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CENTRAL BANK DIGITAL CURRENCY—INITIAL CONSIDERATIONS

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CENTRAL BANK DIGITAL CURRENCY—INITIAL CONSIDERATIONS

September 29, 2023

EXECUTIVE SUMMARY

This paper briefs the Executive Board on staff's initial considerations on central bank digital currency (CBDC). Key messages include:

- The landscape of CBDC exploration is diverse – some central banks are proceeding rapidly while others are moving more slowly or adopting a wait-and-see approach.
- If designed, implemented, and regulated appropriately, CBDC has the potential to modernize payment systems and support demand for central bank money even if alternative digital means of payment are rapidly adopted.
- However, the decision to explore and potentially even launch CBDC should remain jurisdiction specific, depending on policy objectives and domestic circumstances such as the degree of digitalization, the structure of the financial system, legal and regulatory frameworks, and the central bank's own capacity.
- A dynamic decision-making framework can help guide central banks in their CBDC exploration. At least six elements should be considered in such a framework, including policy objectives, design choices, capacity assessment, stakeholder engagement, macro-financial risks and implications, and legal and regulatory issues.
- To build trust in CBDC, robust institutional, legal, and technological safeguards should be adopted to protect user privacy while ensuring compliance with anti-money laundering and counter-terrorism financing (AML/CFT) standards.
- CBDC development also needs structure and flexibility. A phased and iterative approach over five steps, including preparation, proof-of-concept, prototype, pilot, and production, could allow central banks to adjust the pace, scale, and scope of their CBDC projects.
- The impact of CBDC on monetary policy transmission and financial stability will depend on design features and characteristics of the economy. Transmission could strengthen, though probably not by much.
- CBDC could facilitate cross-border payments and provide an alternative channel for capital flows. Capital flow management measures (CFMs) can be built into CBDC, allowing for automation and greater efficiency, though raising some operational risks.
- If designed to mimic the ease of use and trustworthiness of cash, and accompanied by policies facilitating adoption, CBDC could help promote financial inclusion.

These messages are drawn from a wave of five IMF Fintech Notes on CBDC published in September 2023. The messages thus do not offer a comprehensive view

on CBDC. The Fintech Notes will be edited into the initial chapters of a CBDC Handbook after incorporating comments by the international community, including on this paper.

The planned virtual CBDC Handbook will address the most frequently asked questions related to CBDC and serve as a basis for capacity development (CD). The questions are bundled into five priority areas: (i) policy objectives and operational framework of CBDC; (ii) foundational requirements and readiness to issue CBDC, such as legal considerations, cyber resilience, central bank governance, and regulation and supervision; (iii) CBDC design processes, considerations, and choices; (iv) project approaches and technology; and (v) potential macro-financial impacts of CBDC.

CBDC Fintech Notes and Handbook chapters are prepared in close collaboration with member countries and other international organizations. Staff follows a three-step approach: (i) develop Fintech Notes on CBDC topics to seek comments inside and outside the IMF; (ii) brief the IMF Executive Board on key themes extracted from the Fintech Notes (as done in this paper); and (iii) subsequently publish Handbook chapters, in this case after the 2023 Annual Meetings.

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Acronyms and Abbreviations

AML/CFT	Anti-Money Laundering and Counter-Terrorism Financing
BIS	Bank for International Settlements
CBDC	Central Bank Digital Currency
CD	Capacity Development
CFMs	Capital Flow Management Measures
EMDE	Emerging Market and Developing Countries
IMF	International Monetary Fund
IMS	International Monetary System
MCM	Monetary and Capital Markets
PSP	Payment Service Provider

INTRODUCTION

1. **CBDC is digital money issued by central banks.** Central bank money in retail form today is cash. Central bank money in wholesale form today are reserves held electronically by eligible financial institutions in central bank accounts. Their digital equivalents amount to CBDC. Retail CBDC is accessible to the general public through “digital wallets”, and wholesale CBDC, instead, they would be available just to financial institutions, much like reserves, though would be held and exchanged using a different technology such as digital ledgers optimized to be programmable, immutable, and widely shared. While the emphasis in this paper is on retail CBDC, its wholesale counterpart is mentioned at times.
2. **CBDC can contribute to the efficiency and stability of domestic and international payment systems.** CBDC could modernize payment systems, increase resilience of payments, and – in a digital future in which cash is no longer the primary means of payment – help anchor the general public’s trust in money. CBDC could foster financial inclusion, and spur competition and innovation. Further, CBDC could improve the speed and transparency of cross-border payments, facilitate access, and lower costs.
3. **However, there is no “one-size-fits-all” approach to CBDC.** The field remains new, raising many unanswered questions. Benefits will vary with country circumstances as well as design choices, implementation, and regulatory and legal frameworks. CBDC might not be the right approach for all jurisdictions. Ensuing risks must also be mitigated, such as effects on the commercial banking sector as well as operational and reputational risks for the central bank. CBDC exploration should be careful, iterative, and methodic.
4. **In April 2023, IMF staff informed the IMF Executive Board about the plan to prepare a CBDC Handbook (IMF 2023).** The Handbook will serve as the basis for staff’s engagement with country authorities in CBDC CD and be a reference for policymakers and experts at central banks and ministries of finance, particularly in emerging market and lower income countries. About twenty chapters will be published over the next four to five years, with chapters produced and likely updated each year. The Handbook will offer information, experience, policy lessons, empirical findings, and frameworks to evaluate CBDC. The CBDC Handbook will be a “living” document reflecting evolving experiences, findings, and policy views.
5. **An initial wave of CBDC Handbook chapters is slated for publication just after the 2023 Annual Meetings.** These will be based on five Fintech Notes published in September 2023. Drafts of the Fintech Notes were shared with country authorities for comments, to ensure that insights and lessons from around the globe were accurately reflected. The five Fintech Notes are:
 - “How Should Central Banks Explore CBDCs? A Dynamic Decision-Making Framework” (Soderberg and others 2023) proposes a decision-making framework to help central banks systematically evaluate CBDC given existing uncertainty.

