



# FINTECH

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## NOTES

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### **Central Bank Digital Currency Adoption** Inclusive Strategies for Intermediaries and Users

Tayo Tunyathon Koonprasert, Shiho Kanada,  
Natsuki Tsuda, and Edona Reshidi

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**FINTECH NOTE**

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## **Inclusive Strategies for Intermediaries and Users**

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September 2024

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**Central Bank Digital Currency Adoption: Inclusive Strategies for Intermediaries and Users**

Note 2024/005

Prepared by Tayo Tunyathon Koonprasert, Shiho Kanada, Natsuki Tsuda, Edona Reshidi\*

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# Contents

<b>I. Thinking about Central Bank Digital Currency Adoption .....</b>	<b>1</b>
<b>II. Understanding the CBDC Ecosystem.....</b>	<b>6</b>
<b>III. Preparing for CBDC Adoption .....</b>	<b>10</b>
Regulation.....	11
Education.....	17
Design and deployment.....	21
Incentives.....	26
<b>IV. Policy Considerations .....</b>	<b>32</b>
<b>V. Concluding Recommendations.....</b>	<b>35</b>
<b>Annex 1. CBDC Adoption Questionnaire Findings .....</b>	<b>36</b>
<b>Annex 2. Sample KPIs for CBDC Adoption .....</b>	<b>46</b>
<b>Annex 3. Existing Market Structures Relevant for the CBDC Ecosystem .....</b>	<b>48</b>

## FIGURES

1. Stakeholders within the CBDC Ecosystem.....	6
2. The REDI Framework for CBDC Adoption.....	11

## BOXES

1. Stakeholder engagement on CBDC in Peru .....	9
2. Digital ruble fees for businesses in Russia .....	16
3. Leveraging creative content to educate users about UPI in India .....	18
4. Issuing a consultation paper on the digital pound in the U.K.....	19
5. Deploying Sand Dollar Ambassadors in The Bahamas.....	20
6. Testing offline eAUD payments on campuses in Australia.....	22
7. Making e-CNY wallets available to short-term visitors in China .....	23
8. Scaling P2P payments and beyond via Swish in Sweden.....	25
9. Paying employee benefits with e-Rupee in India.....	25
10. Providing incentives to boost JAM-DEX adoption in Jamaica .....	31

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## Glossary

AML .....	Anti-money laundering
API.....	Application programming interface
B2P.....	Business-to-person payments
BCRP .....	Banco Central de Reserva del Peru (Central Bank of Peru)
CBDC .....	Central bank digital currency
CBOB .....	Central Bank of The Bahamas
ECB .....	European Central Bank
ECCU .....	Eastern Caribbean Currency Union
FAQ .....	Frequently asked question
FPS .....	Fast payment system
G2P .....	Government-to-person payments
KPI.....	Key performance indicators
KYC .....	Know your customer
NFC .....	Near-field communication technology
P2P.....	Person-to-person payments
POS.....	Point of sale
PSP .....	Payment service provider
UPI .....	Unified payments interface
UX/UI.....	User experience/user interface

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# I. Thinking about Central Bank Digital Currency Adoption

In recent years, central banks worldwide have been exploring retail central bank digital currencies (CBDC),<sup>1</sup> driven by varying policy objectives. CBDC can generally be defined as a digital representation of a nation's fiat currency, issued and regulated by the central bank. Jurisdictions may see CBDC as a policy tool to improve financial inclusion, a means to enhance payment resiliency and competition, a springboard to facilitate cross-border payments, or an obligation to provide safe, sovereign money to citizens.

Realizing these policy objectives, and to some extent avoiding risks, hinges on attaining sufficient levels of adoption and managing it over time. For instance, a jurisdiction aiming to foster financial inclusion might prioritize the adoption of CBDC in rural or underserved areas, focusing on easy access and user education. In contrast, a country seeking to enhance the efficiency of its payment systems might concentrate on integrating CBDC within its existing financial infrastructure, ensuring seamless interoperability with other payment methods. However, a country may limit the extent to which CBDC may be held to attenuate bank disintermediation, requiring measures which may be challenging to keep up in the longer term. If adoption is not adequately managed, CBDC projects may not deliver the anticipated benefits or justify the investments made.

Central banks should not take for granted that CBDC, once launched, will be adopted and scaled up easily. Among the countries that have launched CBDC or are conducting large-scale pilots, adoption remains slow and limited. However, this slow uptake is expected initially and does not suggest that interest in CBDC is low, or that CBDC should be seen as a failure.<sup>2</sup> Rather, multiple barriers to adoption may stand in the way, such as a lack of public awareness and trust, privacy protection concerns, preference for existing instruments, and lack of appropriate incentives for attracting intermediaries. These challenges underscore the need for central banks to proactively engage stakeholders in the CBDC ecosystem to facilitate adoption, going well beyond simply creating the CBDC product.

