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DIGITAL MONEY ACROSS BORDERS: MACRO-FINANCIAL IMPLICATIONS

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DIGITAL MONEY ACROSS BORDERS—MACRO-FINANCIAL IMPLICATIONS

EXECUTIVE SUMMARY

Rapid ongoing progress with digital technologies has increased the prospects for adoption of new forms of digital money for both domestic and international transactions. These include central bank digital currencies (CBDCs) and the so-called global stablecoins (GSCs) proposed by large technological companies or platforms.

This paper explores the complex interactions between the incentives to adopt and use CBDCs and GSCs across borders and discusses the potential macro-financial effects.

The use of currencies internationally reflects the economic weight of issuing countries and broader geopolitical factors. In addition, strong network effects and synergies across the three functions of money (unit of account, means of payment, and store of value) act as self-reinforcing mechanisms: Once a currency is dominant, it has tended to stay dominant.

Moreover, the use of foreign currencies for domestic transactions ("currency substitution") depends on the degree of monetary stability and other country circumstances, including legal frameworks and regulation.

However, digitalization could drive international use of currencies in ways that are distinct from traditional dynamics. CBDCs and GSCs potentially lower transaction costs by increasing competition, widen access to services and promote financial inclusion through mobile devices, and open the possibility of complementary services offered on social networking and e-commerce platforms of global scale.

The economic consequences and policy challenges depend critically on the degree of adoption. Since the latter is difficult to predict, this paper presents different stylized adoption scenarios to examine potential consequences. These range from niche use for small cross-border payments, to pervasive adoption in a subset of countries, to global adoption of a single GSC, or a multipolar world featuring intense competition between a few major CBDCs and GSCs. The purpose of presenting scenarios is to illustrate and explore the possible implications of adoption. This is not an effort to forecast specific outcomes or judge their desirability.

The benefits of using CBDCs and GSCs for cross-country transactions are conceptually clear, although difficult to quantify at this stage. Making a payment or transferring

funds across borders could be just as easy as sending an email. This could reduce transaction costs to the benefit of end users, especially for small transactions. Perhaps more importantly, it affords the prospect of access to a wide range of other cross-border financial services leveraging the big data generated from individual transactions.

At the global level, currency competition due to the adoption of CBDCs and GSCs could lead to improved risk-sharing in the longer term.

Digital money adoption across borders also entails risks and policy challenges. Foreign CBDCs and GSCs could raise pressures for currency substitution and worsen vulnerabilities from currency mismatches. They could reduce the ability of local authorities to run monetary policy. Without appropriate safeguards, they could facilitate illicit flows and make it harder for regulatory authorities to enforce exchange restrictions and capital flow management measures. In the case of GSCs, there are additional challenges relating to their governance.

In addition to domestic advantages, cross-border use of CBDCs could help firms and households in issuing countries better manage risks (e.g., by issuing debt denominated in their own currency). But to the extent that it meaningfully increases financial integration without a commensurate development of financial markets and institutions, the issuing countries could have increased exposures to global shocks.

Overall, the paper finds that CBDCs do not qualitatively change the economic forces that lead to the international use of currencies but quantitatively could reinforce the incentives behind currency substitution and currency internationalization. GSCs that do not represent independent units of account are similar to CBDCs in terms of monetary effects but could affect financial stability as they may suffer from bouts of confidence crisis. GSCs that represent new and independent units of account could similarly offer improved financial services but have a potentially more fundamental impact on global monetary and financial stability.

With its universal membership and mandate for safeguarding international monetary and financial stability, the IMF is uniquely positioned to consider the macro-financial effects and policy implications of these developments in both bilateral and multilateral surveillance, and capacity development.

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Glossary

AML/CFT	Anti-Money Laundering and Combating the Financing of Terrorism
BIS	Bank for International Settlements
Big Techs	Large technological companies or platforms
CBDC	Central Bank Digital Currency
CFM	Capital Flow Management Measures
CPMI	Committee on Payments and Market Infrastructures
DLT	Distributed Ledger Technology
E-Money	Electronic Money
FATF	Financial Action Task Force
FSB	Financial Stability Board
GSC	Global Stablecoin
ICO	Initial Coin Offering
IMS	International Monetary System
IMF	International Monetary Fund
OECD	Organization for Economic Cooperation and Development
RegTech	Regulatory Technology
SupTech	Supervisory Technology

INTRODUCTION

A. Overview

1. New forms of digital money are increasingly capturing policymakers' attention. These include central bank digital currencies (CBDCs) currently envisaged by some countries, and the so-called global stablecoins (GSCs) proposed by large technological companies or platforms ("Big Techs"). Potential motivations for the introduction of CBDCs and GSCs vary. Some see them as payments solutions facilitating peer-to-peer or peer-to-business transactions, especially across borders. Others view them as complements to large e-commerce ecosystems. More recently following the COVID-19 pandemic crisis, governments are also exploring CBDCs as a fast and direct means to provide fiscal assistance to vulnerable populations during the emergency, including to the unbanked.

2. Digitalization of money and payments has the potential to shock the organization of the international financial system. Recent breakthroughs and cost reductions in digital technology such as cloud computing and the proliferation of mobile devices have dramatically increased the accessibility by individuals and firms to payment instruments previously used only by financial institutions (e.g., real time transfer of balances maintained at central banks). At the same time, distributed ledger technology (DLT) such as blockchain has made it possible to use digital tokens to transfer value over a peer-to-peer system without necessarily going through a central party (for example, commercial or central banks). [1] Making a payment overseas could be just as easy as sending an email. As a result, the present international monetary landscape, which is based on connecting banking systems spread around the globe in different locations and time zones, could be reconfigured (Figure 1).

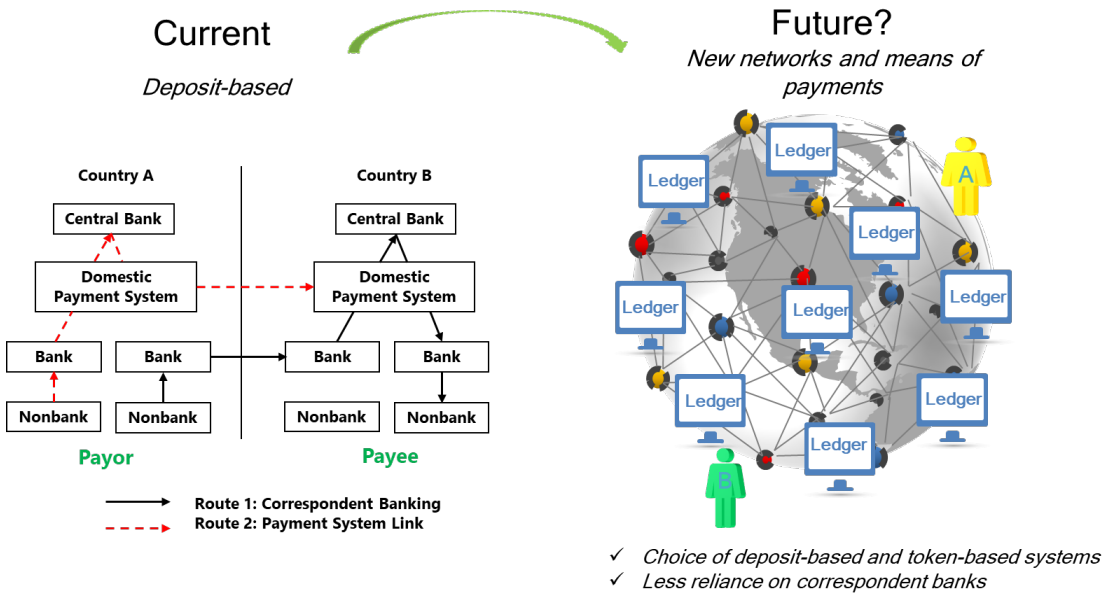
3. CBDCs and GSCs could make cross-border payments less costly and make it easier for households and small firms to have access to financial services. Based on a sample of 112 countries, Bank for International Settlements (BIS) (2020, p. 84) reports that the average total cost of a US$200 bank-based cross-border remittance is over 10 percent of the remittance value. Remittances to developing countries exceeded US$550 billion in 2019 surpassing FDI and portfolio flows. At the same time, the share of adults without access to a bank account stands above 50 percent in parts of the developing world, such as Sub-Saharan Africa, North Africa and the Middle East (BIS, 2020, p. 72). As a result, a majority of the population do not have access to banking services, including cross-border payments. Much of the aforementioned costs reflects service charges and cost recovery by financial intermediaries. Hence, while it is difficult to quantify the benefits, it is clear that CBDCs and GSCs have the potential to lead to significant efficiency gains by flattening the multi-layered correspondent banking structure and shortening the payment chains.

4. At the same time, foreign CBDCs and GSCs could make it harder for country authorities to run independent monetary policies and control domestic financial conditions. By increasing the accessibility of foreign currencies for domestic use, CBDCs and GSCs could raise

[1] See Annex III for an explanation of the technical terms used in this paper.

pressures for currency substitution and worsen risks of currency mismatch. Without appropriate safeguards, they could facilitate illicit flows and make it harder for regulatory authorities to enforce exchange restrictions and capital flow management measures (CFMs). While the application of digital technology in regulation and supervision ("RegTech" and "SupTech") may empower authorities in enforcing compliance, their effectiveness remains a work in progress.

Figure 1. Evolving Landscape for Cross-border Payments



Source: IMF staff.

5. The scale and scope of CBDC and GSC adoption will be subject to strong network effects but will also depend on design features, country circumstances, legal frameworks, and regulation. Digitalization has the potential to disrupt existing equilibria of cross-border use of currencies. Some of the attributes of these new forms of digital money could drive adoption in ways that are distinct from existing dynamics. They lower transaction costs by reducing reliance on banks, widen access to services and promote financial inclusion through mobile devices, and open the possibility of complementary services offered on social networking and e-commerce platforms of global scale. It is thus possible to envisage a variety of plausible adoption and use outcomes. In addition, the rise of GSCs could hark back to an era when the private sector played an important role in the monetary sphere,[2] with Big Techs not only supplying goods and services, but also payment instruments that could influence monetary policy in many countries.

[2] For example, as discussed by Champ (2007), in the 19th century much of the paper currency in the US consisted of notes issued by not only banks, but also railroad, coal and lumber companies.

(continued)

6. Policy makers will face challenges in responding to digital money use across borders. As a strategic response to CBDCs and GSCs issued by foreign central banks and Big Techs, central banks could issue their own CBDCs, but that would not necessarily help counter currency substitution if the local monetary policy framework lacks credibility. They might have to adapt the use of fiscal and macroprudential policies to better respond to shocks when monetary policy effectiveness is impaired. For central banks that decide to issue CBDCs, doing so might in some cases help their currencies to internationalize or achieve reserve currency status, but could complicate the conduct of their own monetary policy as foreign use of their CBDCs could increase capital flow volatility. As new forms of digital money gather steam, there will likely be calls for policy makers to harmonize legal and regulatory frameworks governing data use and sharing, competition policy, consumer protection, digital identity, and other important policy issues relating to the digital economy.

7. This paper explores stylized scenarios of cross-border use of CBDCs and GSCs in order to illustrate and explore their possible implications. This is not an effort to forecast specific outcomes or judge their desirability. The hypothetical scenarios range from niche use for small cross-border payments, to pervasive adoption in a subset of countries, to global adoption of a single GSC, or a multipolar world featuring intense competition between a few major CBDCs and GSCs. Using these scenarios as expositional devices, the analysis aims to shed light on the following questions: What is special about these new forms of digital money that could lead to scenarios where they are used extensively across borders? What are the mechanisms through which adoption of CBDCs and GSCs across borders may affect monetary policy transmission, financial stability, capital flows, and the demand for and supply of international reserves? What are the potential policy responses country authorities could consider balancing efficiency gains against risks? And, in a situation where monetary policy effectiveness is impaired, how will other policies need to adapt to allow countries to deal with shocks?