- “A Guide to CBDC Product Development” (Tourpe and others 2023) introduces a methodology to assist CBDC product development teams to deliver the requirements and respond to queries of policymakers.
- “Implications of CBDC for Monetary Policy Transmission” (Das and others 2023) reviews likely effects of CBDC for monetary policy transmission.
- “Capital Flow Management Measures in the Digital Age: Design Choices for CBDC” (He and others 2023) discusses how CFMs could be implemented with CBDC, and what benefits, risks and complexities could arise.
- “CBDC’s Role in Promoting Financial Inclusion” (Lannquist and Tan 2023) discusses implications for financial inclusion and provides a step-by-step framework to evaluate design choices.

6. This paper summarizes the main messages. The findings and conclusions of these initial papers are preliminary and will evolve, also as other chapters are written. For instance, monetary policy effects will depend on banking disintermediation, itself a topic that will be treated more fully in the financial stability chapter. Likewise, implications for financial inclusion may be revised once the chapter on data frameworks and privacy will be written.

CURRENT INTERNATIONAL LANDSCAPE

7. Interest in CBDC is global. Recent surveys have provided insights into the widespread exploration of CBDCs as well as the reasoning behind it. The Bank for International Settlements’ (BIS) most recent CBDC survey found that 93 percent of central banks engaged in some form of CBDC work (Kosse and Mattei 2023).¹ The Atlantic Council (2023) separately tracks CBDC developments and indicates that 130 countries, representing 98 percent of global GDP, are exploring a CBDC.

8. The landscape of CBDC exploration is diverse – some countries are proceeding rapidly while others are moving more slowly or adopting a wait-and-see approach. Reasons, approaches, and progress of countries’ CBDC projects differ.

9. Three jurisdictions have officially launched CBDC: The Bahamas, Jamaica, and Nigeria. The Bahamas launched in December 2020, while Nigeria and Jamaica did so in 2021 and 2022, respectively. Early experiences suggest that CBDC adoption is a gradual process with many challenges that need to be addressed. These central banks are continuously making tweaks to their CBDC projects to improve performance and stimulate adoption. Meanwhile, risks discussed in the literature have not materialized in these countries, in part due to careful design.

¹ The 86 central banks responding to the BIS survey represent 82 percent of the world’s population and 94 percent of global economic output.

10. Some central banks are devoting large resources to exploring CBDC. The Euro System is proceeding with explorations around the digital euro and aiming to finalize the investigation phase by October 2023. China is conducting a large-scale CBDC pilot in several regions, with hundreds of millions of wallets having been downloaded. Brazil and India are also actively piloting CBDC projects.

11. In contrast, a few central banks have paused their CBDC exploration. After an early CBDC pilot in 2018, the central Bank of Uruguay decided to scale back its work. Likewise, the Central Bank of Kenya stated that CBDC is not a compelling short- or medium-term priority, but that it will continue to monitor CBDC developments overseas.

12. International organizations are also partaking in CBDC exploration by spurring and coordinating discussions, and engaging in technical experimentation. The BIS Innovation Hub conducts multiple technical experimentations in collaboration with national central banks (BISIH 2023). Recent examples include Project Polaris that tested offline payment solutions involving CBDC, and Project Icebreaker – conducted together with the central banks of Sweden, Norway, and Israel – that explored ways to use retail CBDC for cross-border payments. The IMF and World Bank have an active capacity development (CD) program on CBDC, including bilateral missions, regional workshops, and training. And all institutions are contributing to pushing the frontier of CBDC exploration with analytical papers, including with the BIS' Committee for Payments and Market Infrastructure (CPMI) in the context of the G20 Roadmap to enhance cross-border payments.

13. The IMF is ideally positioned to share lessons on CBDC exploration, including through the CBDC Handbook, however tight collaboration with other organizations will remain essential. The IMF's near global membership and involvement in CD offer a privileged position to become aware of the needs, questions, and projects of countries. But staff remains committed to continuing to interact closely and transparently with other organizations, including on joint working groups, papers, and missions where expertise from around the world should be brought to bear.

