (2019).

Box 2

Application of existing regulatory frameworks

Payment systems

A systemically important GSC arrangement should adhere to the requirements laid out in the PFMI as implemented in applicable domestic frameworks. Because GSC arrangements share many of the features of cross-border and multicurrency payment and settlement systems, they are of potential oversight relevance to more than one central bank. This is especially true if the arrangement is systemically important in multiple jurisdictions. Responsibility E of the PFMI addresses such a scenario, by expecting central banks and other relevant authorities to cooperate, both domestically and internationally, as appropriate, in promoting the safety and efficiency of FMIs.①

Financial institutions and services

Financial institutions may provide a number of functions with regard to GSCs. They may be custodians or wallet providers or traders/market-makers. Several activities may be performed by financial institutions that are already subject to domestic regulations and international standards. For instance, new and existing hosted or custodial wallet service providers will be bound by FATF standards (Recommendation 15) and their national implementation, in particular for transfers from cryptoassets to fiat currencies.

The Basel Committee on Banking Supervision has set out its prudential expectations regarding banks' exposures to cryptoassets and related services. At a minimum, banks are expected to conduct comprehensive due diligence before engaging in such activities, have a clear and robust risk management framework, disclose any material exposures or related services, and inform their supervisory authority of actual or planned activities (BCBS (2019)).

For new types of entities, the identification of relevant risks and of the relevant regulatory authorities may be more complicated, but there will be legal tools for authorities to respond. For instance, a reserve pool could be treated as a collective investment vehicle. This would come with a number of specific requirements regarding disclosure and the sale of units in the reserve pool or leverage restrictions/limits. Similarly, new tokens could be classified as securities, or as e-money, each of which would give rise to additional requirements in various jurisdictions (Zetzsche et al (2019)).

Securities markets

Potentially, GSCs may be traded or exchanged on-market. In a recent consultation report, IOSCO looked at the Regulation of Platforms Trading Crypto Assets (IOSCO (2019)) and found that the issues are similar to those of traditional securities trading venues. Therefore, the IOSCO Principles and Methodology provide useful guidance for regulatory authorities, in particular with respect to access; safeguarding participant assets; conflicts of interest; operations; market integrity; price discovery; cyber security and resilience. To the extent that GSCs are cryptoassets, the same considerations may apply. However, while the issues and risks may be similar, they may be amplified or altered by the particular operating models of these trading platforms. Regulatory and supervisory approaches may therefore need to be adjusted accordingly.

① Notification and information-sharing procedures and cooperative oversight arrangements should also be established, with one authority accepting primary responsibility for oversight, including carrying out oversight activities on behalf of, and in cooperation with, the other relevant authorities. The primary overseer should have powers to obtain timely information to understand and assess the functions, risks, impact on the broader economy, and adherence to relevant regulations and policies of the GSC arrangement as whole. In exercising those powers, it should consult with other relevant authorities. See CPMI (2012) and CPSS (2005).

4. A way forward / improving cross-border payments

Recent GSC initiatives have highlighted the shortcomings in cross-border payments and access to transaction accounts, and the importance of improving access to financial services and cross-border retail payments. However, it remains to be seen whether GSCs will indeed be able to overcome the shortcomings of existing payment systems. Moreover, their adoption is, as yet, uncertain as they face significant legal, regulatory, supervisory and operational challenges. Stablecoins, regardless of size, pose challenges and risks to AML/CFT efforts across jurisdictions, as well as operational resilience (including for cyber security), consumer/investor and data protection, and tax compliance. GSCs, by nature of their potential scale, may amplify those challenges and could also pose challenges to competition policy, financial stability, monetary policy and, in the extreme, the international monetary system. Consequently, it is important that the private and public sectors continue to explore innovative ways to make payments better, reduce inefficiencies and be more inclusive. In particular, the public sector should redouble its efforts to reduce frictions in international payments and support measures to improve financial inclusion.[27] It is critical that such work be completed in a timely manner and in a way that is best able to support efficient transactions and innovation going forward.