CBDC inherently faces hurdles to be adopted. Unlike fast payment systems (FPS), which primarily augment existing payment infrastructures, CBDC requires users to adopt new types of accounts distinct from traditional banking or e-money accounts.<sup>3</sup> This shift demands significant changes in users' understanding and behavior, extending beyond simple transactional improvements to encompass how

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<sup>1</sup> This note does not cover wholesale CBDC. Wholesale CBDC is limited to a set of predefined user groups, typically banks and other members of national payment systems, whereas retail CBDC is widely accessible to the public. The reason for a focus on retail CBDC is that offering digital central bank money to the public adds a layer of complexity in terms of appropriately designing strategies to encourage adoption among consumers and merchants. Additionally, cross-border CBDC usage and its implications are not covered in this note.

<sup>2</sup> The adoption rate of new technologies and innovations does not tend to be linear. Rather, adoption is slow at first, then rapidly rises before flattening out again as it reaches market saturation. This pattern of growth is often referred to as the S-curve.

<sup>3</sup> A forthcoming IMF Fintech Note titled "Positioning CBDC in the Payments Landscape" will discuss retail CBDC versus FPS.

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and where people choose to keep their money. Also, CBDC presents a potential threat to the traditional business models of existing financial institutions, particularly in deposits and loans. This potential for disintermediation may make intermediaries reluctant to engage with and support CBDC initiatives.

Moreover, CBDC faces a classic chicken-and-egg problem, where adoption by consumers is dependent on the participation of merchants.<sup>4</sup> In the retail payments market, coordination problems are common and seemingly useful products can fail if stakeholders hesitate to adopt them, fearing others will not. Central banks, as the leading entity and owner of the CBDC initiative, can take a proactive role to align expectations and guide stakeholders toward a consensus. Monteleone and others (2024) highlight the pivotal role of central banks in championing FPS adoption—a role that is equally relevant to CBDC.

Given this backdrop, this note encourages policymakers to consider CBDC adoption from the start as an integral part of the project, offering guidance to support and manage adoption based on country case studies. The note argues that successful CBDC adoption hinges not only on technical readiness and operational robustness, but also on strategic policy and design choices that target end-user and intermediary involvement from the outset. Moreover, the note proposes a novel framework, referred to as the “REDI Framework,” which discusses different regulatory strategies, education and communication initiatives, design and deployment choices, and incentive mechanisms that central banks can use to prepare for CBDC adoption.

The path toward CBDC adoption is not universal; it requires a strategic approach adapted to the unique circumstances of each jurisdiction. The policy tools discussed in this note to favor adoption will tend to be more effective if implemented together. For instance, providing incentives to end-users may be more effective when coupled with educational initiatives on the benefits of CBDC. However, not every policy will be applicable or relevant across all jurisdictions. Many of the discussions raised in this note would also equally apply to FPS adoption.

To support the analysis, a CBDC Adoption Questionnaire was sent to central banks and monetary authorities in March 2024, to gather policymakers’ initial thoughts on facilitating CBDC adoption. The responses received represent jurisdictions of diverse geographies and in varying stages of CBDC exploration, providing valuable insights on how central banks are currently thinking about adoption goals, stakeholder engagement, incentives, and cost recovery. Responses have been incorporated into the note and a summary of findings is presented in Annex 1.

The note is structured as follows. The remainder of this section discusses how CBDC adoption can be measured and ongoing challenges of CBDC initiatives. Section II gives an overview of the CBDC ecosystem and approaches for engaging stakeholders. Section III presents a high-level framework on adoption strategies. Section IV highlights policy considerations associated with adoption. Section V presents concluding recommendations.

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<sup>4</sup> For more details: [Central Bank Digital Currency Adoption: A Two-Sided Model](#).

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## Measuring CBDC adoption

CBDC adoption can be broadly defined as the extent and manner in which CBDC is utilized by end-users and intermediaries within a given jurisdiction. Adoption can be measured through several key dimensions that collectively frame its acceptance and integration into a country's financial and economic systems. This can encompass a range of indicators, from user transaction volume and merchant acceptance to the integration of CBDC into existing financial infrastructures and services.