INITIAL CONSIDERATIONS FOR CBDC EXPLORATION

14. The remainder of the paper summarizes the main findings from the initial wave of Fintech Notes intended to become virtual Handbook chapters. This section focuses on CBDC exploration, offering a framework to guide the work of central banks. A first subsection on why central banks might explore CBDC is more conceptual, while a second subsection on how central banks should approach their experimentation is more practical. The next major section shifts the focus to macro-financial implications of CBDC, another topic of particular interest to countries.

A. Why Might Central Banks Explore CBDC?

15. Jurisdictions exploring CBDC differ in their objectives: some attempt to solve existing problems, others aim to prepare themselves for a more digital future. Some jurisdictions intend to use CBDC to address existing pain points and pressing challenges, such as high costs of domestic payments. Other jurisdictions are primarily looking to prepare themselves for the future in which cash may be much less prevalent, and large – possibly foreign – stablecoin or other payment

instruments become more prominent and possibly incompatible with one another. We refer to this approach as “future-proofing” – ensuring that central bank money continues to define the unit of account and remains the ultimate settlement asset. Future-proofing means that CBDC can be explored even without concrete plans for imminent issuance.

16. CBDC could help promote financial inclusion. Currently, financially excluded populations mostly use cash. And yet, CBDC can be designed to replicate desired properties of cash. For instance, CBDC could be used without a bank account for those holding and transacting small amounts. It could have low or no fees for small transactions and apply less stringent identification requirements to accommodate low-risk populations lacking formal identity documentation. CBDC could even be designed to operate offline, to accommodate rural areas with patchy connectivity. Also, as a direct liability of the central bank, CBDC should be trusted – more so than commercial banks about which rural populations may be skeptical. Once adopted by the financially excluded, CBDC can serve as an entry point to the broader formal financial system.

17. CBDC could promote competition in payment systems and help reduce cost of payments. In some countries, payments systems are dominated by a few large firms extracting high rents, and not always offering compatible services. In those cases, CBDC could discipline the market to offer better and cheaper services, and increase innovation. It could also serve as a backbone to offer interoperability as payment service providers (PSPs) could settle claims against each other in CBDC.

18. CBDC could also serve as a “back up” for other digital payment systems and thus strengthen resilience. Digital payments could become vulnerable to disruptions from cyberattacks, power outages, and different forms of malfunctions. Cash serves as a useful alternative when payment systems are temporarily out of order, however can be cumbersome and is not well adapted to e-commerce and other digital environments. Furthermore, in some jurisdictions, cash use is diminishing rapidly. CBDC could be designed as an alternative payment system, and one that is operationally independent from other payment systems. As such, it would stand a good chance of being up-and-running as a “back up” in a severe disruption. In addition, CBDC could be designed from the outset to be more resilient than other payment systems, for instance through incorporating new offline technologies and ensuring high cybersecurity readiness.

19. CBDC could make domestic currency more attractive and help safeguard monetary sovereignty by countering currency substitution and “cryptoization” (IMF 2021). While weak macro fundamentals (e.g., absence of sound macroeconomic policies and robust institutions) remain the core reason for currency substitution, factors such as ease of use and network effects can help to exacerbate adoption of a foreign currency (IMF 2020). Jurisdictions wishing to reduce or avoid currency substitution could issue their own CBDC to increase the attractiveness of the domestic currency though effects are likely to be marginal. Similarly, CBDC could help counter the use of crypto assets, such as stablecoins, to the extent these are used to facilitate payments, especially across borders.

20. CBDC could bolster the role for central bank money, and thus of key central bank functions in an environment of diminished cash use. Central bank money is available to the

public today as cash. Importantly, people can always convert other forms of money such as bank deposits into cash. Cash thus offers a risk-free store of value (and a relatively efficient means of payment), but also the ultimate “bridge” between two bank accounts, clearly signaling whether the exchange can be done at par. This feature illustrates a point that is largely taken for granted: cash is the representation of a country’s unit of account, much like the prototype meter bar was the basis for the metric system. If cash would no longer be available for the public, these features might disappear or be weakened. Might confidence in bank accounts become more fickle if they cannot be converted to cash, and might a foreign or novel unit of account more quickly take hold without cash? The implications are uncertain, but could be far-reaching. The concern is shared among various policymakers (Bank of England 2023, Lagarde and Panetta 2022, Ingves and others 2022). CBDC may be a way to ensure continued availability of, and demand for, central bank money in the future.

B. How Should Central Banks Explore CBDCs?

21. Exploring CBDC is a significant undertaking that involves complex decisions and considerations in a rapidly changing digital environment. Most central banks have little experience operating CBDC, dealing with a consumer product (and potentially interacting with end-users), and leveraging the novel technologies developed for payments by fintech startups. Further, some central banks face resource constraints and have exposure to a limited set of service providers.