8. The paper provides an informal briefing to the Board about the relevance of digital money across borders to international monetary and financial stability. It is an initial attempt to address the complex interactions between incentives to adopt and use CBDCs and GSCs across borders and their macro-financial effects. While the paper presents an initial analysis of the policy implications of such macro-financial effects, it refrains from making policy recommendations. Normative policy discussions would require further welfare analysis and broader public debate. Overall, the paper finds that CBDCs do not qualitatively change the economic forces that lead to the international use of currencies, as they are only digital forms of existing fiat currencies but quantitatively, they could reinforce the incentives behind currency substitution and currency internationalization. GSCs that do not represent independent units of account are similar to CBDCs in terms of monetary effects but could affect financial stability as they may suffer from bouts of confidence crisis. GSCs that represent new and independent units of account could similarly offer

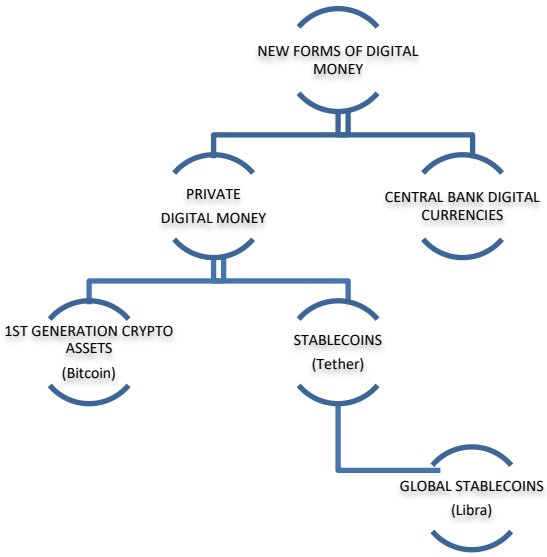
The difficulty of Treasury coin distribution in remote parts of the country, as well as the fact that the silver in coins was often worth more than the stated value of the coins, lead to a significant reliance on private money for small denomination payments. In 1862, the US Congress forbade issuance of dollar-denominated private money, after which many issuers began denominating their currencies in services (e.g., miles of railroad service).

better financial services but pose challenges to global governance as profit maximization by the GSC issuer could conflict with the public policy objective of maintaining monetary and financial stability.

B. What are CBDCs and GSCs

9. CBDCs and GSCs are new forms of digital money that embody recent developments in digital technology. CBDCs are a digital form of fiat money issued by a central bank. For the purposes of this paper we will focus on retail CBDC, which is defined as a widely accessible digital form of fiat money that could be legal tender (Mancini-Griffoli and others, 2018; Group of Thirty, 2020). GSCs are stablecoins, a type of private digital money, issued by Big Techs with the potential for widespread adoption (Figure 2). Stablecoins may differ from traditional e-money schemes as they do not necessarily guarantee redemption at a pre-established face value denominated in the unit of account.[3] While stablecoins are grouped here, for convenience and for expositional purpose, as a form of digital money, it does not mean that they are formally considered "currency" or "money" by IMF staff. The legally appropriate definitions of currency and money are discussed in Box 1.

Figure 2. Terminology of Digital Money



Source: IMF Staff.

10. Ongoing progress in digital technology has made it possible for new forms of digital money to be cheaper and faster than traditional electronic instruments, especially for cross-border payments. As compared to credit cards, CBDCs and GSCs do not incur expensive interchange or foreign transaction fees, in part reflecting the fact that they do not require the multi-layered clearance and settlement infrastructure behind credit card transactions. Also, they can be transferred over a peer-to-peer system in real time around-the-clock essentially bypassing the correspondent banking relationships (Figure 1). He and others (2017) suggest a simple analogy that can help understand the nature of these new forms of digital money. Before the internet, sending a letter domestically was fundamentally different from sending mail internationally. Pricing was significantly different, the infrastructure was different, and the processing of cross-border mail required international agreements on payment sharing, and

[3] See CPMI (2015), He and others (2016), and Adrian and Mancini-Griffoli (2019) for a discussion of more granular categorizations of digital means of payment. Adrian and Mancini-Griffoli (2019) provides a general classification framework for various types of means of payment, and includes a discussion of e-money schemes such as M-Pesa, Alipay and Wechat Pay, which are not the focus of this paper. It also proposes the idea of synthetic CBDC (sCBDC), which is a public-private partnership in which private firms create coins fully backed with central bank reserves and protected from the bankruptcy of the issuer, under license and supervision of the central bank. sCBDC thus resembles CBDC, to the extent user funds are entirely protected from the coin issuer's bankruptcy. But sCBDC also has features of stablecoins, albeit ones entirely backed with central bank reserves.

standards on packaging, tracking and handling. This situation still applies aptly to cross-border payments at present (CPMI, 2020; FSB, 2020b). In the age of the internet, there is no distinction between an email or text message going to a domestic or foreign recipient; both take a click. A message is a message; with the rise of CBDCs and GSCs, a payment might just be a payment in the future, regardless whether the payee is located domestically or abroad.

11. Private digital money differs in their design and stability of value and, so far, their use has been limited. We highlight two main types. First generation cryptoassets (e.g., Bitcoin), denominated in their own units of account, exhibit large price volatility, making them poor stores of value.[4] Stablecoins have emerged as less volatile versions of traditional cryptoassets. Stablecoins seek to minimize price fluctuations by pegging their valuation to fiat currencies or other existing assets, backing their issuance with assets (including assets denominated in globally used official currencies individually or as a basket), or by managing their outstanding supply using algorithms. Until now, neither cryptoassets nor stablecoins have reached the level of use of cash or of established cashless payment methods.

12. Big Techs appear to be poised to issue GSCs. Individuals and firms increasingly rely on platforms offered by Big Techs to connect with one another and to exchange goods and services. These companies, benefitting from network effects as result of their large number of users and their ability to bundle different products, may issue stablecoins that could have the potential for large-scale adoption. For example, Facebook and its partners announced their intention to launch Libra, a blockchain-based digital money fully backed by assets denominated in reserve currencies. Other Big Techs could follow suit. At the beginning, Big Techs might choose to peg their GSCs to existing reserve fiat currencies so as to engender trust in the stability of their value. But, over time as adoption becomes global, GSCs might be de-linked from fiat currencies. They could become an independent unit of account with no backing other than the trust from users that they would be accepted as payments. Their value could be preserved by the issuer committing to a credible set of rules or principles such as the amount and pace of issuance, the level of interest to be paid or fees to be charged, much like central banks conduct monetary policy albeit without necessarily the same instruments or objectives.

13. Central banks have yet to issue CBDCs but many are seriously considering it. A recent survey of central banks in 21 advanced and 45 emerging market economies conducted by the BIS (Boar and others, 2020) indicates that approximately 80 percent are engaging in work related to CBDC and 40 percent have already progressed from analytical studies to experiments or proofs of concept. As far as motives for issuing CBDC, while they vary across countries, according to the aforementioned report the main ones include: (i) providing an alternative to cash and ensuring that the public has access to a state-guaranteed means of payment;[5] (ii) reducing the cost of handling

[4] According to the IMF Treatment of Crypto Assets in Macroeconomic Statistics, crypto assets such as Bitcoin "do not meet the definition of a financial asset—and hence currency—in macroeconomic statistics".

[5] In Sweden, where use of cash has declined significantly and cash is now used in only 13 percent of payment transactions, the Riksbank started contemplating the introduction of a CBDC (the e-Krona project) primarily due to concerns about payment systems being completely in private hands (Sveriges Riksbank, 2017, 2018).

cash in countries with vast or inaccessible territories; (iii) promoting financial inclusion, particularly for the unbanked population; and (iv) improving the efficiency and safety of domestic, and especially cross-border, payments. The potential global adoption of stablecoins issued by Big Techs could also be contributing to the interest in CBDC. Finally, in the wake of COVID-19, CBDC is being contemplated as a means to enable the swift disbursement of government support to households and firms, and as a means of payment more hygienic than cash and consistent with the need for social distancing (Auer, Cornelli, and Frost, 2020).

Box 1. Money and Currency: Legal Definitions

While this paper focuses on the economic aspects of digital money and payments, it is important to note that currency and money are also legal concepts and that laws play a crucial role in determining which assets can and will be used as means of payments. The law uses several related but distinct legal categories in providing a legal foundation to the monetary system.

All countries establish by monetary law the legal concept of ***currency***, which denotes the official means of payment of a country (or monetary union), denominated in its official monetary unit. Today, currency status is provided in all countries to banknotes and coins issued by a central authority (typically, the central bank) that has the exclusive right to do so. "Legal tender" status is a key attribute of currency: it entitles a debtor to discharge monetary obligations by tendering currency to the creditor.

While there is no universally accepted legal definition of money, it is widely accepted that the legal concept of ***money*** is broader: in addition to currency (banknotes, coins), in many (but not all) jurisdictions it also includes certain types of assets or instruments that are readily convertible or redeemable into currency, such as commercial bank "book money" (credit balances on accounts). There is similarly no uniform legal treatment of *electronic money* in many jurisdictions, but it could be classified as a version of money. Some assets (e.g., bitcoins) may be considered as money under one body of law (e.g., VAT law), but not under another (e.g., financial law).

From a legal perspective, ***payment instruments*** (e.g., cheques, bills of exchange, promissory notes) are neither currency nor money, but are legally used to effect payments that are ultimately settled in currency or money.

How can CBDC and GSCs be categorized under those legal concepts?

CBDC: As it will be expressed in the existing official monetary unit of the issuing country, CBDC would be a new means of payment, but not a new monetary unit. The legal categorization might also depend on the design. CBDC could be deposit- or token-based, the former involving the transfer of a claim on a deposit account and the latter of a digital token between wallets (G30, 2020). Deposit-based CBDC would be book money, and not currency in most jurisdictions. In contrast, the legal status of token-based CBDC is yet unclear:

- Under public law, while jurisdictions could in principle grant it "currency" status, it would be difficult to grant it all attributes of currency, including legal tender status.
- From a private law perspective, token-based CBDC raises a lot of questions, given that digital tokens do not fit well into the legal categories that have been developed in legal systems. Legal concepts and theories will need to be developed or adapted to allow for weaving digital tokens in private law. Key questions to be addressed will include: what is the legal nature of a digital token (e.g., movable intangible or sui generis category), how are digital tokens transferred and pledged (by the bilateral act between transferor and transferee or by booking in a DLT registry); to what degree are good faith acquirers of digital tokens protected (e.g., the *nemo dat* rule) ; and what are the relevant private international law rules applicable to digital tokens (*lex rei sitae* or law of the DLT registry).

Box 1. Money and Currency: Legal Definitions (concluded)

GSC: The monetary and private law status of GSC is unclear and will depend on the GSC's design features and the governing law. At any rate, GSCs would not be currency (nor a payment instrument), unless the law otherwise so determines. In many instances, the legal qualification of the GSC will likely be *sui generis*. For each GSC, careful analysis will be needed to determine its precise legal status, which in theory could range from money, electronic money, a commodity, a security, to a combination of those. This has important legal and practical ramifications. For instance, if a GSC is not expressed in an official monetary unit but becomes a *de facto* unit of account in the economic sense, it will still not be an official monetary unit in the legal sense. Hence contracts expressed in a GSC might not give rise to monetary obligations, which would have important legal consequences (e.g., with respect to force majeure). It may, however, still be the case that for other legal purposes—e.g., for determining tax liabilities—dealings in GSC could be equated to money or currency and taxed accordingly.

The legal classification of GSCs—consistent between jurisdictions involved in their use— will have a direct impact on their capability of being widely used (e.g., classification of GSCs as securities would imply the application of securities laws and regulations, raising significant obstacles for the use of these GSCs as a cross-border means of payment).

ADOPTION AND USE SCENERIOS

A. Factors Affecting CBDC and GSC Adoption[6]

14. Cross-border use of currencies falls into two categories: use of currency for international transactions, and domestic use of currency issued by a foreign entity. In the first category, international currencies serve as a medium of exchange, store of value, and unit account and are used for international trade, international finance, and foreign exchange reserves (Figure 3). In the second category, a foreign currency displaces a domestic currency for domestic transactions, a situation commonly referred to as currency substitution. Below we review the factors that drive the use of a currency in international transactions as well as currency substitution. Annex I describes the current landscape and presents various indicators of international use of currencies. Annex II provides stylized facts on the extent, dynamics, and persistence of currency substitution.

15. Safety, liquidity, trade links, financial connections, and geopolitical factors explain why some currencies are used disproportionally in cross-border transactions.[7] Price stability and confidence in a currency's value (both stemming from the credibility of the monetary authority) are critical for its use as an international currency since these factors affect the role of the currency as a unit of account and a store of value (Eichengreen and Mathieson, 2000; Hartmann and Issing, 2002). The more liquid and developed a country's financial markets, the more likely that other

[6] For purpose of this paper, the terms "adoption" and "use" are used interchangeably to refer to the cases where CBDCs and GSCs are legally permitted to perform the functions of medium of exchange, store of value and unit of account.

[7] Theoretical papers on the factors that explain why a currency is used as vehicle currency (a medium of exchange across currencies) internationally include Krugman (1980, 1984), Matsuyama, Kiyotaki and Matsui (1993), Zhou (1997), and Rey (2001).

countries will use its currency for intervention purposes or to denominate financial assets (Eichengreen, 1998). The larger a country's share in world output and trade, the more likely that other countries will use its currency due to economies of scale (Eichengreen, 1998; Frenkel and Sondergaard, 1999; Frankel, 2000). The status of an international currency is also influenced by the geo-political relationships between the issuing state and the countries that adopt and use the currency (e.g., Eichengreen and others, 2019).