For consumers, adoption could be measured by various metrics such as the number of individuals registered for CBDC wallets, CBDC transaction volume, transaction value, or percentage of previously unbanked individuals using CBDC. Similarly, adoption by merchants could be measured as the number or size of CBDC transactions processed daily, or the share of merchants accepting CBDC. Beyond end-users, adoption by intermediaries could be measured as the share of financial institutions that make CBDC available to their customers, the amount of CBDC provided to end-users, and so on. Annex 2 provides some examples of key performance indicators (KPIs) that jurisdictions can refine further to set up their monitoring and evaluation frameworks.

This note does not take a view on specific KPI targets for adoption but encourages central banks to set realistic KPIs and success metrics to measure and evaluate adoption. When, where, and to what extent CBDC should be used will be jurisdiction-specific and vary based on the policy objectives. Setting adoption goals based on policy objectives will allow policymakers to monitor project progress and adjust as needed. Without clear KPIs, it is difficult to accurately measure the impact of CBDC. KPIs should be chosen to measure whether the CBDC is indeed “moving the needle” in addressing the target policy goals, as it may not be true in every case that observing large volumes of adoption of CBDC means that it has made a difference. Lastly, adoption rates should also be read in combination with its impact on the general payment ecosystem to monitor any potential unintended consequences of CBDC, such as risks related to financial stability.

## Ongoing challenges with CBDC adoption

Among the countries that have already launched CBDCs or are conducting large-scale pilots, adoption remains slow and limited. To date, three jurisdictions have launched a nation-wide CBDC: The Bahamas, Jamaica, and Nigeria. Several other jurisdictions have initiated large-scale CBDC pilots,<sup>5</sup> including China, the Eastern Caribbean Currency Union (ECCU), and India.

Their journeys have unveiled ongoing challenges and important lessons. The Central Bank of the Bahamas identified several factors contributing to the Sand Dollar's relatively low adoption, including a lack of merchant participation in the Sand Dollar network and lack of integration with the traditional banking system for merchant accounts.<sup>6</sup> Moreover, banks and credit unions exhibited slow engagement

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<sup>5</sup> See Tourpe and others (2023) for categorization of CBDC project phases.

<sup>6</sup> For more details: [The Bahamas' Experience with the Sand Dollar: Remarks by Governor John Rolle](#).



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with the Sand Dollar project, and there were shortcomings in customer education, with users not adequately informed about the benefits and usage of the Sand Dollar.

The ECCU's DCash also faced shortcomings in user education, as consumers were not presented with clear use cases for DCash. Additionally, the Eastern Caribbean Central Bank acknowledged its initial lack of oversight in developing the merchant network adequately, as its initial efforts were concentrated on DCash system development rather than on its practical implementation and usage.<sup>7</sup> Furthermore, the lack of integration of DCash with merchant point-of-sale (POS) devices and ECCU's legacy financial systems contributed to its lower adoption among merchants. Lastly, a two-month system outage, coupled with the lack of timely communication from the central bank on the recovery timeline, further hurt confidence in DCash among users. The DCash pilot was stopped in January 2024 to allow for transition to DCash 2.0.<sup>8</sup> In Jamaica, low adoption rates of the Jam-Dex were attributed to insufficient public education and challenges in onboarding merchants. Merchants were initially required to upgrade POS devices to accept Jam-Dex. Moreover, the lack of incentivization or mandate for commercial banks to modify ATMs for Jam-Dex conversion also posed challenges to adoption efforts.<sup>9</sup>

In Nigeria, the slowness in eNaira uptake can be partially attributed to the Central Bank of Nigeria's phased approach—initially granting access only to customers with bank accounts and restricting eNaira transactions to domestic usage only. However, Ree (2023) finds that 98.5 percent of eNaira wallets were unused one year after its launch, suggesting that the bulk of the wallet holders were inactive.<sup>10</sup>

China's e-CNY is the largest CBDC pilot worldwide in terms of amount of currency in circulation and number of users. Various use cases have been implemented, including public transportation, retirement benefits, school tuition, and tax payments. The e-CNY is available in multiple provinces, with 16.5 billion yuan in circulation and 120 million wallets opened as of June 2023.<sup>11</sup> At 0.16 percent of China's M0 money supply (which includes physical currency in circulation and bank reserves), the e-CNY is still far from competing with privately-owned payment apps, such as AliPay and WeChat Pay.