The G7 Working Group on Stablecoins recommends that relevant public stakeholders (finance ministries, central banks and standard-setting bodies such as the CPMI), in collaboration with relevant international organisations, develop road maps for supporting and scaling up ongoing efforts to improve the efficiency and inclusiveness of payment and financial services. The road maps could include recommendations to:

(a) *Support initiatives to improve cross-border payments*. This could include fostering standardisation of payment processes, promoting direct or indirect interlinking of payment infrastructures, considering whether applicable legal frameworks provide a sufficient foundation of certainty for emerging payment products and services, and facilitating useful and responsible innovation and competition.

(b) *Promote financial inclusion* by reviewing and updating the call for action by all relevant stakeholders and boosting support programmes for less developed countries.

(c) *Improve coordination between authorities,* both domestically and across borders, including through strong regulatory cooperation and harmonised standards, where practicable, and establishing information-sharing and cooperative oversight arrangements between relevant authorities.

Additionally, central banks, individually and collectively, will assess the relevance of issuing central bank digital currencies (CBDCs) in view of the costs and benefits in their respective jurisdictions (see Annex C for background on CBDCs).

Alongside efforts to reduce the frictions in international payments, public authorities are giving careful consideration to the most appropriate regulatory treatment of stablecoins and how existing

[27] A number of private and public sector initiatives have tried to improve cross-border payments and financial inclusion. In the area of cross-border payments, these initiatives were brought together in the five CPMI recommendations on correspondent banking, which have been implemented through various workstreams involving the Wolfsberg Group (an association of global banks); SWIFT; the Global LEI Foundation; the Basel Committee on Banking Supervision; and the FATF. In 2011, the G20 adopted a target to reduce the cost of international remittances from 10% to 5% within five years. The United Nations also set a target indicator for sustainable development of reducing the transaction costs of migrant remittances to less than 3% and eliminating remittance corridors with costs higher than 5% by 2030. To monitor the cost of remittances, the World Bank established the Remittance Prices Worldwide (RPW) database. To promote financial inclusion, the CPMI and the World Bank established a joint Task Force on Payment Aspects of Financial Inclusion (PAFI), which developed a report outlining concrete actions that countries can take.

regulatory frameworks can and should be applied, as well as assessing their economic and technological features.

The FSB and standard-setting bodies are intensifying their efforts to assess how their existing principles and standards could be applied to, and/or to develop new policy recommendations for, stablecoin arrangements in a globally consistent and coordinated manner.

Additionally, the Working Group on Stablecoins recommends that public sector authorities continue to underscore regulatory expectations with GSC arrangements. To facilitate such engagement, this report has:

(i) developed concepts for how stablecoin arrangements may be defined, including which design features determine the definition and the vocabulary to be used;

(ii) detailed the regulatory, oversight and policy issues associated with stablecoin initiatives should such initiatives be adopted or look likely to be adopted on a large scale; and

(iii) reviewed, on a preliminary basis, the existing regulatory and oversight regimes that may be applicable to stablecoins. To that end, the Working Group on Stablecoins welcomes the FSB's plans to work with standard-setting bodies to assess whether there may be regulatory gaps around GSCs, and to deliver its findings to the G20.

Finally, the Working Group recommends that finance ministries, central banks, international organisations, standard setters and other public authorities maintain the high level of international coordination and collaboration needed for cross-border policies and regulatory regimes that apply to stablecoins. Public authorities should also be mindful to forestall harmful regulatory arbitrage and to ensure a level playing field that encourages competition. Close international coordination will help to reap the benefits of recent technological advances more quickly and efficiently and address the formidable challenges identified above.[28]

[28] As a first step, the Working Group organised an inclusive high-level conference at the Bank for International Settlements that brought together a broad set of relevant authorities and private sector stakeholders to discuss the opportunities and challenges on a cross-border and cross-agency basis.

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Annex A: Stablecoins and their ecosystem

Stablecoins are digital tokens that typically transact on a distributed ledger[29] and rely on cryptographic validation techniques to be transacted, with the goal of achieving stable value relative to fiat currencies. In principle, stablecoins allow users to protect the nominal value of their holdings. Stablecoins are inherently at the edge of the decentralised crypto world in the sense that the price stabilisation aspect, whatever its form, usually requires some kind of trusted intermediation or other centralised infrastructure.