Figure 3. International Use of Currencies

	Roles		
	Medium of exchange	Store of value	Unit of account
Private sector	• Vehicle currency • Liquid & safe asset markets	• Nominal securities issuance • Banking, cash hoarding	• Denomination of securities • Trade invoicing • Pricing of goods and services
Official sector	• Intervention currency • Lender of last resort	• Reserves	• Exchange rate pegs • Anchor currency

Note: Adapted from Kenen (1983).

16. The use of currencies internationally is affected by strong network effects or externalities reinforced by synergies across monetary functions. Network effects occur when the private value of using a service or product increases with the number of other users. Once a currency is established internationally, the fact that it is used by many increases the likelihood that others will adopt it. Synergies between the different functions of an international currency are likely to reinforce the network effects of adoption. For example, the status of the U.S. dollar as the dominant international currency for trade invoicing and payments has boosted the role of the dollar in international finance and vice versa. Hence, from a dynamic perspective, once a currency gets established as a leading currency, it tends to be in a self-justifying dominance (He and Yu, 2016; Gopinath and Stein, 2018).

17. Currency substitution typically occurs against the backdrop of unsound domestic macroeconomic policies and a lack of trust in policy institutions. High and volatile inflation hampers the ability of the domestic currency to function as a stable store of value. In the event of hyperinflation, the domestic currency's medium of exchange and unit of account functions become encumbered as well, as households and firms aim to minimize exposure to the rapidly depreciating currency and prefer switching the unit of account to avoid resetting prices constantly. Such inflationary episodes generally result from the interaction of significant macroeconomic pressures and weak policy institutions, such as large fiscal deficits coupled with a lack of central bank independence (De Nicolo et al. 2005; Catao and Terrones, 2016; Kokenyne et al., 2010). Limited hurdles to foreign exchange convertibility, government guarantees on foreign denominated liabilities, low foreign exchange transaction costs, and the absence of regulatory bounds on foreign

exchange exposure for banks and corporates further raise the likelihood of currency substitution (Burnside et al., 2001; Broda and Levy Yeyati, 2006; Garcia-Escribano and Sosa, 2011).

18. On top of the factors discussed above, certain intrinsic attributes of CBDCs and GSCs could also drive their adoption and use:

- **Lower transaction costs.** CBDCs and GSCs carry the potential to reduce the costs of cross-border payments by cutting out intermediaries and potentially simplifying compliance procedures. They could help lower transaction costs in securities issuance and trading through tokenization of assets more broadly.[8]

- **Ease of access**. Access to foreign currency can be challenging to establish, especially in rural areas in developing countries. Whether in the form of physical exchanges or access through bank accounts, foreign currency access comes with prerequisites in terms of brick and mortar infrastructure. CBDCs and GSCs have the potential to overcome some of these impediments. Moreover, particularly if the issuer is a private company, there can be an upfront investment with the specific aim of reaching a broader set of users.

- **Access to complementary services or bundling.** Stablecoins specifically can be more than a new form of money: they can provide entry into a wider platform of services. The evolution of China's payments system illustrates how e-money providers have bundled services to promote adoption, something that could happen with stablecoins issued by Big Techs. WeChat Pay integrates the transfer of electronic money with its ubiquitous social media services, while Alipay links its e-money to China's largest online retail site. Moreover, both major e-money issuers offer their customers access to credit services. Going forward, Big Techs such as Facebook could follow a similar pattern bundling their existing social media and e-commerce services, respectively, with payment services through the issuance of a stablecoin.

19. Legal provisions will heavily influence CBDC and GSC use. While countries should not stifle innovation, they could set boundaries for the role of CBDCs and GSCs through changes in their legal frameworks. Importantly, recipient countries may determine the degree to which denomination and settlement of contracts in a foreign currency or a GSC will be legally authorized. Moreover, the treatment of foreign CBDC in a recipient country could depend on the legal treatment of that CBDC in the issuing country (e.g., currency and legal tender status). In addition, in designing the CBDC, countries need to decide whether nonresidents will be allowed to access the system where CBDC and transfers of CBDC are recorded. Legal certainty would be necessary for GSCs to operate as a means of payment in cross-border transactions: this would require a degree of uniformity in the legal characterization of GSCs as instruments consistent with a payment function. Beyond characterization of the GSC, the rights of coin holders and the status of the issuer and intermediaries

[8] Tokenization of securities, or the conversion of financial assets into digital tokens could transform the clearing and settlement of securities trades. A key motivation is to lower the large costs of trade processing. Tokenization could also transform how the underlying risks are managed. See ASIFMA (2019), Beck and others (2020), and OECD (2020) for further discussions.

would need to be clearly defined, and a close examination of private law issues that may affect the proper functioning of GSCs is warranted (see Box 1). GSCs that offer greater clarity and protect the rights of coin holders are likely to see greater adoption, all else equal. The tax treatment of transactions involving GSCs needs to be substantially similar to equivalent transactions involving fiat currencies, including where they take place across borders.

20. Regulatory frameworks also have a crucial role in shaping the scale and scope of CBDC and GSC use. The regulatory environment in which new forms of digital money operate is fragmented at present. This leaves open the possibility that in countries with exchange restrictions, households and firms could choose to use CBDCs and GSCs because these can help circumvent some of those restrictions. At the same time, given regulatory uncertainty about the treatment of GSCs, and concerns regarding the ability to effectively oversee and supervise the complete ecosystem involved in a cross-border CBDC or GSC, there may be significant pushback from regulators to allow these to operate in their jurisdiction unless there is clarity on their financial stability impact and the regulatory framework that would be applicable (G7 Working Group, 2019).

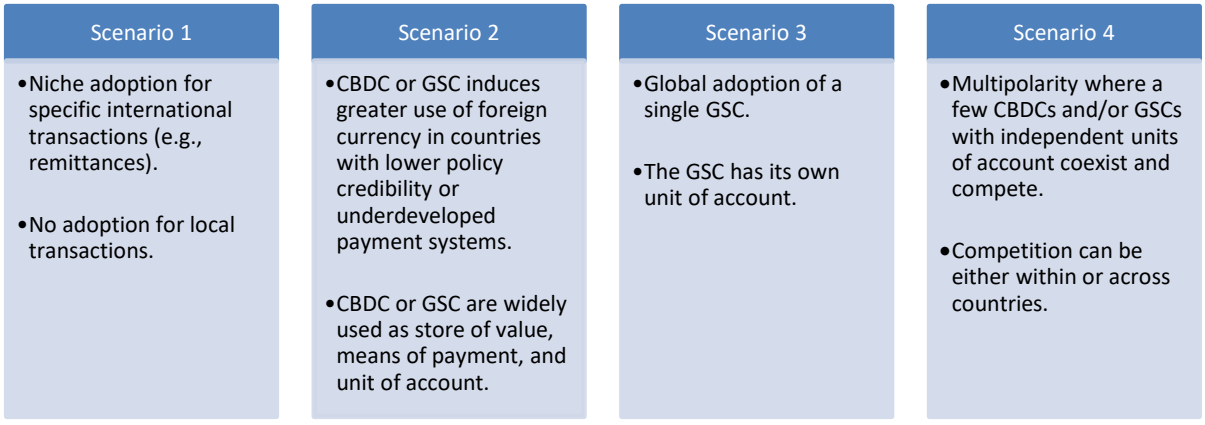
B. Hypothetical Scenarios

21. A few hypothetical scenarios for CBDC and GSC adoption are presented here (Figure 4) to help illustrate its potential macro-financial implications. These scenarios are not chosen because they are likely or desirable; rather they are designed as stylized examples to help analyze the macro-financial effects of different degrees of CBDC and GSC adoption. The scenarios take various dimensions into account: for what purpose (i.e., functions of money) CBDCs and GSCs are used, how pervasively they are used across countries, to what degree they supplant the local currency, and the type of issuer—whether public (CBDC) or private (GSC), as this might require different preconditions and have different implications .

22. Scenario 1: Niche use for cross-border payments. A CBDC or a GSC is used as the preferred means for small value transactions, such as remittances across borders, due to its low cost and efficiency or due to legal and regulatory limits that are placed on the purpose and amounts that can be transferred internationally. The CBDC or GSC would not be held for very long—in most cases for the duration of the transaction, and in some cases as a store of value. The CBDC or GSC would be exchanged for local currency to make purchases domestically, and the CBDC or GSC would not supplant the local unit of account.

- **The convenience and easy accessibility of CBDCs and GSCs make them attractive as vehicle currencies.** For example, instead of opening a bank account holding balances of foreign currencies, CBDCs and GSCs allow residents of foreign countries to have exposures to them without a bank account, something which in many countries is very difficult to obtain due to compliance requirements or other costs. Because they can be transferred over a peer-to-peer system operating around the clock, their use flattens the multi-layered correspondent banking structure, shortens the payment chains, reduces transaction time, and facilitates increased competition among service providers. As a result, cross-border payments could then become cheaper and more inclusive, benefiting in particular small value remittances.

Figure 4. Stylized Scenarios



Source: IMF staff.

23. Scenario 2: Greater currency substitution in some countries. A foreign CBDC or a GSC pegged to an existing fiat currency induces greater use of foreign currency in countries with high and volatile inflation and unstable exchange rates. In those countries, use of the CBDC or GSC is intensive and replaces the domestic currency significantly: as a store of value (in and of itself, or to access assets in that currency), as a means of payment for many but not all transactions (including some regional cross-border trade), and as a common (though not necessarily ubiquitous) unit of account. In addition, even in countries with credible policy frameworks, the adoption of GSCs could be significant as they could facilitate transactions associated with certain e-commerce or social networking platforms. The platforms might not require the use of GSCs but could encourage it through incentives (e.g., lower prices paid for goods and services on the platform if the GSC is used).

- **Macroeconomic conditions and the degree of financial market development will matter greatly for CBDC and GSC adoption.** In countries struggling with less credible monetary policy regimes and poor track records of price stability, the emergence of CBDCs and GSCs may exacerbate the problem of currency substitution due to better accessibility. In such circumstances increased currency substitution may not necessarily lead to a reduction in welfare. Gulde and others (2004, page 4) note that "in comparing the financial vulnerability of dollarized and nondollarized systems, it is important to account for the fact that dollarization itself largely arises as protection against risk." Also, countries with less developed payment systems could see higher adoption of foreign CBDCs and GSCs as a way to leapfrog to better payment and settlement services, even for local transactions.

24. Scenario 3: Global adoption. A single GSC becomes commonly adopted in many countries and replaces the local currency as store of value, means of payment, and unit of account; and is also widely used for international transactions.[9] The GSC is an independent unit of account and is used as a means of payment on e-commerce and/or social platforms that span multiple countries. Its value

[9] This scenario could also contemplate the global adoption of a CBDC but the implications would only differ from those in Scenario 2 in terms of the number of countries that would adopt the CBDC.

could be preserved by the issuer committing to a credible set of rules or principles. For example, it may target a "price stabilization rule" relative to a basket of products sold on the Big Tech's platform.

- **This scenario may arise if a Big Tech platform of global scale decides to launch a GSC to its large customer base which spans across the globe.** In this case adoption will be driven by the network externalities associated with the existing large customer base as well as the synergies between the coin and other goods and services that the platform offers. Such a GSC could initially be issued against assets denominated in existing reserve currency. Given the vast scale of the customer base of the Big Tech platform, the GSC could be adopted globally at a rapid pace. And the launch of a payment instrument that is catered specifically to its customer network would help strengthen its business model. As the GSC gains popularity, network effects would take over: agents would start invoicing contracts in the GSC and financial intermediaries would start collecting deposits and lend through GSC-denominated contracts. At some stage, once adoption reaches some critical mass, the peg to existing reserve currencies may no longer be needed to generate trust in the value of the GSC , and the GSC could become a fiat currency.[10]

25. Scenario 4: Global adoption with multipolarity. This is a scenario of competition between a few major CBDCs and GSCs that represent independent units of account. Instead of one single GSC dominantly used for international transactions and payments, and for domestic use worldwide (as described in Scenario 3), a few CBDCs and GSCs are used internationally for both domestic and international transactions. In the case of CBDCs, there may be "currency blocs" within which countries choose one common CBDC for both international and domestic transactions. For GSCs, there may be "digital currency areas", whereby the use of a stablecoin is determined not by geographical borders but instead by the boundaries of the e-commerce and/or social platforms which use it. Such a digital currency area can be defined as a network where payments and transactions are made digitally by using a currency that is specific to this network. In other words, either the network operates a payment instrument that can only be used inside, between its participants; and/or the network uses its own unit of account, distinct from existing official currencies (Brunnermeier and others, 2019c). And in a third case, there may be currency competition between a few major CBDCs and GSCs.