22. A dynamic decision-making framework would help central banks as they explore CBDC. A “dynamic” approach means one that is adaptable, iterative, and responsive to the rapidly changing digital and policy landscape. This differs from other central bank initiatives in areas where much experience has been gained internationally and the degree of uncertainty is lower. In those cases, a cost-benefit analysis is easier to establish up front, and subsequent time can be devoted to implementation.

23. The exploration of CBDC involves two distinct yet interconnected scopes of work. The first, led by a team of policymakers (called here the “policy management” team), focuses on evaluating CBDC and establishing strategic requirements (more below). Then the product development team implements, tests, and validates the requirements set by the policy management team. These two teams operate in unison. A two-way dialogue is beneficial to ensure that requirements are implemented, but are also informed by what is technically possible.

24. The policy management team is encouraged to consider at least six elements in the decision-making framework. These include: (i) policy objectives; (ii) assessment of risk and impact; (iii) capacity for experimentation and implementation; (iv) stakeholder engagement; (v) feature requirements; and (vi) legal and regulatory considerations.

(iii) capacity for experimentation and implementation; (iv) stakeholder engagement; (v) feature requirements; and (vi) legal and regulatory considerations.

25. First, policy objectives must be clearly defined and prioritized. Policy objectives (discussed in the last subsection) should be consistent with central bank mandates which differ across jurisdictions, and should recognize domestic conditions. A clear and detailed view of a country's main objectives is key to inform design choices down the road, and evaluate the success and risks of a pilot project. That is not to say that objectives cannot change as countries learn about CBDC and further reflect on their conditions. However, the process should be transparent and explicit.

26. Clearly specified policy objectives should be accompanied with well-defined criteria of success. These criteria should be specified early and used to evaluate the CBDC project at regular intervals. Different policy objectives will be associated with different success factors. For instance, objectives on financial inclusion would call for metrics on adoption rates, while objectives on payment system resilience would not necessarily require high adoption but rather uninterrupted availability of CBDC in stressful scenarios.

27. Second, central banks should establish a clear view of macro-financial risks. One key issue is potential bank disintermediation to the extent CBDC competes with bank deposits. Another is the increased risk of bank runs in time of financial distress as concerned depositors convert their deposits into risk-free central bank money. The relevance of these risks depends on the structure and overall health of the banking sector, and the existence of a credible deposit insurance, as well as features of CBDC such as its remuneration and caps on wallet holdings (more on this below). Without proper safeguards, countries should be wary of issuing CBDC. Countries should assess the degree of contestability and resilience of the banking sector and conduct stress-testing exercises consisting of different scenarios of CBDC adoption. A Handbook chapter on the implications of CBDC for financial stability is being planned that will delve deeper into these topics.

28. The analysis of macro-financial risks also provides input to the design process. Bank disintermediation and digital run risks could warrant the decision to put caps on holdings of CBDC. Likewise, designing CBDC with no remuneration (e.g., zero interest rates) could limit its attraction as a store of value and reduce disintermediation risks.

29. Third, central banks should assess their capacity to explore and potentially issue CBDC. Capacity covers a jurisdictions' overall digital infrastructure as well as financial resources and in-house expertise including project management, engineering or information technology (IT), cybersecurity (a topic that will be explored in an independent chapter given its importance), design, communications, operations, legal services and regulation, and oversight. In case a resource gap is identified, the central bank must decide how to bridge it. Typically, three options are available: partner, hire, or grow capacity internally from existing teams involved in payments operations and oversight, IT, and legal services.

30. Fourth, central banks should identify key stakeholders and prepare a strategy to engage with them. Key stakeholders include the public sector – for instance government bodies such as ministries of finance – and the private sector such as PSPs, merchants,

and end users. Stakeholders can provide information on challenges that CBDC could address, desired design features, and risks to be mitigated. Further, CBDC adoption will rely on building trust with stakeholders. Finally, the choice to proceed with CBDC in most countries will lie with elected officials or possibly even end users. So it is important for the central bank to facilitate a constructive and well-informed public debate. Possible engagement activities include bilateral meetings, consultation papers, town hall meetings, focus groups, and surveys. Activities should be tailored to the needs and technical knowledge of stakeholders. The importance of a clear and comprehensive communication strategy around CBDC from the very start of the project cannot be overstated, given likely sensitivities among the public and the many technical elements that can be misunderstood.

31. Fifth, the policy management team should lay out key feature requirements. These should be based on the first four steps, namely to meet objectives, attenuate risks, reflect internal and infrastructural capacity, and support user needs. Feature requirements fall in four categories: (i) mandatory principles, including compliance with laws and regulations, and basic security features; (ii) high-level operating model including the role of the central bank and the private sector as in a “two-tier” model where the central bank issues and redeems CBDC and the private sector distributes it and provides payment services; (iii) key functionality to satisfy user needs and policy objectives, such as offline payments to bolster financial inclusion; and (iv) interconnection features to ensure compatibility of CBDC with third party wallets, other financial and social services, foreign CBDC, and other external services to build the CBDC ecosystem.