A.1 Stabilisation mechanics

Issuers of stablecoins can use multiple approaches to support a stable value relative to the fiat currencies they are linked to. The simplest and most direct approach is the depository receipt model, whereby the stablecoin is a direct claim on a single currency. Under this approach, the value of the stablecoin is guaranteed by the issuer, who fully collateralises the claim and commits to redeem coins at par value in the same currency in which they were purchased. Early proofs of concept in building wholesale payment platforms on distributed ledgers utilise this approach.[30]

A second approach to stabilising the value of stablecoins is to "link" their value to a basket of reference assets in an indirect way. Much like an exchange-traded fund, the holder of these stablecoins does not own the underlying assets. The basket of reference assets could include fiat currencies, government securities, commodities, cryptoassets or combinations thereof.[31]

A third approach to stabilising the value of stablecoins is to leverage the financial strength and stability of the offering institution. Commercial banks can issue stablecoins as an alternative to a deposit, note or other financial instrument. In some cases, the issuing institution might operate a permissioned distributed ledger platform that institutional customers can use to transfer tokens. These tokens can be exchanged at par with conventional deposits or exchanged for cash. They are ostensibly "backed" in the same way conventional deposits are backed – namely, by the balance sheet of the bank.

Other types of stablecoins that are intended to be stable with respect to individual currencies, but are not backed by those currencies, include cryptocurrency-backed stablecoins, and algorithmic stablecoins, which seek to maintain par value with the underlying currency through bond issuance and algorithmic trading. These lie outside the scope of this report, as their ability to maintain a stable value over the medium term is questionable.

The type and management of the stability mechanism will have a bearing on the likely success of the stability function. For example, where a stablecoin is issued by an institutional issuer with fractional reserve backing, the stability of that currency relies on the trust which users have in the issuer to remain liquid in the normal order of business. If a stablecoin is backed by assets, then users must trust the issuer to be a faithful custodian of the funds.

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29 The CPMI (2017) defines DLT as "the processes and related technologies that enable nodes in a network (or arrangement) to securely propose, validate and record state changes (or updates) to a synchronised ledger that is distributed across the network's nodes".

30 See Chapman et al (2017) and Monetary Authority of Singapore (2017).

31 Some stablecoins are traded on exchanges at prices that fluctuate with respect to a particular legal tender currency, and at the same time offer redemption at par with respect to that currency for a fee. Price fluctuations in these cases presumably are limited by the fee structure and the credibility of the redemption pledge.

A.2 Examples

Stablecoins can be differentiated at a high level by the users and the exchange rate policy. "Users" refers to who is able to hold and/or transact the stablecoin. Following Bech and Garratt (2017), the term "retail" is used to refer to stablecoins that are intended for use by anyone and "wholesale" to refer to stablecoins where access is restricted, typically to financial institutions or selected clients of financial institutions.[32] For example, the Libra Association has proposed making its stablecoin accessible to everyone, and so it is considered a retail stablecoin, while USC is intended for use only by financial institutions that are part of the USC consortium, so it is considered it a wholesale stablecoin.[33]

The exchange rate policy can be fixed or variable. Wholesale stablecoins that fall under the depository receipt model are designed to be a tokenised representation of the issuers' underlying liability (customer deposits), and hence have fixed exchange rates. This means that these tokens are purchased and redeemed at exactly the same nominal value. Other stablecoins, even those that claim to be backed 100% by a single currency, will have a price that may fluctuate relative to that (or any other) currency. Tether, TrueUSD and Paxos are all listed on crypto exchanges and have exchange rates that fluctuate (in some cases more than others) around the US dollar.

To date, only two categories of stablecoins have been observed: wholesale stablecoins with a fixed exchange rate; and retail stablecoins with a variable exchange rate (Table A.1). Wholesale applications are aimed at replicating or replacing existing processes for settlement in commercial bank or central bank money, and hence wholesale applications with a variable exchange rate are not consistent with this objective. The emergence of retail stablecoins with a fixed exchange rate seems plausible; however, no examples exist at present.