- **This scenario could be the result of strategic responses by central banks and Big Techs in a game of currency competition in the digital age.** Anticipating the issuance of CBDC by the dominant reserve currency central bank or GSC by a globally dominant Big Tech, other central banks and Big Techs could also launch their own CBDCs and/or GSCs. This scenario of multipolarity can be facilitated by interoperability of different networks. With interoperability, users of a particular technology or system can interact easily with those using other technologies or systems, with substantially reduced interchange costs. First-mover advantage and the persistence of the established, dominant standard may no longer be so strong. Based on this line of thinking, the rise of CBDCs and GSCs could prove to be the shock that hastens the

[10] This situation could resemble the ascent of the dollar where it was first pegged to gold but maintained its status as a dominant currency even after the US abandoned the peg in 1971.

transition to a multi-polar world of reserve currencies. Indeed, in certain historical periods several major currencies appeared to have simultaneously played consequential international roles (Eichengreen and Flandreau 2009; Eichengreen, Mehl and Chitu, 2018).

MACRO-FINANCIAL CONSEQUENCES

A. Monetary Policy Transmission

26. Foreign CBDCs and GSCs can affect the transmission of monetary policy by increasing currency substitution and by reshaping patterns of business cycle synchronization. Currency substitution reduces the monetary authorities' control over domestic liquidity by limiting the component over which the authorities have direct influence and by reducing the stability of money demand (El-Erian, 1988). [11] As a result, the transmission of monetary policy – the extent to which policy-induced changes in monetary instruments (e.g., the nominal money stock or the short-term nominal interest rate) can affect macroeconomic variables—could be weakened. Substitution into CBDCs or GSCs is no different from substitution into existing fiat currencies. However, these new forms of digital money could intensify currency substitution due to easier accessibility. In addition, they could facilitate economic activities and trade links organized around Big Techs and help reshape patterns of business cycle synchronization, which may reduce the ability of monetary policy to respond to shocks.

27. Niche adoption of CBDC or GSC for remittances (Scenario 1) would probably not have a significant impact on monetary policy effectiveness unless it fosters currency substitution. To the extent that they facilitate the growth of remittances by reducing transactions costs or regulatory barriers, they could impact monetary policy effectiveness in recipient countries. This is because there is a close link between the domestic availability of a foreign currency and substitution into that currency. For instance, during Cambodia's transition to democracy, US dollar usage rose rapidly in the course of only a few years, as large foreign aid flows provided ample dollar liquidity (Kubo, 2017). Initially, dollar use centered on the payment system, but it subsequently migrated to a store of value, as consumers began to save the dollars (Odajima, 2017). [12]

28. If countries use a foreign currency (including by granting legal tender status to CBDC) or a GSC extensively (Scenario 2), their ability to weather shocks will depend on whether their business cycles are in sync with those of the currency issuer. When currency substitution occurs, monetary policy effectiveness in the user country weakens; but monetary policy in the currency issuer could partially serve the needs of the country using the foreign currency, if the business cycles of the user and the issuer coincide. This could be the case if they face similar shocks or are

[11] There is an extensive and old literature on currency substitution. For a survey of the literature see Giovannini and Turtelboom (1992). Currency substitution also entails a loss of seigniorage revenues and reduced the ability of the central bank to act as lender of last resort.

[12] A similar widening of the role of the foreign currency has been observed in cases where personal remittances underpinned foreign currency availability, such as El Salvador and Tajikistan (Ventura, 2012; Grigorian and Kryshko, 2019).

economically integrated as in a currency union. However, currency substitution has often occurred in countries that are geographically and economically remote from the issuing country. In these cases, currency substitution results in a reduced ability of the country to use monetary policy to absorb shocks. [13]

29. In addition to the challenges associated with the conduct of monetary policy in a currency union, the global adoption of a GSC (Scenario 3) will subject countries to the monetary stance of a private firm. The fact that a uniform monetary policy for a large set of countries might not adequately align with the business cycles of each one is a well-known challenge associated with conducting monetary policy in currency areas. What would be different in this scenario is that countries that have adopted a GSC as their fiat currency would find themselves exposed to the monetary stance of a private company, which could raise fundamental issues about entrusting the care of a centerpiece of countries' macroeconomic policy to a profit-oriented company.

30. Although privately issued money has circulated in various forms in the past[14], the reach of a globally adopted GSC would be unprecedented. Therefore, the impact of any potential misuse of the payment system and monetary stance for private ends could exceed that of any private money previously seen. If the platform issuer makes a profit from other coin-related activities, it could cross-subsidize the coin and offer an interest rate. Conversely, if the access to additional services enabled by the coin places it in high demand, the issuer may be able to charge a fee for its use. The issuer could adjust the level of interest rates or fees in order to maximize its own profit, instead of aiming for price and output stabilization in countries that use the GSC. [15] The potential for conflicts of interest would be especially large if that company is also a major provider of credit, the demand for which could come to depend upon its own monetary stance.[16]

31. If the GSC has a price stabilization rule relative to a basket of goods sold on the Big Tech's platform, notions of optimal currency areas based on the synchronization of national business cycles could be challenged. Platform-based economic activities and other parts of an economy could experience different trends. The sectors closely associated with the platforms could become a source of shocks to other parts of the economy. Moreover, if the GSC pays an adjustable rate of return, changes to this rate of return may not be aligned with what is required to stabilize other parts of the economy. Nevertheless, adoption of a platform-linked GSC could also offer some benefits that transcend considerations of ease of payment and business cycles, because they take advantage of the mutually complementary activities and data linkages that arise in a digital

[13] Against this cost stands the lower inflation that currency substitution can entail, as the country partly imports the inflation rate of the foreign currency, which is often considerably lower than the prevailing domestic inflation (Edwards, 2001).

[14] See King (1983) and White (1995).

[15] In addition, there could be risks from a private entity having the ability to control (and potentially, limit) citizens' access to engaging in economic transactions using a GSC.

[16] Provision of credit could also increase the riskiness of the stablecoin issuer, endangering the value of the coin.

network's ecosystem, such as tailored offerings of products and services or credit provision based on payment data (Brunnermeier and others, 2019b).

32. The monetary policy implications of global adoption with multipolarity (Scenario 4) depend on whether the multipolarity is characterized by country currency blocs or currency competition within each country. If multipolarity is delineated by blocs of countries, with each country adopting one CBDC or GSC, then the monetary policy implications for using countries mirror those of single-currency adoption. [17] However, in order to attract more countries into their respective blocs and gain seigniorage, CBDC issuers might offer ample swap lines or a monetary policy that internalizes some of its externalities on the using countries.[18] If GSCs have an adjustable rate of return, competitive forces could drive them to similarly take account of business cycle conditions in the countries using their coins. Competition could therefore make each GSC currency bloc more similar to a currency union than to a "dollarized" economy. Nevertheless, as in a currency union, monetary policy could only be tailored to the bloc as a whole and might not be of much help to countries whose business cycles diverge from the average bloc member.[19]

33. Multipolarity could imply that each country witnesses the domestic use of multiple currencies, perhaps because the functions of money are unbundled with different currencies preferred for different functions. [20] The domestic monetary implications of substitution into multiple currencies resemble those of substitution into a single currency, with two exceptions. First, multiplicity could entail diversification benefits. Second, multiple currencies could complicate exchange rate anchoring, if the domestic currency is still in use. Many countries that have experienced currency substitution into a single foreign currency have geared their monetary policy towards limiting bilateral exchange rate movements, to stabilize domestic balance sheets exposed to the foreign currency. But with multiple currencies, exchange rate fluctuations between the foreign currencies would complicate such stabilization efforts.[21]

34. Cross-border use of a CBDC could affect the monetary policy of the issuing country. On the one hand, the issuing central bank could increase seigniorage revenues.[22] On the other hand,

[17] To some extent we already have a situation of multipolarity today: e.g., the dollar is used extensively in Latin America whereas the euro is used extensively in Eastern Europe.

[18] E.g., when the issuer experiences a local recession or overheating, its rate cuts or hikes could be less steep.

[19] Another possible effect of bloc multipolarity is that, due to reduced payment frictions within the bloc, trade creation and diversion could come about, as found for currency unions (Rose and Van Wincoop, 2001). A related question is whether currency unions are likely to lead to increased integration and similarity of business cycles or instead specialization, and hence business cycle divergence, within the bloc (Frankel and Rose, 1997; Krugman, 1993).

[20] An implicit assumption behind this scenario is that the decline in switching costs and the fact that a GSC may offer the bundling of financial and non-financial services can be enough to outweigh the strong network effects associated with the CBDC issued by a reserve currency.

[21] For example, in Lao PDR, the Lao kip, Thai baht and US dollar are in wide use simultaneously. Movements in the exchange rate between baht to dollar would be a challenge. A further complication of a multiple currency environment is that private sector agents need to monitor several exchange rates and frequently adjust price quotations (Keovongvichith, 2017).

[22] Estimates for seigniorage gains by the US Federal Reserve from the accumulation of cash are in the order of 0.1–0.2 percent of GDP (Bernanke, 2016; Chinn and Frankel, 2007). However, when accounting for lower Treasury yields due to foreign ownership of US bonds, US seigniorage revenues could be a multiple of this, although there is no

(continued)

swings in the external demand for the CBDC could drive large movements in capital flows. Whether capital flows associated with the use of CBDC present challenges to the issuing central bank depends on the size and depth of the country's financial markets. Market liquidity could move significantly in response to global capital flows in some reserve currency issuers.[23] This could occur if the issuer's financial markets are shallow relative to the size of its economy or because its economy is fairly small compared to the global economy. Should sterilization fail to stop large swings in flows, a CBDC issuer could experience fluctuations in market liquidity and asset prices that mirror the global demand for its currency.

B. Financial Stability

35. CBDCs and GSCs could create additional incentives for risk taking and raise vulnerabilities, as easier access to foreign currency lowers transaction costs for taking speculative positions. A first question is whether the increased convenience and ease to hold and transact in these new forms of digital money would add additional pressures to the traditional financial stability risks associated with currency substitution, such as funding risks and solvency risks arising from currency mismatch. A further question is whether their use would pose disintermediation risks in normal times and elevate run risks in stressful times. Box 2 discusses the implications of widespread adoption and use of CBDCs and GSCs for the structure of financial intermediation. In addition, confidence crises could arise from cyberattacks, the failure of assets custodians or wallet service providers (e.g., crypto exchanges and/or authorized resellers), or liquidity risk of GSC market makers (FSB 2020). Countries that host GSC arrangements will need to consider whether there are significant liquidity risks, market risks, and operational risks of the GSC arrangement itself, their interlinkages with the local financial systems and spillover effects.

36. A scenario of niche adoption of CBDC or GSC for cross-border payments (Scenario 1) will likely imply small effects on vulnerabilities of the balance sheets of financial institutions. In this scenario, users will likely hold balances of the CBDC or GSC only for transactional purposes. In some cases, individuals could temporarily hold limited balances of the CBDC or GSC as store of value, substituting for bank deposits. The associated modest decline in bank deposits could lead to a moderate increase in funding risk, as banks compensate the loss of deposit funding with other, more volatile, sources. In addition, banks that rely significantly on fees from cross-border payments could experience a reduction in this source of revenue.

consensus estimate for these gains (Cohen, 2012; Papaioannou and Portes, 2008). In the current low interest rate environment, however, these gains are likely to be relatively small.

[23] He and McCauley (2012) argues that the Federal Reserve was concerned in the 1970s about the role of the euro-dollar market in affecting liquidity conditions of the onshore markets in the United States.

Box 2. CBDCs, GSCs, and the Structure of Financial Intermediation

CBDCs, if sufficiently attractive, could disintermediate the banking system by crowding out bank deposits. CBDCs could compete with deposits at commercial banks, for example because CBDCs are considered safer. Commercial banks are key in maturity transformation and credit allocation—functions that the central bank cannot provide efficiently—because they are better at alleviating information frictions and monitoring debtors. However, stronger competition for bank deposits may raise funding costs and depress lending, lowering bank-funded investment. The extent depends on design and use of the CBDC, country- and market features and the responses of the financial system (e.g., Agur, Ari and Dell'Ariccia, 2019; Keister and Sanchez, 2019).

Domestically, adverse effects of CBDC on bank lending will be attenuated if:

- **CBDCs function predominantly as means of payment rather than store of value.** Users may hold relatively small amounts of liquidity in CBDCs if they are mainly used for transaction purposes, deposit-based payments remain competitive, regulation limits CBDC holdings, or the central bank does not pay positive interest on CBDCs.
- **Increased competition for deposits reduces banks' profit margins without raising lending rates.** When banks have monopolistic power in offering deposits, they limit the supply of deposits to keep deposit rates low. CBDC as a competing safe instrument may force banks to raise deposit rates. The increased competition could cut into monopoly rents with potentially limited impact on lending. Andolfatto (2019) and Chiu et. al. (2020) show that higher deposit rates resulting from CBDC competition may result in an expansion of bank deposits and that banks may even expand lending under certain conditions.
- **Banks may make up for lost deposits with other cheap sources of funding.** To back their CBDC liabilities, central banks may invest in assets that directly or indirectly ease funding for commercial banks. Bindseil (2019) illustrates how funds may re-cycle back to commercial banks. Also, monetary policy may respond to limit the rise in bank funding costs. Brunnermeier and Niepelt (2019a) show theoretically how automatic substitution of deposits with central bank funding could keep bank funding constant under certain conditions, achieving the same credit allocation with and without a CBDC. However, central banks may be reluctant to implement such policies, which can have significant impact on the size of their balance sheets and on credit risk.