32. Importantly, feature requirements should be high-level, flexible, and adaptable to changes in the payments landscape and user needs. Feature requirements should remain high-level and not preclude nor assume a specific technology and user-interface. Moreover, requirements may change over the course of CBDC exploration. For instance, innovators may spur new use cases or interoperability requirements, and user expectations may evolve.

33. Sixth, CBDC issuance and distribution require a sound legal basis and robust regulatory foundations as well as effective and independent institutions. As putting in place these pillars takes time, central banks should start early, possibly during the CBDC investigation phase, before a decision to issue CBDC has been taken. Lawyers are encouraged to be involved in the design of CBDC from the beginning. The key issues to be considered are the legal basis to issue CBDC, the supervisory and regulatory framework to support CBDC operations, the legal amendments necessary to give CBDC transactions legal certainty, the laws and regulations related to technology-based data security and the measures necessary to ensure appropriate accountability and transparency over the central bank’s role (Bossu and others 2020). Cross-border use of CBDC would entail additional legal challenges that need to be carefully addressed. Additionally, CBDC issuance also requires a strong rule of law with effective, well-functioning, and independent institutions to ensure appropriate protection of rights and mitigate risks of corruption, fiscal domination, and subjugation of CBDC issuance. Effective supervision is also needed to ensure compliance with the regulatory framework.

34. Central banks must also take measures to safeguard financial integrity. Existing money laundering and terrorist financing vulnerabilities must be assessed as a start, and addressed with proper mitigating measures, such as customer due diligence, record-keeping, reporting of suspicious transactions, and implementation of targeted financial sanctions. Weaknesses in a country's AML/CFT regime may otherwise be exacerbated by an improperly designed CBDC. Countries should also assess implications of CBDC issuance for supervisory and law enforcement authorities, including their capacity and expertise. Thoughtful CBDC design can align with the Financial Action Task Force standards and support the application of AML/CFT preventive measures.

35. Relatedly, to build trust in CBDC, robust institutional, legal, and technological safeguards should be adopted to protect user privacy while ensuring compliance with AML/CFT standards. Payments involve a significant amount of data including on transaction parties, amounts, and purpose. Users will likely have strong preferences for who should collect this data, store it, and use it. Some may trust the public sector, while others will prefer the private sector to be involved to benefit from services leveraging the data, such as cheaper access to credit. Preferences for privacy will vary by country and social groups. The degree to which CBDC preserves privacy will thus strongly affect adoption, while CBDC projects can be misunderstood as an attempt by the government to control payments. Open and transparent communication with the public about privacy protection is thus key, as is the choice of CBDC technology to limit those who have access to data. Importantly, further requirements come from the need to fully comply with international AML/CFT standards. But the type and volume of data that need to be collected vary depending on the level of ML/TF risks – less information may be required of those posing lower risks, such as by transacting and holding small amounts of CBDC, to foster financial inclusion for instance. Access to data will also vary depending on the authorities' needs. For example, law enforcement agencies may need to have access to some data during an investigation. Considerations related to data use and privacy protection are still just emerging. A full chapter will be dedicated to this topic in later iterations of the CBDC Handbook.

36. As the policy management team navigate these six elements of CBDC exploration, it should be in close touch with the product development team. Large projects often follow a well-established sequence. Once product requirements are established, the product development team researches, experiments, develops, tests, and eventually operates a product in line with the original requirements. This linear approach works relatively well when the goals of the project are clear, when proven technology is readily available, and a wide range of experience exists among technology providers, consulting firms, and clients. However, when a project is continuously evolving or when value is unproven, as is often the case for CBDC, these steps are still necessary but are difficult to follow in a linear process. Thus, close collaboration and iteration among the policy management team and the product development team are essential such as to revisit product requirements on the basis of technological experimentation.

37. And further iteration and flexibility are needed in product development itself. Development can be split into five phases (called "5P") which nonetheless should be iterative, meaning

that findings and insights gained should feed back into the process, allowing for continuous refinement and improvement, and that any phase can be revisited during the process.

38. The 5P methodology is based on global best practices in project management and covers the following five phases:

- a. The *preparation* phase is where the policy management team is most active and where the six elements of the earlier framework are initially established;
- b. The *proof-of-concept* phase uses small-scale empirical tests and validation activities to understand various aspects of CBDC requirements, typically in a lab environment;
- c. The *prototype* phase focuses on the development or acquisition of the technologies and the selection of relevant partners;
- d. The *pilot* phase is the live test of a product being considered for issuance. The 5P framework clarifies that a pilot is not a research and experimentation phase. Instead, it involves a real-world assessment of the readiness of a product;
- e. Finally, the *production* phase covers issuance and operation.