Stablecoin examples by user and unit of account — Table A.1

		Exchange rate	
		Fixed	Variable
Use case	Retail	-	Tether, TrustTokens, Paxos, *Libra*
	Wholesale	Signet, JPM Coin, *USC*	n/a

TrustTokens include TrueAUD, TrueCAD, TrueGBP, TrueHKD and TrueUSD. Italic font denotes proposals; regular font denotes active/live token arrangements.

A.3 The stablecoin ecosystem

This section provides a stylistic overview of a typical stablecoin ecosystem in terms of the three core functions outlined in Section 1.1:

1. Issuance, redemption and stabilisation of value of the coins.
2. Transfer of coins among users.
3. Interaction with users (ie the user interface).

Issuance and stabilisation typically require a central governance entity to govern the stability mechanism, and the transfer of coins among users is typically ruled by the DLT protocols (Graph A.1).

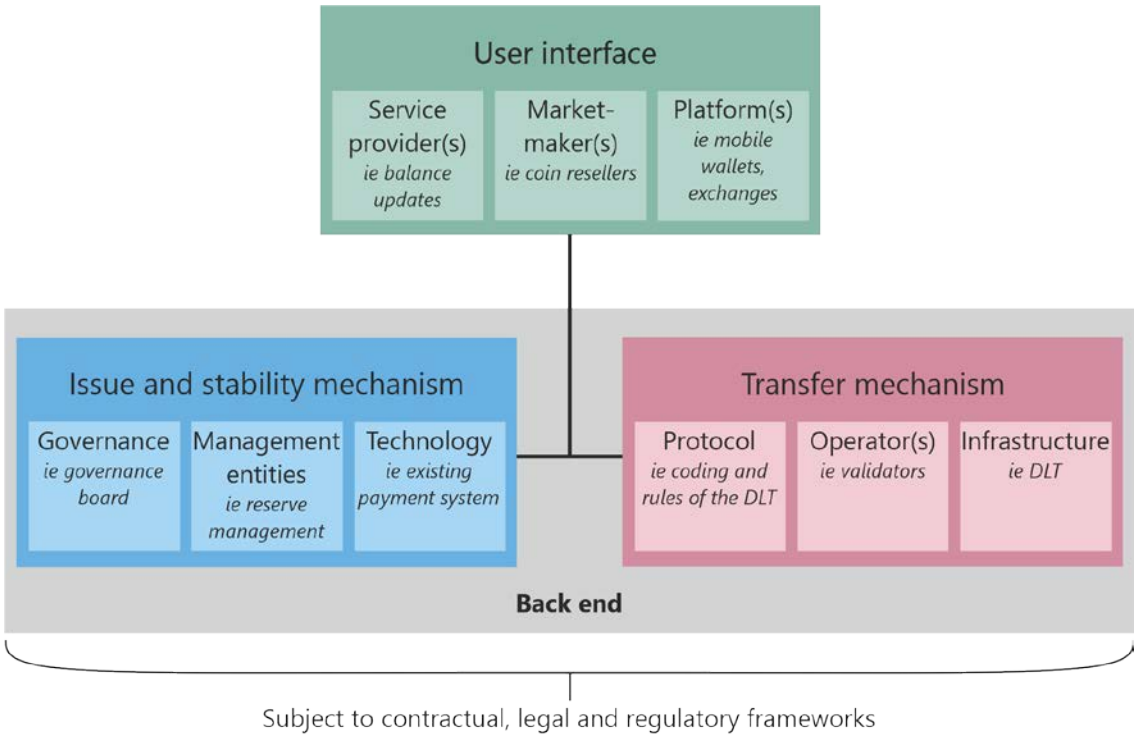
[32] See also Adrian and Mancini-Griffoli (2019).

[33] This note draws on examples from specific private sector initiatives. These should be seen as illustrative examples, and not as representing any statement about any individual firm, product or service.