Similarly, in India, the digital rupee pilot has yet to achieve mainstream adoption among India's vast population, especially in the presence of the widely adopted Unified Payments Interface (UPI). As of May 2024, the e-rupee in circulation stood at 3.23 billion rupees, up from 1 billion rupees in December 2023. However, this remains a small fraction of the 35.4 trillion rupees in banknotes currently in circulation.<sup>12</sup>

Further observation will be needed to track CBDC adoption trends over time. Considering the limited number of countries that have launched CBDC, it remains challenging to draw conclusions or forecast adoption trends. Moreover, embracing a new payment instrument will undoubtedly be a gradual process.

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<sup>7</sup> For more details: [ECCB Governor views expansion of merchant network to boost DCash use in A&B, subregion.](#)

<sup>8</sup> For more details: [DCash Pilot Closure Announcement.](#)

<sup>9</sup> For more details: [Hiccups hamper digital currency roll-out.](#)

<sup>10</sup> For more details: [Nigeria's eNaira, One Year After \(imf.org\).](#)

<sup>11</sup> For more details: [China's digital yuan transactions seeing strong momentum, says cbank gov Yi.](#)

<sup>12</sup> For more details: [Currency in Circulation \(week ended May 31, 2024\).](#)

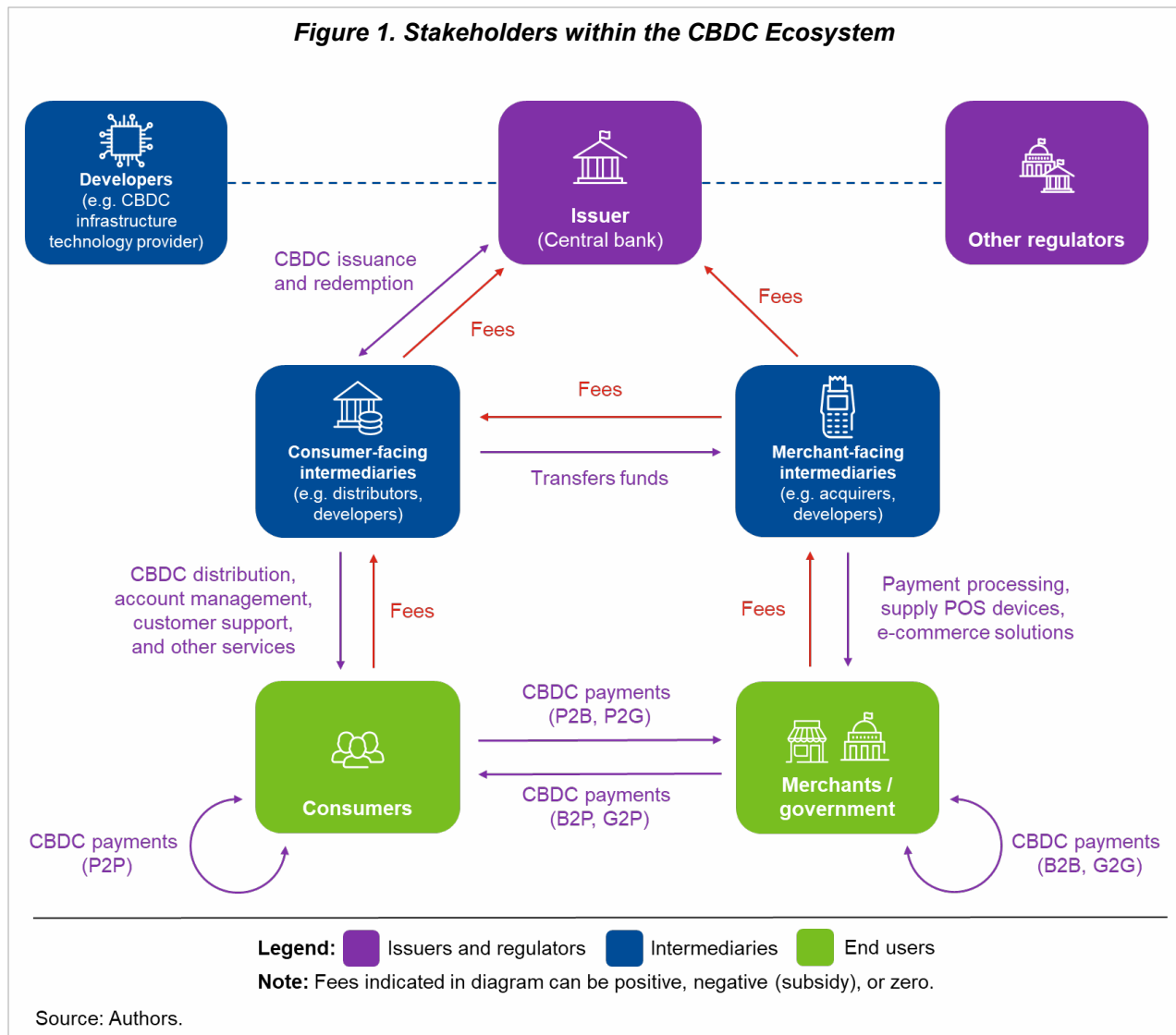
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Yet even with low adoption, the introduction of CBDC could still enhance trust in the financial system by providing a reliable, central bank-backed digital payment option and infrastructure for settlement. It can also increase stability against tail risks and spur competition among payment service providers. This note does not deem CBDC adoption efforts thus far unsuccessful but seeks to emphasize the need for central banks and stakeholders to collaboratively enhance public understanding and acceptance of CBDC.