How might GSCs affect credit intermediation? The choice between bank deposits and GSCs as stores of value would depend on the risk-return profile and on other services that may be linked to the GSC. Internationally, their impact largely depends on whether credit intermediation would be able to create "inside money"[1/] denominated in the GSC's unit of account. Indeed, Big Techs could be competitive in extending credit, as they are in a good position to take advantage of the personal data of potential borrowers generated on their platforms. To the extent that their credit intermediation becomes "bank like" through maturity transformation and other risk-taking, it is likely that they would be required to be licensed and regulated as a bank.

Across borders, CBDCs and GSCs could affect the structure of credit intermediation through at least two channels:

- **Foreign CBDCs and GSCs could lead to currency substitution in the banking system.** However, this does not necessarily reduce credit provision, as many countries that have experienced currency substitution episodes have witnessed extensive provision of both bank deposits and loans in the foreign currency (see Annex II). Matching the denominations of their assets with that of their liabilities, in the foreign CBDC/GSC, allows local banks to hedge currency risks, but may transform it into credit risk if local borrowers lack revenue denominated in the foreign currency.

Box 2. CBDCs, GSCs, and the Structure of Financial Intermediation (concluded)

- **Innovation may reduce cross-border financial frictions and help deepen and integrate international capital markets.** Along with payment efficiency, these new forms of digital money could enable digital and data-dependent technologies like asset tokenization and machine learning. Initial coin offerings, crowd funding and other innovations might boost the efficiency of financial services. Borders amplify information and search frictions - suggesting high potential gains for cross-border financial flows. The rise of these new forms of digital money and associated technologies may complement and improve cross-border financial intermediation, or substitute credit flows intermediated by banks with more reliance on direct financing through capital markets.

While CBDCs and GSCs may hamper bank funding, the extent and overall impact on credit intermediation is less clear cut. Policy responses will need to be country- and market-specific, balance disruption to traditional intermediation with efficiency gains from new technologies and trade off credit market functioning with payment efficiency, financial stability, and other policy goals.

1/ Inside money is backed by private credit and thus in zero net supply within the private sector, as opposed to outside money created by the central bank (see Lagos, 2010).

37. Greater currency substitution (Scenario 2) could add additional pressures on funding and solvency risks relative to those typically observed in partially "dollarized" economies (Gulde and others, 2004; Levi Yevaty, 2006; De Nicolò and others, 2005). The CBDC or GSC could increase the degree of currency substitution in countries that already use a foreign currency, as frictions in access and transacting in this currency are likely to decrease. For instance, foreign banknotes might not be freely available, and cost of shipment from the issuing country can be high, limiting its use as means of payments. With a CBDC or GSC, absent regulatory barriers, availability is limited only by technology. Due to complementarities in the functions of money, higher use as means of payments will likely also lead to higher use as store of value. As individuals substitute domestic bank deposits for the CBDC or GSC as store of value and means of payments, banks would face higher funding and currency risks (Box 2). Banks may also face increased credit risks if they denominate loans in the CBDC or GSC. This is particularly relevant for loans to borrowers with main source of income in the local currency, or whose collateral is denominated in the local currency.

38. Use of foreign CBDC or GSC could lead to higher run risks in stressful times. Mancini-Griffoli and others (2018) analyze the potential impact of CBDC on financial stability in countries that issue the CBDC. They argue that the impact would likely be limited, depending on the design features of the CBDC. However, for many emerging markets and developing countries, a run on the banking system is often associated with a run on the currency or the country (Laeven and Valencia, 2018). In such cases, depositors would be incentivized to move their wealth into foreign assets. The degree of accessibility of foreign assets is an important factor that depositors consider when choosing whether to run on the bank. Another important factor is the availability of lender of last resort support from the central bank that issues the currency. If opening and transferring to a digital wallet is faster and more accessible than opening and transferring to an account in a bank abroad, and considering that emergency liquidity assistance from the issuing central bank may not be easily available, incentives for depositors to run could increase.

39. The GSC ecosystem can also be an important source of risks. All types of conventional risks, including liquidity, market, credit, operational, and cyber, as well risks associated with of GSC

wallet service providers, exchanges and other related market infrastructures, can affect the value of the GSC. Realization of these risks could lead to runs away from the GSC into other safer currencies and assets, potentially leading to the break of the peg between the GSC and its currency of denomination. Such runs could cause potential losses for its holders, raising the volatility of cross-border capital flows, and leading to wider financial stability repercussions. [24]

40. In a scenario of global adoption of a single GSC (Scenario 3), domestic financial conditions would become more influenced by global factors. As the global financial system becomes more integrated, domestic financial conditions of individual countries have been increasingly driven by so-called global financial cycles (Agrippino and Rey, 2020)**.** Widespread adoption of a single GSC could reinforce this trend. Global financial cycles could be associated with perceived changes in the safety and soundness of the ecosystem of the GSC arrangement. They could also be driven by interest rate changes initiated by the GSC issuer. As a result, local regulatory authorities may find it more difficult to constrain boom and bust dynamics. The experience of the euro area, for example, showed that some countries (e.g., Spain) faced important challenges in using regulatory and supervisory tools to contain upward pressures on real estate prices and credit growth, induced by loose financial conditions in the wider euro area.

41. The global adoption of a GSC can give rise to systemic risks due to interconnectedness. Pressures on any component of the GSC ecosystem could quickly be transmitted across borders. This applies not only to "direct" channels pertinent to the cross-border provision of services itself (such as questions on the availability and conditions of services and access to backing funds and reserves), but also "indirect" channels, such as through reputational risk. Failure of a service provider (e.g., resellers, wallet providers, managers or custodian/trustees of reserve assets) in one jurisdiction may lead users in another jurisdiction to question the safety and reliability of the GSC. Ultimately, weaknesses in one jurisdiction could raise risks for the entire ecosystem. This could lead to a potential breakdown of the global payment system where payments worldwide are interrupted.

42. In a scenario of global adoption with multipolarity (Scenario 4), currency competition within a jurisdiction could make local financial conditions more volatile. Low switching costs between CBDCs and GSCs could make the participation in a currency bloc or digital currency area unstable. Nevertheless, competition could foster discipline in risk management in order to maintain the attractiveness of privately issued money in the longer term (Hayek, 1976), although Fernandez-Villaverde and Sanches (2019) argue that currency competition only delivers stability under certain restrictive conditions. Indeed, there is no consensus among economists as to whether historical episodes of currency competition are associated with an improvement or deterioration in financial stability (e.g., White, 1995).

43. Currency competition could create incentives for GSC service providers to take on higher risks to gain market share in the short term. As GSCs benefit from strong network effects, the issuers and service providers would be under significant pressure to compete to capture market share. Therefore, aggressive business models could be a driver of additional risks to the ecosystem.

[24] Some of these risks, such as operational risks arising from providers of wallet services, could also arise with CBDC.

For example, GSC service providers may seek to gain a dominant market position by providing services at a loss (in the short run), with a view to recouping such losses through higher margins in the long run (capturing monopoly rents), taking excessive risks, and/or gaining from a possible subsequent too-big-to-fail subsidy. The emerge of new systemically important institutions and potential anti-competition effects could thus be a source of systemic risk.

C. Capital Flows

44. CBDC and GSC adoption and use could affect gross cross-border capital flows by reducing transaction costs and frictions in international capital markets.[25] International capital markets are not frictionless: there are significant transaction costs and markets are segmented by informational asymmetries or familiarity effects. From an investor's perspective, "plumbing" of market infrastructure may become more efficient because of digitalization of money and payments and the associated asset tokenization. As a result, transaction costs are lower and foreign financial markets could become more accessible. GSCs, if bundled with big data derived from the e-commerce and social networking platforms, could also offer improved cross-border credit analytics and help lower information asymmetries.[26] From a borrower's perspective, a reduction in search and transaction costs could help improve cross-border offerings by banks or reduce the reliance on banks, improve access to international capital markets, and lead to higher financial inclusion of less developed countries or of SMEs across the world. At the same time, a more atomized investor and borrower base could lead to more noise trading and herd behavior.

45. A scenario of niche use of CBDC and GSC (Scenario 1) would likely not affect capital flows significantly, but a scenario of greater currency substitution (Scenario 2) could affect capital flow volatility. These new forms of digital money can be supplied directly by nonresident service providers to a country's residents through the internet. As such, they can be used to effectively conduct a cross-border transfer while bypassing traditional payment systems, through which exchange restrictions and CFMs are typically enforced. The relative ease of acquiring CBDCs and GSCs on the internet make them particularly attractive in regimes where the costs and national regulatory burden associated with traditional payment systems are high. To the extent that their adoption facilitates capital flows or increases capital flow volatility, it may sharpen the "policy trilemma,"[27] complicating the conduct of monetary policy and the management of exchange rates.

46. A scenario of global adoption of a GSC (Scenario 3) could lead to more integrated international capital markets. Adoption of a common GSC would largely remove exchange risks and re-denomination risks. Use of the GSC, if bundled with sophisticated financial instruments, may give households and small businesses easier access to real-time hedging services and improved risk

[25] The purpose of this section is not to predict the impact on net capital flows, which would result from differences in savings and investment, but rather to focus on the drivers of international transactions in financial assets.

[26] Portes and Rey (2005) present strong evidence that there is an important 'geography of information' component in international asset flows.

[27] The "policy trilemma" states that it is not possible to have all three of the following at the same time: a fixed foreign exchange rate, free capital movement and an independent monetary policy.

management. However, the experiences of the banking and capital markets union of the euro area indicate that full integration of financial systems and markets require much more than a single currency.

47. Global adoption of a single GSC could lead to more volatile financial conditions in the short term. For a GSC bundled with social media platforms, there could be higher incidence of herding behavior, panics and noise-trading of financial assets This could reflect two factors. First, information disseminated on social media or other platforms is noisier. Second, the class of investors operating in such environments is arguably more prone to such behavior (small, more noise-traders, etc.). Indeed, the literature on social media/social trading platforms and capital markets find that social media interaction reinforces various psychological biases on trading behavior.[28]

48. A scenario of global adoption with multipolarity (Scenario 4) could create more opportunities for international risk sharing. This would be the case if these CBDCs and GSCs are not correlated, either because the issuing countries have unsynchronized business cycles, or because the units of account of the GSCs are different from the fiat currencies. Furthermore, new classes of safe assets with superior features, such as triple-A rated bonds denominated in the GSC units of account but imbedded with smart contracts that offer attractive risk hedging properties, may emerge. They could offer the opportunity of portfolio diversification and the construction of better hedges against idiosyncratic external risk facing countries. For example, households and small firms in commodity exporting countries could have easier access to financial instruments that help them hedge against volatilities in the prices of the commodity they produce and export. Nevertheless, the emergence of multiple CBDCs and GSCs, while lowering various frictions, could also increase complexity. This could lead to fragmentation in established market and official mechanisms to provide liquidity backstops, hindering the ability to deal with runs and thereby amplifying volatility.

D. International Reserves

49. Digitalization could facilitate cross-border use of currencies, reshaping the demand for and supply of safe assets. While the U.S. dollar may well remain the dominant reserve currency for the foreseeable future, digitalization could allow change to occur more rapidly going forward than previously envisioned. In terms of demand, an uneven pace of technological advances across countries or currency blocs, emergence of alternative cross-border payment rails or a shift to trade invoicing and financial intermediation denominated in a CBDC or GSC, could reposition reserve currencies. In terms of supply, new digital platforms have emerged and achieved global scale in a matter of years, offering alternative networks that digital money may tap into to spur adoption upon issuance. Granting global access through a network of digital wallets could help credible CBDC issuers to achieve a degree of scale and market liquidity that was not previously feasible.[29] The key

[28] For example, Hong and others (2004) and Kaustia and Knüpfer (2012) show that social interactions alter the stock market participation of individual investors. Heimer (2016) presents evidence that social interaction increases behavioral biases such as the disposition effect, which refers to investors' reluctance to sell assets that have lost value and greater likelihood of selling assets that have made gains.

[29] From this perspective, issuing CBDC could make the currencies of smaller countries but with highly credible policy frameworks easier to use as reserves. Anderson and others (2020) outlines the long-term scenarios of the rise (and fall) of a global CBDC and a world with multiple private digital money.

difference is the potentially higher speed of scalability and the possibility that this reduces switching costs out of existing dominant currency networks.

50. Adoption and use of CBDCs and GSCs may alter the incentives for both reserve holders and issuers. The official sector uses reserves as safe stores of value and for ready access to international liquidity. For reserve holders, key drivers of the currency composition of reserves are the size and credibility of the issuers, the currency's usefulness in trade and financial transactions, including foreign exchange intervention, and inertia as safety is reinforced by coordination of beliefs. Anderson and others (2020) compare these drivers in a novel dataset of official reserve holdings and highlight that financial links and inertia have become increasingly important in explaining reserve currency shares. Reserve issuers, on the other hand, need to trade off the potential gains and risks from cross-border use of CBDCs. How these changes will look like depends on how CBDCs and GSCs affect the drivers of reserves in each scenario.