In contrast, the user interfaces for stablecoins do not necessarily include a high-level governance entity or protocol. It is possible that entities might perform multiple roles across different functions. For example, some stablecoins have a central governance body over issuance and stabilisation as well as over transfers.[34]

A functional view of the stablecoin ecosystem

With selected examples — Graph A.1



Italics represent selected examples for illustration only. The specific configuration of entities or technology to perform roles within each function will vary across stablecoins. The design of the interface functions can range from basic (and accessible only to advanced users) to user-friendly (which simplifies access to the stablecoin and provides additional services).

A.3.1 Issuance and stabilisation mechanism

The issuance and stabilisation function includes governance, management entities and underlying technologies such as DLT, smart contracts or conventional FMI technology such as bank accounts.

Governance plays a key role in stabilisation because a central agent or group of agents must design, and set rules for, how the value of the stablecoin will be stabilised. For example, a governance agency must set the rules that asset managers or stablecoin issuers should follow in order to ensure that any stability target is maintained.

Management entities also play a key role in the issuance and stabilisation of stablecoins. They manage the issuance and redemption of the stablecoin, the stability of the stablecoin, or the custody of reference assets according to the rules designed by the governance layer. Management entities can also include custodians that hold reference assets, such as fiat currencies, commodities and other financial assets. In addition, management entities could comprise a stablecoin mint that issues new stablecoins,

[34] It is worth noting that initial funding activities to set up a stablecoin ecosystem have a key bearing on the incentives and governance structure of the ecosystem.

collects funds from users and manages redemptions. Third-party entities can be used to perform management roles depending on the design of the stablecoin.

The technology used in the issuance and stability function could interact with conventional financial arrangements such as bank accounts or it could rely on standalone infrastructure such as a DLT and smart contracts. For example, smart contracts could be used to manage the stability mechanism.[35]

A3.2 Transfer mechanism

The transfer function involves a protocol, operator(s) and infrastructure required to transact the stablecoin over the distributed ledger technology. In the transfer function, the design of the DLT plays a key role and existing payment systems are not necessarily required. In particular, the DLT protocols determine how transactions are validated, who has access to the stablecoin, what the access conditions are, what roles exist within the system, and who can participate in each role (CPMI (2017)). These institutional and technical design configurations can be summarised by four characteristics (Wadsworth (2018)):[36]

- Permissionless (anyone can be a validator) or permissioned (only selected entities can be a validator).
- Public (anyone can use the DLT for transactions) or private (only selected entities can initiate transactions).
- Non-hierarchical (anyone can see the full version of the ledger) or hierarchical (only a designated entity has a full copy of the ledger).
- Open source (anyone can suggest edits to the source code) or closed source (only authorised developers can edit the source code).

A3.3 User interface

Stablecoin ecosystems require an interface that provides an access point for users. This function could have a high level of interaction with existing payment systems.

At the most fundamental level, user interfaces consist of client software that connects the DLT network to a computer terminal or command prompt (a basic platform). However, some ecosystems have more user-friendly platforms such as wallets[37] and websites that also provide additional services such as a store for cryptographic keys, a gateway to initiate transactions, and a place to view balance and transaction histories.

Entities and technology within the user interface include trading platforms that link the ecosystem to existing fiat currencies and FMIs, eg by linking to existing bank accounts or credit cards and thus enabling the user to buy and sell the stablecoin with fiat currency.

Lastly, some stablecoins have market-making entities that buy coins from the issuer and resell them to the public, as well as the reverse when needed. This is not a core component of the ecosystem, but it can provide easier access to the coin for end users.

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[35] See Bullmann et al (2019) and FSB (2017). Smart contracts are defined as "programmable distributed applications that can trigger financial flows or changes of ownership if specific events occur". Smart contracts can be coded to execute, verify and constrain an action involving either units or representations of assets recorded in a distributed ledger.

[36] The configuration of these features determines how the function operates. For example, in DLTs that are permissionless, public and non-hierarchical, validation occurs via a consensus mechanism whereby a group of agents agree to update new transactions to the ledger. In DLTs that are both permissioned and hierarchical, a central agent may be appointed to validate transactions.