39. A crucial aspect of the 5P methodology is the criteria to move to a subsequent phase or return to a prior phase, known as "go/no go" checkpoints in project management. At the intersection of two phases, the central bank has four options: (i) stay in the same phase, iterate to continue learning or building; (ii) move forward to the next phase; (iii) move forward with some elements that are ready, but stay in the same phase for some other unresolved questions; or (iv) pause or stop the project. The go/no go checkpoint is crucial to ensure that all relevant stakeholders are aligned, information is shared, lessons are learned, and responsibilities clearly taken. The criteria for moving from one phase to the next, as well as who should be involved in such decisions, should be agreed early in the process, and regularly updated as new findings and information emerge, including from global research on CBDC. Data relevant to go/no go decisions should be gathered throughout the process. While specific criteria are needed, decisions should generally hark back to the elements established by the policy management team. Only if the CBDC seems able to satisfy objectives, minimize risks, and leverage capacity should the project continue.

40. Central banks should postpone costly or final decisions until they have gathered sufficient information. The above suggests that exploration should be methodic and rigorous, and that decisions should occur only once sufficient information is gathered. It is thus perfectly possible to explore CBDC without having decided to issue one. In fact, the decision to issue should not be taken in haste nor on the basis of incomplete information. The proposed framework encourages starting with low-cost and rapid activities to validate or invalidate initial assumptions. As the project progresses through different phases and decision points, central banks will gradually build their capacity to develop and test a robust CBDC, or to discard CBDC as not sufficiently aligned with objectives and risk management requirements. In fact, clear information and decision criteria will help avoid criticism of policy failure if, and when, a project is halted. Generally, central banks should clearly communicate their decisions and rationales to the public.

C. Macro-Financial Implications of CBDC

41. This section summarizes the main messages from the Fintech Notes covering macro-financial implications of CBDC. Three notes are relevant: one on monetary policy transmission, another on capital flow management measures, and a third on financial inclusion. Each subsection below corresponds to one of these topics.

Monetary Policy Transmission

42. CBDC could affect monetary policy transmission through its potential impact on key parts of the macroeconomic environment. Changes in the macroeconomic environment may affect both the tightness of financial conditions (upon CBDC issuance) and the transmission of monetary policy through its usual channels: the interest rate, bank lending, asset price, and exchange rate channels.

43. CBDC could affect countries' macroeconomic environment in three main ways. CBDCs can increase competition for deposit funding which could increase banks' share of wholesale funding, and lower bank profits. CBDC also has the potential to bolster financial inclusion (see further below) and thus increase the share of the population with access to interest bearing instruments set by monetary policy. Similarly, CBDC could also encourage a greater use of local currency, instead of foreign denominated digital money or crypto assets. Depending on country circumstances, these effects could be large.

44. Changes in the macroeconomic environment induced by CBDC issuance could lead to level changes in the monetary policy stance. For instance, increased competition for bank deposits, increased wholesale funding, and lower bank profits would tighten financial conditions. On the other hand, increased financial inclusion could loosen financial conditions. Decreasing dollarization/cryptoization has an ambiguous impact on financial conditions. The central bank should closely monitor these effects so that it can adjust its policy instruments to keep the stance of monetary policy unchanged.

45. Moreover, CBDC has the potential to strengthen the channels of monetary policy transmission. De-dollarization/de-cryptoization is likely to amplify all transmission channels. Increased competition for bank deposits could strengthen the interest rate and bank lending channels. The pass-through from policy rates to deposit rates is stronger when banks have less market power. Increased wholesale funding would strengthen the bank lending channel, as wholesale funding costs tend to be more sensitive to the central bank's policy rate than retail deposits. Higher levels of financial inclusion can strengthen the interest rate, asset price channels, and lending channels if households have greater access to interest-sensitive borrowing and saving instruments.

46. The impact of CBDC on monetary policy transmission will depend on design features. For instance, most central banks exploring CBDC are considering precautionary design features such as non-remuneration, and limits on CBDC holding and transactions. Such features would limit bank disintermediation. However, when policy rates are low and there is financial market stress, the impact

of CBDC on monetary transmission could be more significant. Moreover, an unremunerated CBDC could entrench the zero lower bound for interest rates as households and firms would prefer holding CBDC rather than negatively yielding bank deposits (Jamet et al. 2022). Also, CBDC would not bear the storage costs that apply to physical cash, raising the effective lower bound (Armeliu et al., 2018).

47. CBDC may also have implications for monetary policy operations. In a mid-corridor system targeting a market rate, CBDC demand can move erratically and thus complicate the forecasting of liquidity necessary to optimize open market operations. However, central banks would likely learn to forecast more accurately over time and have tools to smooth unexpected liquidity demand. Otherwise, monetary policy operations would continue largely unchanged with CBDC. Central banks should be able to affect term spreads through communication as before, such as by releasing and discussing their interest rate projections. Similarly, central banks should be able to retain control of interest rates on reserves, to the extent that the retail CBDC is not available for interbank payments.