51. Niche adoption of CBDC or GSC for remittances (Scenario 1) would most likely have limited implications for reserves as the unit of account of trade and financial transactions would not change. In this case the CBDC or GSC would serve purely as a conduit for completing cross-border payments, and their value would not become an important relative price that affects economic decisions. Central banks will thus see little need to adjust the composition of their reserves.

52. Greater currency substitution induced by CBDC or GSC (Scenario 2) would lead central banks to increase foreign reserves for precautionary motives. For reserve holders, increased adoption of a foreign CBDC or GSC in trade and financial transactions, especially if paired with greater exposure of financial institutions to exchange rate volatility, may shift reserves into the unit of account of the CBDC or GSC. While the qualitative impact is akin to traditional currency substitution, a potentially faster roll-out of the CBDC or GSC might lower the inertia in reserve holdings observed so far. However, the confidence in reserve issuers, for example their ability to ensure cybersecurity or provide emergency liquidity, would still matter greatly. For issuers, the incentives to supply more safe assets may vary. If internationalization is a policy objective, issuers would at least partially accommodate the shift in demand. Otherwise higher demand could lead to a shortage of safe assets, causing possible side effects such as depressed risk premiums and higher leverage in the financial system (Caballero, Farhi, and Gourinchas, 2017).

53. Widespread adoption of a GSC with an independent unit of account (Scenario 3) could expose an inherent tension between the profit motives of its private issuer and global monetary and financial stability. As the GSC and safe assets denominated in the GSC become established in the global economy, central banks would want to hold safe GSC reserves. However, the GSC issuer may have a conflict of interest in deciding the supply of reserves: the supply that meets the demand may differ from the supply that would maximize the issuer's profits. Even under the current system only a small number of central banks establish swap lines that reduce the need for central banks to hold reserves. Private issuance could exacerbate the problem: it is unclear whether GSC providers would offer swaps to act as lender of last resort or how a chronic shortage of safe assets would be prevented.

54. In Scenario 4 as a few CBDCs and GSCs become widely adopted and compete, reserve holdings could become more diversified. Farhi and Maggiori (2017) suggest that a lot of competition between reserve issuers in a multipolar system is good, but too little competition may be detrimental. With many reserve issuers, total issuance is high but individual issuance is low which protects the issuer' domestic financial stability. However, with few issuers, coordination worsens and instability ensues as investors can quickly substitute away from one reserve asset and towards another. Carney (2019) suggests that a 'synthetic hegemonic currency' backed by a basket of CBDCs could achieve similar benefits to a multipolar world by generating confidence in the underlying CBDCs and thus expanding the supply of safe assets.

55. In a multipolar world, reserve composition could be diversified between or within countries—depending on whether currency blocs form or currencies compete within each country. When a country adopts a single CBDC or GSC, then reserves of the country will mostly be denominated in its currency bloc's unit of account. In contrast, use of multiple currencies by residents could diversify reserve holdings also within countries.

POLICY IMPLICATIONS

A. Macroeconomic Policies

56. Policy makers in countries where incentives to adopt and use foreign CBDCs and GSCs are strong need to decide whether to accept greater currency substitution, or to resist it, either by strengthening monetary policy credibility and/or by restricting their use. Maintaining a sound fiscal position and safeguarding the independence of central banks, supported by effective legal and regulatory measures to disincentivize foreign currency use, offer the best hope to reduce or counter the pressure of currency substitution.[30] When monetary policy is encumbered or ineffective, various combinations of other policy instruments need to be considered under an integrated policy framework (IPF) that encompasses fiscal, macroprudential policies, foreign exchange interventions and CFMs in order to mitigate the impact of shocks.

57. Some central banks are considering issuing their own CBDC as a strategic response to the possibility of currency substitution by a foreign CBDC or GSC. However, if the local currency suffers from instability and provides a poor unit of account, issuing CBDC is unlikely to change that. More broadly, the case for CBDC issuance is likely to depend on country circumstances. Any decision will require careful ex-ante cost and benefit analysis and critical design choices (Mancini-Griffoli and others, 2018; Kiff and others, 2020).

58. When domestic monetary policy becomes encumbered or ineffective, countries will need to rely more on fiscal policy as a macroeconomic stabilization tool. When their business

[30] Although currency substitution tends to be highly persistent once established, several countries have successfully worked to reduce currency substitution. See discussions in Catao and Terrones (2016), and García-Escribano and Sosa (2011).

cycles are not synchronized with those of the currency issuer, the need for fiscal policy to mitigate shocks will be stronger. In the scenario of global adoption of a GSC, it is also unclear if the monetary stance of GSC issuer (i.e., the quantity of issuance, or the level of interests or charges) will be compatible with the need to stabilize business cycles of the local economy. As a result, local authorities will need to secure enough fiscal policy space so that revenue and expenditures policies can be adjusted in response to business cycle conditions while maintaining the long-term fiscal sustainability of the country. In fact, CBDCs and GSCs could also make it more difficult to ensure fiscal sustainability as they could make it easier for citizens to evade financial repression, a tool that governments may increasingly find attractive in a world of high debt. Other policies, including macroprudential polices, foreign exchange intervention and CFMs have specific objectives but could also be used to some extent to help countries deal with macroeconomic shocks in the event they do not have fiscal space.

59. To maintain financial stability, authorities in recipient countries will need to build up capital and liquidity buffers in their financial systems, and secure sources of emergency liquidity assistance. Macroprudential policy should aim at limiting systemic risks stemming from a cyclical build-up of vulnerabilities. If sufficient capital and liquidity buffers have been built up, they could be released to help cushion the economies against large shocks, such as the COVID-19 pandemic crisis. For emergency liquidity support, reserves will need to be kept or contingent liquidity arrangements be set up with the issuing central banks in the case of currency blocs. Similar arrangements will need to be made with the GSC issuer in the case of digital currency areas.

60. For CBDC issuing central banks, they need to consider whether the spill-back effects associated with cross-border use of CBDC are consistent with their domestic policy objectives. In both Scenario 2 and Scenario 4, the issuing central banks need to decide whether it is in their national interest to be the lenders of last resort to those countries that use its CBDC extensively. In terms of monetary policy implementation, there are both benefits and costs. On the one hand, the issuing central bank can benefit from adoption of digital payments: the widespread use of CBDC could in principle allow central banks to lower policy rates below the effective lower bound, thereby strengthening the efficacy of monetary policy in very low inflation environments (Bordo and Levine, 2018). On the other hand, if external demand for their currencies leads to their yield curves being close to the effective lower bound, the central banks will need to be innovative in expanding their monetary policy toolkit. Central banks could also consider the merit of a tiered remuneration structure for CBDCs such that foreign demand for CBDCs would have less interference with domestic monetary policy implementation (Bindseil, 2020).

B. Exchange Restrictions and CFMs

61. Some authorities may choose to restrict the use of foreign CBDCs and GSCs in their countries. This may happen pre-emptively in Scenario 1, as the authorities try to seek to minimize risks of currency substitution; or as an important component of the "de-dollarization" strategy in Scenario 2. Countries that have not liberalized their financial accounts to cross-border capital flows may have no choice but to restrict the use of foreign CBDCs and GSCs if they are not ready for the

level of capital flow liberalization that the unrestricted use of foreign CBDCs and GFCs would imply. Even for countries with a largely open financial account, under certain circumstances, for example during capital inflow surges or large capital flight in near-crisis situations, CFMs might still need to be considered as a tool to help deal with shocks.

62. If country authorities wish to restrict the use of foreign CBDCs and GSCs, they will need to assess to what extent the restrictive measures can be effectively enforced. Restrictive measures on domestic transactions could encompass digital money-related services by resident entities. They could range from tight licensing rules to a total ban. Restrictive measures can be implemented on cross-border payments as well, to mirror existing restrictions on current payments or capital transactions (i.e., CFMs), or to ensure that export revenues are collected in foreign fiat currency. However, circumvention outside the regulated financial sector could undermine the effectiveness of such measures. For example, services can be provided directly by nonresident service providers to a country's resident through the internet.

63. The effective implementation of restrictive measures on both domestic and cross-border use of CBDCs and GSCs would require adequate technological support. The design of digital money should provide for verification of the payor, the recipient and the purpose of the payment. The authorities will need to be in a position to stop the payment if the design does not comply with the restrictive measures. While a deposit-based digital money could in principle address these requirements, there is some uncertainty whether a token-based digital money could be coded in a manner that would allow for such high degree of constraints without leakage. On the positive side, CBDCs and GSCs could in principle be designed to facilitate compliance, where restrictive measures are built into the design or programmed through smart contracts. For example, the transfer of value gets rejected if insufficient balance or the metadata for the transaction to succeed do not meet certain requirements.

64. Authorities will also need to assess whether restrictions on payments in CBDCs are consistent with countries' obligations under international and bilateral treaties, including the IMF's Articles of Agreement. As a form of foreign currency, a ban (or limitation) on the use of a foreign CBDC for current international transactions would not give rise to an exchange restriction under Article VIII of the Articles of Agreements as long as those payments are permitted in other convertible currencies.[31] In addition, the appropriateness of restrictive measures on access to CBDC for capital transactions under the Institutional View on the Liberalization and Management of Capital Flows (IMF, 2012) would depend on country-specific conditions. Additional implications may arise under other international, regional and bilateral agreements (e.g., OECD Codes of Liberalization of Capital Movements, WTO agreements or investment and free trade agreements).

[31] In a scenario where a CBDC becomes a globally dominant currency for cross-border payments, a ban on its use can de facto make it impossible or significantly more burdensome to make payments in fiat currencies, in which case the ban might result in an exchange restriction.

C. Legal Frameworks

65. Various scenarios of adoption and use of CBDCs and GSCs require a careful review of existing legal frameworks. The issuance and wide circulation of these new forms of digital money will likely require amendments to the monetary, central bank, financial, contract, property, insolvency, and tax laws. It is crucial that those changes are analyzed and planned well in advance of their introduction and widespread use. For recipient countries, the legal framework will need to be reviewed to ascertain how it will deal with foreign CBDCs and GSCs. It is a matter of policy to decide how accommodative the legal framework will be to foreign CBDCs and GSCs; if the choice is made to be highly accommodative, legal changes are likely to be in order. Naturally, such changes will need to be coherent with the broader exchange control legal framework of the country.

66. Effective implementation of a robust Anti-Money Laundering and Combating the Financing of Terrorism (AML/CFT) framework is needed in all scenarios to mitigate the risk of digital money becoming a tool for criminal activities. Effective implementation of the Financial Action Task Force (FATF) standards on AML/CFT, including its new standards for virtual assets, is key.[32] It notably includes the establishment of a framework for the licensing or registration of professionals dealing with virtual assets and for risk-based monitoring. Also, it includes measures to ensure that the traditional criminal law framework applies in the context of virtual assets. While some AML/CFT measures, such as transaction monitoring, may be easier to implement in a DLT context, others, such as verification of the identity of the end users, may be challenging. The AML/CFT obligations on countries are broadly the same, regardless of whether a specific asset is used in a cross-border context or not, but the intensity of AML/CFT measures and monitoring varies according to risk, and a cross-border use may call for stronger measures.

67. Care needs to be taken with the design of CBDC to ensure the sound and effective functioning of the AML/CFT framework. In the case of a retail CBDC, AML/CFT measures will be implemented by the participating commercial banks and other service providers, with little changes to the traditional implementation of the AML/CFT framework. In the case of a deposit-based CBDC directly operated by the central bank, however, the central bank itself may need to implement AML/CFT measures, including adequate customer due diligence measures. This may require additional resources and expertise for the central bank. Cross-border adoption and use of the CBDC could further complicate the effective implementation of the framework.

68. GSC service providers will need to be licensed or registered, and to be subject to effective supervision or monitoring. GSCs and their proposed global networks and platforms could potentially cause a shift in the virtual asset ecosystem: Due to their potential mass-market use and greater offerings for person-to-person transfers, GSCs could have serious consequences for AML/CFT. The development and spread of GSCs will therefore need to be monitored and the regulatory responses adapted.

[32] The term 'virtual asset' as defined by FATF refers to a digital representation of value that can be digitally traded, or transferred and can used for payment or investment purposes. The definition of virtual assets does not include the digital representation of fiat currencies, securities and other financial assets that are already covered by the FATF standards. Activities in CBDCs are nevertheless subject to AML/CFT regulation – just like fiat in traditional form, under the FATF standard, with some minor exceptions.