[37] The functionality of wallets can vary. Most wallets provide an online service that allows their user to store the (public and/or private keys of) stablecoins, initiate stablecoin transactions, check crypto-asset balances and/or check transaction histories.

Annex B: Big tech and payments[38]

Large technology firms ("big techs") such as Alibaba, Amazon, Apple, Facebook, Google and Tencent have increasingly moved into payments. These big techs draw on their unique combinations of large amounts of customer data, platform network effects and diversified activities to offer new modes of delivery of payment services or new payments features at relatively low cost. This Data-Network-Activity ("DNA") business model inherent in big techs could give them an advantage in payment services:

1. **D***ata analytics* – payment transactions generate customer data that big techs can use to enhance existing services and identify opportunities for new services.

2. **N***etwork effects* – big tech platforms enable direct interactions among a large number of users, and so become increasingly useful as more and more people use them.

3. **A***ctivities* – as the data and network effect generated by a big tech platform expands, the firm can provide new profit-generating activities.

Big tech firms offer payments by building their own standalone payments platform and/or by placing an overlay on existing payments infrastructure (Table B.1).

- *Overlay* systems build an innovative customer interface that improves the ease with which customers can instruct and receive payments. These systems then use existing payments infrastructure, such as correspondent banking, credit card or retail payment systems, to process and settle payments.
- *Standalone* systems are "closed-loop" payment systems and do not interact with or depend on existing payments infrastructure. In these systems, payments are processed, cleared and settled by the platform provider independently of any other system.

Big tech retail payments — Table B.1

		Reach	
		Domestic	Global
Payments infrastructure	Overlay	Venmo[1]	Apple Pay, Google Pay, PayPal *Calibra*[3]
	Standalone	Alipay, M-Pesa,[2] WeChat Pay	*Libra*

A standard font indicates a system or service in operation; an italic font indicates a proposal.

[1] Venmo is a mobile US payments app owned by PayPal. [2] M-Pesa is a mobile phone-based money transfer, financing and microfinancing service. [3] Calibra is the mobile wallet that Facebook intends to run on top of the Libra network.

Big techs can then leverage their existing user network to offer payment services on either a local or a global scale. *Domestic* platforms provide payment services within the jurisdiction or region of the platform provider. *Global* platforms provide payment services to users in several jurisdictions. Global platforms using an overlay system rely on existing correspondent banking relationships to complete cross-border payments. Standalone systems would be completely independent of these relationships and have greater potential to remove frictions in cross-border payments.

[38] This Annex draws from BIS (2019) and Petralia et al (2019).

Annex C: Central bank digital currencies (CBDCs)

The CPMI and the Markets Committee (MC) define a CBDC as a "digital form of central bank money that is different from balances in traditional reserve or settlement accounts" (CPMI-MC (2018)). There are three different types of CBDC that vary depending on who has access and on the technology used (tokens versus accounts). The three types are: (i) digital tokens that can be used by financial institutions (eg for interbank and securities settlements); (ii) accounts at the central bank for the general public; and (iii) a digital "cash" token that could be used by the general public in retail payments (Table C.1).

Types of digital central bank money — Table C.1

		Access	
		General public	Financial institutions
Technology	Account	*Central bank accounts for the public*	Settlement or reserve balances at central bank
	Tokens	*Digital "cash" token*	*Central bank wholesale digital token*

A standard font indicates existing forms of digital central bank money; an italic font indicates central bank digital currency.

Proofs of concept for central bank wholesale digital tokens have been conducted for various use cases, including interbank payments, cross-border payments and settlement of securities transactions. Use of tokens for interbank payments and settlement of securities transactions has not improved on current arrangements due to stringent business requirements for capacity, efficiency and robustness. According to a number of published collaborations (eg a joint project by the Bank of Canada, the Monetary Authority of Singapore and the Bank of England (2018), use of central bank wholesale digital tokens for cross-border payments could be more promising.