48. The size of the central bank balance sheet could grow considerably but is unlikely to have a meaningful impact on monetary transmission. If CBDC replaces deposits to a large extent and central banks' demand for government bonds increases to meet high CBDC demand, there could be price impacts which can affect the yield curve, though available evidence from similar shifts suggests these would be marginal (Williams 2011). Naturally, in countries with much smaller government bond markets, the impact of CBDC on the yield curve could be greater. There would also be implications for seigniorage revenue — the income to the central bank from holding assets with a return higher than the cost of liabilities. Bindseil (2016) argues that a large balance sheet increases seigniorage. However, Hall and Reis (2015) point to the risks (interest rate, foreign exchange, and default) from a larger balance sheet which boils down to higher leverage. Losses could undermine the central bank's independence (Ishi and others 2011).

49. There could be a significant impact on monetary policy autonomy if a foreign CBDC were available domestically. Foreign CBDCs could increase the risk of currency substitution. CBDC can also amplify the international spillover of shocks and increase international linkages. If a domestic CBDC could be held in large quantities abroad, the domestic central bank balance sheet could be subject to large fluctuations connected to changing external demand (possibly related to currency and/or bank runs). These fluctuations may have potential effects on market liquidity and the availability (and price) of domestic safe assets which could undermine monetary policy. Further complications to financial stability and central bank operations could also follow (He and McCauley 2010).

50. In general, unless holdings of CBDC are very large, the effects on monetary policy transmission are expected to be relatively small in normal times. The strengthening of transmission channels via increased competition and wholesale funding relies on a significant substitution of bank deposits for CBDC which may not materialize. The impact of financial inclusion is also uncertain and constrained by the relatively small share in overall savings and lending of the financially excluded populations, particularly in more advanced economies. The impact of de-dollarization/de-cryptoization may also be small if CBDC does not effectively increase the attractiveness of local currency.

Capital Flow Management Measures

51. In the digital age, CFMs can continue to be part of the broader policy toolkit to help countries reap the benefits of capital flows while managing associated risks. CBDC does not imply a cause to revise the IMF’s “Institutional View” on Liberalization and Management of Capital Flows which considers CFMs to be appropriate only under certain circumstances and only if they do not substitute for warranted macroeconomic adjustment (IMF 2012, 2022). Accordingly, country authorities will need to consider how CFMs could be implemented with CBDC, and what benefits, risks and complexities could arise, either because they plan to issue a domestic CBDC that can be used to buy foreign assets, or because they expect a foreign CBDC to be accessible to domestic entities. Also, design choices should take into account the need for CFMs to be relaxed or removed in the process of liberalization in line with IMF’s revised Institutional View (IMF 2022). Still, this does not imply that issuance of CBDC necessarily requires the implementation of CFMs.

52. CBDC can be designed to implement CFMs if countries find these warranted. By exploiting automation and digitalization of information, CFMs can be implemented within a CBDC ecosystem at different levels of the architecture. The CBDC ecosystem includes user interfaces such as wallets, underlying technology allowing for basic functions such as transferring and recording property rights, and platforms that might connect CBDC with foreign currencies. CFMs can be implemented at each of these levels, with ensuing costs and benefits. These will depend on the characteristics of desired CFMs. For instance, different types of CFMs require varying amounts of information, and flexibility, such as to be quickly implemented in the face of a crisis.

53. Thanks to the programmable nature of CBDC payments, certain CFMs could be implemented more efficiently and effectively than in today’s environment. Traditional CFMs are usually handled manually by staff at financial intermediaries involved in cross-border transfers. New technology, incorporated from the outset in CBDC design, allows for information processing to be automated. These “smart CFMs” could lower costs of monitoring, compliance, disclosure, and leakages. Still, operational risks may rise given the novelty of technologies.

54. Implementing CFMs on foreign CBDC requires central banks to collaborate on practices and standards. In the case of foreign CBDC circulating domestically and absent collaboration between central banks, a domestic central bank may need to resort to alternative policies to implement CFMs, such as banning access to foreign CBDC wallets and related applications, with potentially limited effectiveness.

55. CFMs on CBDC would need to operate alongside traditional CFMs. While CBDC represents one way to access or receive foreign assets, remaining channels will continue to exist, such as through correspondent banks. Coordination will be necessary to ensure consistency of CFM enforcement among these different rails, avoid loopholes, and preserve overall effectiveness of CFMs. This might require the streamlining of some CFMs so that they can be equally implemented in the digital and traditional form.

56. Jurisdictions also need to consider additional complexities associated with CFMs. Privacy concerns could arise. Implementation of CFMs requires extensive information, some of which

may need to be stored in data repositories owned by the central bank or financial intermediaries, to fully exploit automation. However, if information-requisition necessary to implement CFMs is perceived to be overwhelmingly intrusive, users may move towards less regulated alternatives. It is therefore important to strike a balance between privacy protection and risk management.

57. Operational risks from “smart CFMs” could arise and need to be explored further in operational settings. The automation of CFMs reduces the risks linked to human interventions, including slow processes, inability to scale, and human errors. However, several challenges need to be properly understood and mitigated in the design and governance of smart CFMs, including the management of software bugs, outages, cyber resilience, and contingency plans. Experimentation with CBDC will need to find the right balance between efficiency gains and risk management.