69. Changes to the AML/CFT framework are likely to be necessary and international cooperation will be critical. Whether countries wish to bring activities in virtual assets into the AML/CFT regulatory fold or ban them altogether, amendments to the existing legal and institutional framework may be necessary (e.g., to designate the authority in charge of AML/CFT supervision and/or of sanctioning unauthorized activities). In a cross-border context, dialogue amongst the competent authorities – and in particular AML/CFT supervisors – will be key to ensure that there are no regulatory loopholes and to combat misuse in an effective way.

D. Regulatory Policies

70. The different scenarios of CBDC and GSC adoption do not change the underlying principles for regulation, including that of technology neutrality, but will affect the intensity of the supervisory approach. In all scenarios, regulations will need to be established to preserve financial stability and to ensure sound governance, safety and integrity of payment infrastructure, operational resilience, and consumer protection. Regulation will also need to take into account the actual use and potential abuse of financial instruments and transactions, and their impact on the financial system to support AML/CFT and maintain market integrity.

71. Authorities may need to tailor measures in line with different risk profiles that could arise with CBDC and GSC adoption and use. Since Scenario 1 has relatively little impact on financial vulnerability, no major changes in regulation and supervision are required under this scenario. In Scenario 2 and Scenario 4, borrowers and financial intermediaries could experience greater currency mismatches and increased exposure to foreign exchange market risk; deposits in foreign CBDC could have a different liquidity profile than traditional foreign exchange deposits. In Scenario 3, the main risk is maturity mismatch instead of currency mismatch, as financial institutions may fund their longer-dated GSC-denominated assets with short-term liabilities. Authorities may need to increase capital charges of the GSC-denominated loans, enhance their underwriting standards or impose additional liquidity risk management standards given risks from GSC-denominated funding.

72. The scope of regulation and intensity of the supervisory approach will need to consider how existing financial intermediaries could be affected by GSCs. This is of particular importance where financial intermediaries will be allowed to have GSC exposures on their balance sheet, or even would be allowed to intermediate entrusted GSC client funds (e.g., depending on the existing regulatory framework banks and insurance companies may not be allowed to invest in digital instruments, particularly cross-border). Cases where GSCs include bank deposits as reference assets would also intensify interconnectedness with the financial system.

73. The Financial Stability Board (FSB) has developed a set of high-level principles for the regulation of GSCs. The FSB recommends that relevant authorities should apply comprehensive regulatory requirements and relevant international standards to GSC arrangements. Authorities should cooperate and coordinate with each other, both domestically and internationally, to foster efficient and effective communication and consultation in order to support each other in fulfilling

their respective mandates. In addition, authorities should ensure that GSC arrangements meet all applicable regulatory requirements of a particular jurisdiction before commencing any operations in that jurisdiction, including affirmative approval in jurisdictions that have such a mechanism.

74. The question remains to what extent the high-level recommendations are sufficient. While FSB high-level recommendations have been developed to promote coordinated and effective regulation and supervision of GSC arrangements, they are crafted to accommodate divergent regulatory approaches among members and facilitate their efforts to adjust their existing regulatory frameworks. For example, the existing coordination mechanisms among regulators are currently sector-based. Expanding such coordination mechanisms to be cross-sectoral would require further efforts by the different standard-setting bodies (SSBs) and their members. To address these issues, an overarching multi-sector effort to develop more detailed international principles or international standards would be an important next step, to strengthen international consistency and thus contain arbitrage risks.

75. The potential absence of a traditional "home" supervisor for the GSC ecosystem makes it difficult to achieve effective cross-border coordination. The GSC ecosystem may be comprised by loosely connected potentially specialist entities (such as issuers, custodians, authorized resellers, validators and wallet service providers) and, depending on the design, may not have a single governing body that exercises control over the elements of the ecosystem. In principle, the supervisor of the governance body (or arrangement) would be the "home" supervisor, but this may be more difficult to determine when the governance arrangement only covers some elements and when the ecosystem is very open. The rights and responsibilities of any such 'home' supervisor may also be hard to determine. It may be necessary to identify home/host supervisors on each sub-entity level (such as an exchange or wallet provider), and to spell out clearly the associated co-ordination arrangements.

76. There remain significant challenges to achieving a global consensus on how to regulate the GSC ecosystem. One example is the current distinction in the regulatory treatment of issuers: some authorities are focusing on the potential applicability and extension of securities regulation to GSCs, while others are working to adjust existing payment providers regulation and capture GSC as a type of e-money. Sometimes small adjustments could close differences between diverse regulatory approaches, but it is likely that material gaps, inconsistencies and the potential for regulatory arbitrages could remain unless more detailed international standards or guidance are agreed upon. The emergence of globally consistent regulations to cover other services providers (such as authorized resellers, exchanges and wallet service providers) will be equally challenging.

E. Structural Policies

77. The potential for widespread adoption of GSCs raise important questions over the welfare implications of privately issued monies at the global scale. In both Scenario 3 and Scenario 4, recipient countries could find themselves effectively exposed to the monetary stance related to private companies. The GSC issuers may not optimize relative to the needs of the receipting countries when adjusting interest rates or fees: it is unclear whether the objective of issuing firms will be consistent with stabilizing prices in the areas that use the GSC.

Also, the GSC issuer may not have enough incentives to practice robust governance and risk management, doubts about which could lead to financial instability and volatile capital flows across the globe. These potential problems could become acute when the GSC issuers enjoy a monopolistic position globally.

78. Policies to promote contestability among Big Techs platforms could help mitigate the risks posed by lack of competition and uncertain governance of potential GSC issuers. Effective competition among money issuers, including GSCs, could help alleviate the conflict of interest problems noted above and enhance monetary stability in the longer term (Hayek, 1976; Farhi and Maggiori, 2017). Two key options include data policy frameworks mandating portability of user data and interoperability requirements on payments systems. Without regulation, the GSC issuer has sole control over users' data which makes it harder for other potential entrants to compete in the provision of data driven financial services (Carrière-Swallow and Haksar, 2019 and 2020). This logic, of control of data as a barrier to entry, is what has motivated open banking initiatives around the world requiring financial market incumbents to share customer data with entrants. A similar approach could be considered in the case of payments services provision by Big Techs, whether domestically or across borders. This would reduce the barriers to entry arising from harvesting of customer sourced data and related cross-selling of financial services.

79. There is also the scope to consider approaches that facilitate the interoperability of payments networks. In principle this would help counter network effects as a barrier to entry as competitors would be able to offer tokens, including GSCs, on the Big Tech platforms without having the need to build their own separate networks. This is an area that will require further consideration on implementation and how to balance the private interests of companies that have invested in building large networks, with public interest of greater competition and stability.[33] An important question is whether these types of requirements are enforceable on cross-border networks, and whether international cooperation would be needed.

80. Consumer protection is an important component in promoting competition among new payment service providers. A wide range of unsophisticated consumers will likely be using these new payments instruments, particularly for social media linked GSCs, but even for retail CBDC. Any significant use will require consideration of issues such as adequacy of disclosure, anti-fraud protections, suitability requirements, etc.

CONCLUSIONS

81. As the pace of digitalization accelerates, the landscape of international finance will likely be in a state of flux. Payments and financial services provision will likely become increasingly integrated with the digital economy organized through the internet and mobile phones. While

[33] The experience of the development of the so-called India stack is an interesting example of a possible approach to some of these challenges. The stack offers a combination of public infrastructures (digital ID and settlement) as well as common standards for interoperability that has led to a the development of a contestable domestic fast payments network with participation by many global technology companies (see Carriere-Swallow, Haksar and Patnam (2020) for a discussion).

digital technology can quickly spread internationally, and the rise of new forms of digital money could lead to a more efficient and a more integrated global financial system, monetary policy effectiveness could be affected and sovereign governments might have to use various policy tools to maintain monetary and financial stability, including fiscal, macroprudential policies, and CFMs. This also includes a robust legal framework, which plays a critical role in allowing instruments to acquire official status as a legally accepted means of payment and has a major impact on their use.

82. This paper elaborates on the Bali Fintech Agenda by focusing on the macro-financial implications of CBDCs and GSCs across borders. A key issue in the Bali Fintech Agenda (IMF 2018) is the need to balance opportunities and risks in managing the emergence of new forms of digital money. This paper has demonstrated that country authorities will likely face important challenges in doing so. To help illustrate these challenges, the paper has presented a few hypothetical and stylized scenarios of CBDC and GSC adoption and use, analyzed their macro-financial consequences, and discussed policy implications. It finds that the implications of CBDC and GSC adoption and use are scenario specific. Overall, the paper finds that CBDCs do not qualitatively change the economic forces that lead to the international use of currencies but quantitatively they could reinforce the incentives behind currency substitution and currency internationalization. GSCs that do not represent independent units of account are similar to CBDCs in terms of monetary effects but could affect financial stability as they may suffer from bouts of confidence crisis. GSCs that represent new and independent units of account could have more fundamental impact on global monetary and financial stability.

83. For the countries that adopt foreign CBDCs and/or GSCs, the main challenge is how to preserve macroeconomic and financial stability without forgoing the benefits of more efficient cross-border payments and better access to international capital markets. The balance may differ from country to country, depending on the patterns of business cycle synchronization. Also fiscal policy space and the availability of other tools for stabilization will be important. For countries whose economic activities are tightly integrated with those of the CBDC issuing country, macroeconomic stabilization does not necessarily require an independent monetary policy. For countries with larger fiscal space and capital and liquidity buffers in their financial systems, fiscal policy and macroprudential policies could play a larger role in mitigating shocks, tilting the balance of benefits away from monetary independence to those from financial integration.

84. For countries that adopt GSCs issued by Big Tech platforms, they will have a strong interest in ensuring that the GSC arrangement has robust governance and risk management. They will need to develop mechanisms to ensure that the GSC issuer's profit maximization objectives do not jeopardize monetary and financial stability. Policies that promote competition among Big Tech platforms and interoperability between different types of GSCs could help mitigate some of these concerns but require further work.

85. Countries that issue CBDCs need to carefully consider the costs and benefits of allowing nonresidents to use their CBDCs. Access by nonresidents could help firms and households in the issuing country better manage risks (e.g., by issuing debt denominated in their

own currency) and improve the breadth and depth of the issuing country's financial markets. But to the extent that they increase financial integration before financial development has reached a relatively advanced stage, this could increase risks from exposure to global shocks. At the global level, currency competition induced by the rise of CBDCs and GSCs and emergence of new classes of safe assets could lead to improved options for risk-sharing in the longer term, but could also make policy coordination more difficult in the short-term.

86. The implications for the IMF of the emergence of CBDCs and GSCs will require further analysis. Issuance and cross-border use of CBDCs have important spillover and spillback effects across the IMF membership. With its universal membership and mandate for safeguarding international monetary and financial stability, the IMF is uniquely positioned to consider such effects in both bilateral and multilateral surveillance, and in capacity development. In terms of services to its members, questions may arise as to whether the IMF can play a role in enhancing cross-border payments and promoting the safety and soundness of CBDCs and GSCs. These questions will need further research by the staff and discussion with other relevant stakeholders. Ongoing and planned analytical and policy work by staff focuses the benefits and risks of CBDCs; data policy frameworks; the regulation and supervision of stablecoin issuers and service providers; the role of digital money in fostering financial inclusion and, in turn, its macroeconomic effects; and legal issues relating to the rise of CBDCs and GSCs.

Annex I. Current Landscape of Cross Border Use of Currencies

1. International transactions have been dominated by the U.S. dollar. Despite the United States representing just 10 percent of global trade and 15 percent of world GDP, the U.S. dollar is the invoicing currency for 50 percent of global trade. Two thirds of global securities issuance are in dollars, and 75 percent of cross-border bank claims and public debt by emerging markets and developing countries are denominated in the U.S. dollar. It accounts for about two thirds of official foreign exchange reserves, while around 45 percent of forex trading involves the U.S. dollar. (Figure A1 presents various indicators of use of international currencies). [1]

2. The U.S. dollar is also used extensively for domestic transactions in some countries. The situation in which a foreign currency displaces a domestic currency is referred to as currency substitution. This can come about as a policy choice, when country authorities choose to grant the foreign currency domestic legal tender status (for example in Ecuador, Kosovo, and Liberia). Alternatively, in many countries the foreign currency de facto partially or fully displaces the domestic currency in the payment system or financial sector, irrespective of authorities' objectives. These countries are typically referred to as (partially) "dollarized". Currency substitution often occurs against the backdrop of unsound domestic macroeconomic policies and a lack of trust in policy institutions. Annex II provides stylized facts on the extent, dynamics, and persistence of currency substitution, as well as a discussion of its drivers.

3. Currency use across the globe is supported by an infrastructure of cross-border payments. Since the transacting parties reside in different physical locations, cross-border payments are typically made in the form of transfers of deposit balances, held in banks connected through correspondent banking relationships. Correspondent banking is an arrangement whereby one bank (correspondent) holds deposits owned by other banks (respondents) and provides those banks with payment and other services. The global network of correspondent banking is a multi-layered clearing and settlement system, shaped not only by available payment technologies but also legal and regulatory requirements and restrictions. In the past decade, there has been a broad-based retreat of cross-border correspondent banking relationships, although some countries were affected more than others (IMF, 2017; Rice and others, 2020). The withdrawal of correspondent banking relationships notably reflected increasing costs associated with tighter AML/CFT requirements.