Providing the general public with access to central bank money could take a jurisdiction into uncharted waters (Cœuré (2018)). CPMI-MC (2018) highlights the monetary and financial stability risks of (i) instability in commercial bank deposit funding; (ii) fast and large-scale flight towards a central bank; and (iii) ultimately, a greater role for the central bank in allocating economic resources that could give rise to political risks and prove inefficient for an economy. These risks need to be considered with more practical matters, such as requirements relating to anti-money laundering and countering the financing of financing requirements, satisfying supervisory and tax regimes, and having the legal authority to issue a CBDC.[39] A CBDC entails huge operational consequences for central banks in implementing monetary policy as well as implications for the stability of the financial system (Carstens (2019)).

Despite the challenges and risks, interest persists and work continues, especially in those countries where cash use is declining.[40] Although the majority of central banks are actively researching CBDCs, very few are likely to be issued in the short or medium term (Barontini and Holden (2019)). Even for those central banks at the forefront, the jury is still out. Any decision to go further will differ from country to country (Carstens (2019)).

[39] Just under 80% of central banks do not have the legal authority to issue a CBDC, or are uncertain if they do (Barontini and Holden (2019)).

[40] For example, in Sweden, payments in cash are small and a third of what they were in 2010. As per a survey conducted in 2018, only 13% of Swedes paid for their most recent purchase in cash, down from 39% in 2010 (Sveriges Riksbank (2018)). The central bank has already moved to develop a pilot programme before making a judgment on issuing a CBDC (Ingves (2018)). Declining use of cash in payments is more widespread than just in Sweden, and not surprising, given that domestic electronic payment systems in most of the world are becoming increasingly instant and robust (Cœuré (2018)).

Annex D: Members of the G7 Working Group on Stablecoins

Members[41] and technical experts

Committee on Payments and Market Infrastructures European Central Bank		**Benoît Cœuré** (Chair)
Canada	Bank of Canada	**Carolyn Wilkins** Tim Lane Scott Hendry
	Ministry of Finance	**Rob Stewart** Leah Anderson Julien Brazeau
European Union	Eurogroup	**Hans Vijlbrief** Florian Abadie
	European Central Bank	**Sabine Lautenschläger** Klaus Löber Dirk Bullmann
	European Commission	**John Berrigan** Florian Denis Jon Isaksen
France	Bank of France	**Sylvie Goulard** (until August 2019) **Nathalie Aufauvre** (from September 2019) Valerie Fasquelle Marie-Hélène Ferrer
	French Ministry for the Economy and Finance	**Odile Renaud-Basso** Sébastien Raspiller Arnaud Delaunay
Germany	Deutsche Bundesbank	**Claudia Buch** Benjamin Weigert Melanie Wulff
	Ministry of Finance	**Jakob von Weizsäcker** Stefan Mai Markus Neimke
Italy	Bank of Italy	**Fabio Panetta** Riccardo Cristadoro Paola Giucca

[41] Members are shown in bold.

Italy	Ministry of Economy and Finance	**Alessandro Rivera** Stefano Cappiello
Japan	Bank of Japan	**Shinichi Uchida** Norio Hida (until September 2019) Masaki Bessho (from September 2019) Takeshi Yamada
	Ministry of Finance	**Yoshiki Takeuchi** Takefumi Yamazaki Yuta Takanashi (Japanese Financial Services Agency)
United Kingdom	Bank of England	**Jon Cunliffe** Tom Mutton Ben Dyson
	HM Treasury	**Veda Poon** Gillian Dorner William Bennett
United States	Board of Governors of the Federal Reserve System	**Steven Kamin** David Mills Brett Berger
	United States Department of Treasury	**Geoffrey Okamoto** Sharon Yang Daniel Greenland
International Monetary Fund		**Tobias Adrian** **Gita Gopinath** Tommaso Mancini-Griffoli Soledad Martínez-Pería
Bank for International Settlements (observer)		**Hyun Song Shin** Leonardo Gambacorta (until September 2019) Jon Frost (from September 2019)
Financial Stability Board (observer)		**Dietrich Domanski** Jon Frost (until September 2019) Alexandre Stervinou (from September 2019)

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