58. Issues surrounding the legal framework of smart CFMs warrant further careful investigation. When implementing smart CFMs, jurisdictions would first need to undertake a careful analysis of the legal and regulatory framework underlying CFMs. For instance, smart CFMs do not replace FX legislation relative to CBDC use in cross-border transactions. In addition, for CFMs to become self-executing, the legal framework will need to clearly assign the relevant powers, rights, and responsibilities of all parties.

Financial Inclusion

59. Financial inclusion is a key policy objective that central banks, especially those in emerging and low-income countries, are considering for retail CBDC. About 60 percent of emerging and low-income countries see financial inclusion as one of the top three motivations for issuing CBDC (Kosse and Mattei 2023). Globally, 1.4 billion people remain outside of the formal financial system, and tackling this challenge is a top priority in many regions.

60. Financial inclusion can contribute to poverty reduction, stimulate economic growth, help reduce income inequality, and enhance financial stability. However, financial inclusion may or may not be an explicit component of a central bank’s mandate. In some countries, it is an implicit or supportive component as part of ensuring sound and efficient payment systems, implementing effective monetary policy, or guaranteeing universal access to domestic payments and a store of value.

61. CBDC has potential to promote financial inclusion. CBDC can gain acceptance among financially excluded populations if properly designed. For instance, CBDC can be designed so that small transactions require no or low fees and allow for the application of simplified customer due diligence measures where appropriate. CBDC could even be designed to operate in offline environments. As a direct liability of the central bank, a CBDC would also be as trusted and risk-free as physical cash.

62. CBDC can then serve as an entry point to the broader formal financial system. CBDC would allow households to send and receive funds from other digital financial service providers more efficiently, expanding their access to a broad array of products and services (including savings,

insurance, and credit) that could meet their needs and improve their financial wellness. Additionally, CBDC-based transaction data could be sent to credit providers or other financial service providers in place of collateral or a more formal credit history when needed.

63. CBDC should be designed to address the barriers to financial inclusion that exist in the country in question. These can include barriers related to cost, infrastructure availability, onboarding, and trust. To improve financial inclusion, CBDC should generally be available at very low or no cost with no minimum balance requirements, and compatible with a variety of hardware devices and potentially in an offline environment, and have a simple and intuitive user interface. Tiered wallets (with lower limits on CBDC holdings and transactions) could also allow identification requirements for certain low risk and financially excluded populations to be relaxed.

64. Complementary policies to address digital exclusion can help maximize the potential of a well-designed CBDC: (i) implementing digital literacy programs is essential to equip individuals with the skills and knowledge necessary to navigate such a digital service effectively (Cooper et al. 2019); (ii) developing digital infrastructure; (iii) increasing access to mobile phones; and (iv) establishing digital ID.

65. However, CBDC alone is not a panacea to financial inclusion. CBDC and its supporting policies can address several barriers to financial inclusion, but other barriers remain. Such barriers include low financial literacy, cultural factors (e.g., gender norms), and low trust in formal financial institutions (for saving, credit, and insurance products).

66. Therefore, countries are considering other solutions, such as fast payment systems and e-money schemes, aimed at promoting financial inclusion. Unless these solutions offer the exact same advantages as CBDC, they should not strictly be considered as alternatives but rather as complements to CBDC.

67. CBDC has unique properties and may offer additional features that other solutions may not provide. These include: (i) CBDC should be more trustworthy as central bank money; (ii) CBDC is a public sector-led initiative which can be provided at lower cost, improve efficiency, ensure interoperability and operational resilience; (iii) CBDC could offer an open and widely accessible system as a form of public infrastructure that is widely interoperable; (iv) CBDC can help hedge against operational risks from private service providers; (v) CBDC may offer offline payments and programmability.

68. The suitability of CBDC as a tool for improving financial inclusion must be carefully assessed on a country-specific basis. Each country's conditions and drivers of exclusion must first be thoroughly understood. CBDC's value proposition then relies on the extent to which CBDC can be designed and supported by complementary policies to address the country-specific barriers where there are significant gaps.

CONCLUSION AND NEXT STEPS

69. This paper briefs the Executive Board on staff's initial considerations on CBDC stemming from five Fintech Notes. If appropriately designed, CBDC has the potential to improve payment systems and support a role for central bank money even as other digital payment solutions proliferate. But the appropriateness of CBDC will vary with country circumstances. Given the complexities and the novelty involved, policymakers need to explore CBDC carefully and systematically. This offers initial guidance to policymakers on how to explore CBDC and investigate its macro-financial implications.

70. A second wave of Fintech Notes and CBDC Handbook chapters will be published in 2024. Again, topics will be chosen on the basis of country needs and feasibility. Possible topics include financial stability; CBDC distribution, incentives, and adoption; the relationship between CBDC and other payment systems; cross-border payments; cyber security; and implications for data frameworks and privacy protection.

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