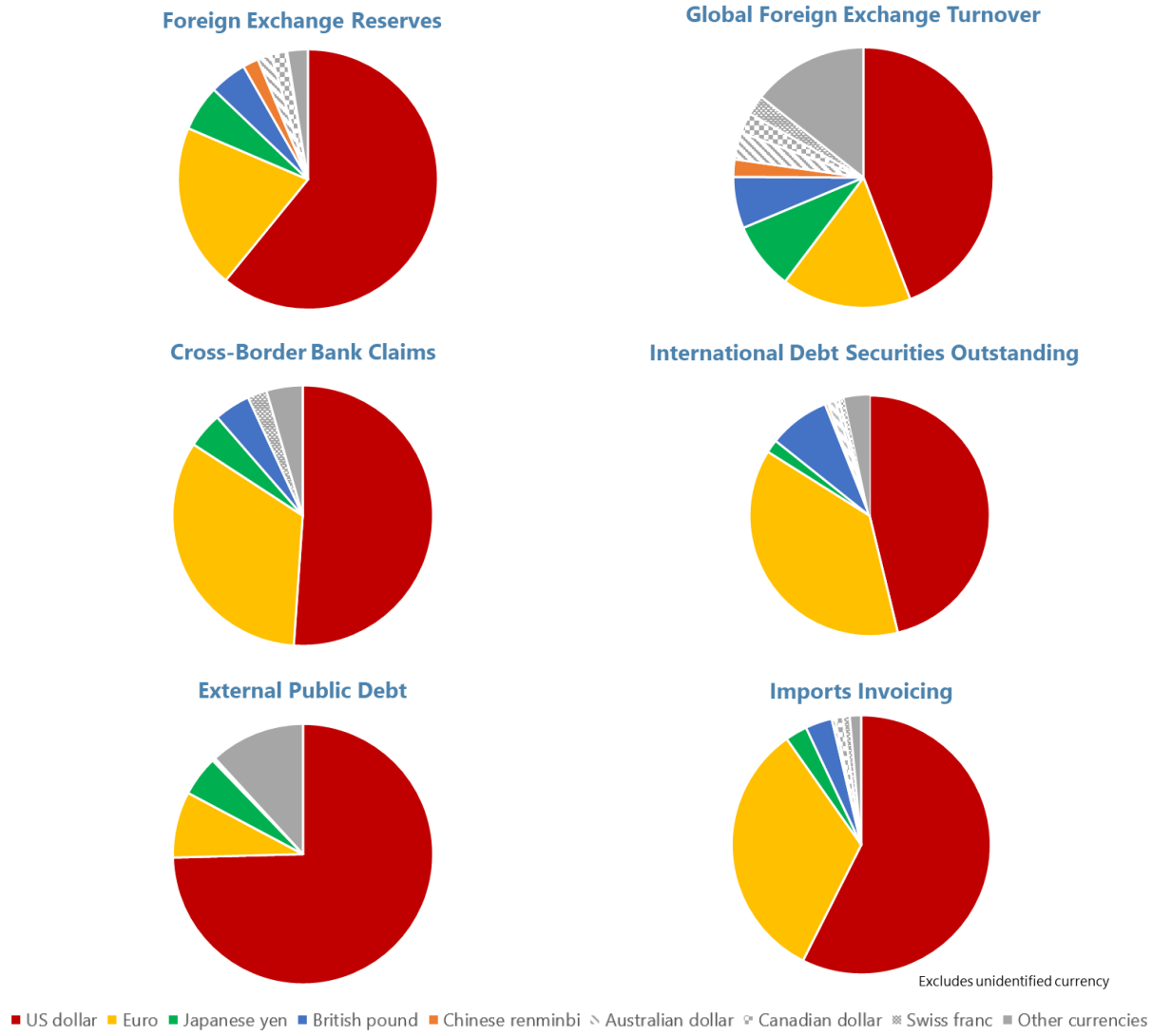
4. Cross-border payments have high transaction costs, particularly at the retail level. Factors behind these costs include fragmented data standards, complexities in undertaking AML/CFT compliance checks, limited operating hours, outdated legacy platforms, high funding costs, long transaction chains, and weak competition. Such frictions have resulted in high fees, slow speed and low transparency in cross-border payments. The global regulatory community has paid increasing attention to these issues (e.g., He and others, 2017; CPMI, 2018). A concerted global effort coordinated by the Financial Stability Board is underway to take actions to improve the efficiency of

[1] See also Boz et al. (2020).

cross-border payments, in part as response to the rise of GSCs as a solution to remove frictions in cross-border payments (CPMI, 2020; FSB 2020b and 2020c).

Figure A1. Currency Composition of Reserves, Foreign Exchange Turnover, Financial Claims, and Trade Invoicing, 2019 or Most Recent

(In percent)



Sources: Anderson and others (2020).

Notes: External public debt data are for end-2018; invoicing data are averaged across all years for which data are available between 1999 and 2014 for 49 countries (Gopinath, 2016); and foreign exchange turnover comes from the BIS Triennial Central Bank Survey conducted in April 2019. The remaining figures use data for end-2019. The figure on foreign exchange reserves shows the shares in allocated reserves reported under COFER, with unallocated reserves being the difference between the total foreign exchange reserves in the IFS and the total allocated reserves in COFER. The figure on external public debt includes only EMDCs. A further breakdown of currencies is not available for external public debt and cross-border bank claims.

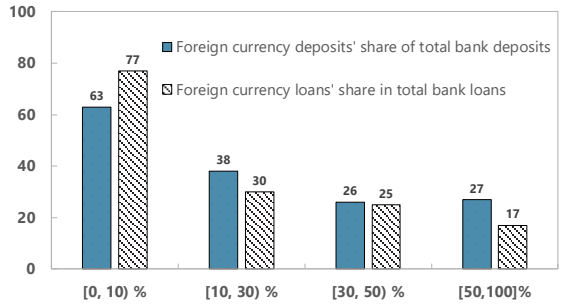
Annex II. The Extent and Dynamic of Currency Substitution

1. How currency substitution unfolds depends on which functions of money a foreign currency can perform better than the domestic currency. When the domestic currency is a poor store of value, households and firms will prefer to hold financial assets and liabilities denominated in a foreign currency.[1] This is the most prevalent form of currency substitution, and often includes domestic bank deposits (Bannister et al., 2018). If banks on-lend their foreign currency deposits, this further results in credit denominated in the foreign currency, implying a significant correlation in the extent of currency substitution in terms of deposits or loans (Figure A2. chart B). If instead the attractiveness of a foreign currency stems from its value as a medium of exchange, currency substitution tends to focus on the payment system. For instance, in Cambodia, currency substitution initially centered on the medium of exchange function (Odajima, 2017). Such currency substitution in the real economy sees local wages and prices set in the foreign currency. Extensive use of a foreign currency as a medium of exchange therefore also implies its use as a unit of account. However, in some cases the unit of account function, in the form of wage or price indexation, can substitute for use of a foreign currency as a medium of exchange (Kokenyne and others, 2010).

2. While most countries around the world exhibit low levels of currency substitution, in close to one third of countries currency substitution exceeds 30 percent of deposits/loans (Figure A2. chart A). This is calculated for a sample of 154 (149) countries that report data on foreign currency deposits(loans) to total deposits (loans).[2] Foreign currency use exceeds half of total deposits in 17 percent of countries, and exceeds half of total loans in 11 percent. The countries with high levels of currency substitution are all emerging or developing economies.

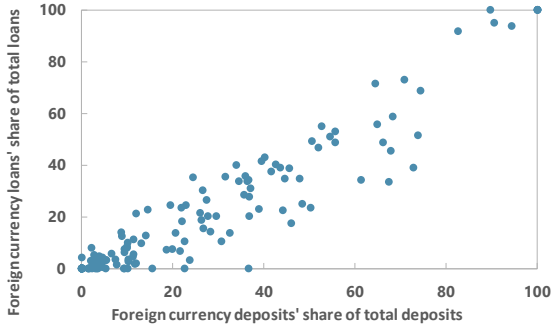
Figure A2: Stylized Facts on the Extent of Currency Substitution

Chart A: Currency substitution around the world
(number of countries in given ranges)



Sources: Bannister et al. (2018), IMF SRF, and author calculations. Includes all SRF-reporting countries: 11 advanced economies and 143 developing countries.

Chart B: Comparing currency substitution in deposits and loans
(in percent)



Sources: Bannister et al. (2018), IMF SRF, and author calculations. Dots represent the most recent (annual) observation per country.

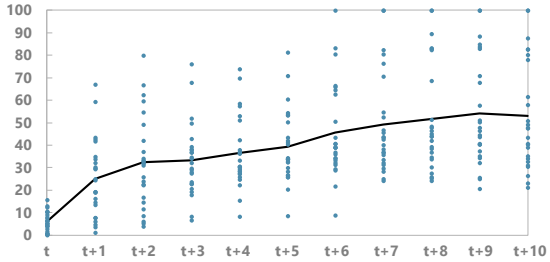
[1] This assumes that foreign denominated holdings in the financial system are legally allowed in the country. If not, currency substitution could take the form of physical storage or capital outflows.

[2] This dataset contains two countries where a foreign currency is the only legal tender (Ecuador, El Salvador), two countries where both the domestic and a foreign currency are legal tender (Liberia, Panama) and one country where foreign currencies were legal tender during the sample period, but are no longer (Zimbabwe).

3. Currency substitution can happen rapidly and, once entrenched, the domestic usage of foreign currency tends to be highly persistent. In the wake of economic crises or major political transitions, the speed of foreign currency adoption can be high. The chart on adoption dynamics, based on the experience of twenty-five countries that underwent currency substitution episodes, highlights that countries where the use of foreign currency is initially limited, can witness a rapid emergence of such use, with foreign currency deposits on average rising from the single digits to above thirty percent of total bank deposits in the space of two years. Following a currency substitution episode, habit formation among households and firms often ensues. The foreign currency becomes a vehicle of trust, providing insurance against the recurrence of macroeconomic instability, implying a high persistence to currency substitution. In the chart, all countries that experienced currency substitution episodes remain with a higher level of foreign currency use at the end of the ten-year period than at the outset, and the average extent of foreign currency use plateaus rather than reverts.

Currency substitution: adoption dynamics

Line: Average foreign currency deposits in percent of total bank deposits.
Dots: country observations.



Note: Includes 25 country cases of currency substitution since 1975, with starting year normalized to t. Sources: Bannister et al. (2018), IMF SRF, Levy Yeyati (2006), and author calculations.

Annex III. Glossary of Technical Terms[1]

Asset tokenization: a process through which a real tradable asset is represented in a digital form, for example on a blockchain, where it acquires new properties, such as the ability to trade a fraction of the asset or implement other programmable actions.

Blockchain: a growing list of records, grouped in a chain of blocks, that are linked using cryptography. It is a type of distributed ledger technology that uses a specific consensus mechanism to update the records of financial and other types of transactions.

Cloud computing: the on-demand availability of computer system resources, especially data storage and computing power through the internet, typically made available by third-party service providers.

Coins: digital tokens used for payments.

Crowdfunding: the practice of funding a project or venture by raising many small amounts of money from a large number of people, typically via the internet.

Cryptoassets: digital representations of value, made possible by advances in cryptography and distributed ledger technology.

Distributed Ledger Technology: a database that is stored, shared and synchronized on a computer network. Data is updated by following rules of achieving consensus among the network participants. While blockchain is a type of distributed ledger technology, the latter does not necessarily maintain its record using the same chain of blocks architecture.

Initial Coin Offering: a type of funding using cryptoassets through which a quantity of cryptoassets is sold to investors on the internet, in exchange for a stake in the company, or in anticipation to a return on investment in the cryptoasset. It is often a form of crowdfunding.

Machine Learning: an application of Artificial Intelligence that provides systems the ability to automatically learn and to determine on its own how to make improvements from experience.

RegTech: the use of technology to manage regulatory processes within the financial industry through technology. The main functions include regulatory monitoring, reporting, and compliance.

Smart contract: a computer program or a transaction protocol which is intended to automatically execute, control or document events and actions according to the terms of a contract or an agreement. Smart contracts are often associated with distributed ledger technology.

SupTech: the use of innovative technology by supervisory agencies to support supervision. In other words, it's the technologies for the regulators and supervisors themselves.

Tokens: digital representation of a claim, either on a specific issuer or on underlying assets or funds, or some other right or interest, that can be transferred over a peer-to-peer system without necessarily going through a central party to effect settlement.

[1] This glossary does not represent official definitions of the terms by the IMF. It serves as an informal guide to the technical terms used in this paper.

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