## II. Understanding the CBDC Ecosystem

### Stakeholders and dynamics within the CBDC ecosystem

In this section, the CBDC ecosystem and the main stakeholders are discussed first, followed by the importance of engaging stakeholders and understanding their needs, business models, and incentives for their participation in the ecosystem.



**Central banks**, at the forefront of the CBDC ecosystem, are tasked with the issuance and regulation of CBDC, thus ensuring its stability and integration into the financial infrastructure. To govern the issuance and management of CBDC, the central bank develops and implements a clear regulatory framework, often alongside other regulators such as financial market regulators, competition and antitrust authorities,

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data protection agencies, anti-money laundering (AML)/know your customer (KYC) regulators, and cybersecurity agencies.<sup>13</sup>

From a central bank perspective, the primary aim of a retail CBDC is to ensure its accessibility to the general public, which predominantly consists of two main groups of end-users: consumers and merchants. **Consumers**, encompassing both banked and unbanked individuals, can use the CBDC for daily transactions such as making payments to merchants or person-to-person (P2P) transfers. **Merchants**, ranging from small enterprises to large corporations, can accept CBDC as a form of payment for goods and services or to manage payroll and settlements with other merchants. **Government agencies** can also be classified among these two types of end-users, depending on their role as either initiators or beneficiaries in transactions.<sup>14</sup>

As mentioned in Section I, the adoption of CBDC presents a classic "chicken and egg" problem. The value of CBDC for consumers relies on the number of merchants accepting it, and conversely, the value for merchants depends on consumer usage. This dynamic creates the need for a carefully balanced set of incentives to ensure both types of end-users are motivated to participate.

To effectively reach end-users, most central banks are exploring a two-tier model for CBDC, where distribution is facilitated through intermediaries.<sup>15</sup> Intermediaries are crucial for the distribution and acceptance of the CBDC as they bridge the gap between the central bank and the end-users. The two-tier model leverages existing financial infrastructures to enhance the efficiency and reach of the CBDC while maintaining the central bank's oversight role. This does not necessarily imply that all end-user-facing activities will be provided solely by intermediaries; some central banks may choose to provide certain services themselves, such as digital wallet or identity verification services.

**Consumer-facing intermediaries** are necessary to provide essential services tailored to facilitate the use of CBDC for the public. These services might include onboarding consumers and account management, providing CBDC-related customer support, and integrating CBDC with financial services. Consumer-facing intermediaries could range from traditional financial institutions like commercial banks and credit unions, to nonbank financial institutions such as fintech and Big Tech firms,<sup>16</sup> and even mobile network operators or e-money providers. Beyond these entities, central banks could engage with government agencies, as well as with national or regional entities like postal operators, leveraging their extensive network and presence in local communities.<sup>17</sup>

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<sup>13</sup> Depending on the jurisdiction, a more general adjustment of the monetary legal framework may be needed.

<sup>14</sup> Government agencies can serve as major initiators and beneficiaries of CBDC payments. When initiating or making a payment, government agencies act as consumers, leveraging the CBDC for disbursements such as social benefits or procurement payments. Conversely, when receiving payments, such as taxes or fees, they function similarly to merchants, utilizing the CBDC to streamline and secure financial transactions.

<sup>15</sup> See Soderberg and others (2023) for an overview of potential stakeholders.

<sup>16</sup> Fintech firms refer to companies that either provide digital financial services to consumers or support other providers in offering these services. Big Tech firms refer to major technology companies focused on platform-based digital services.

<sup>17</sup> In some jurisdictions, these entities are being considered as potential participants, particularly in scenarios where private sector intermediaries are unwilling to participate or if end-users prefer not to engage with private sector entities.

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**Merchant-facing intermediaries** are needed to offer services tailored to merchants. These services could include onboarding merchants, providing technical support, handling dispute resolution, and offering value-added services. Potential entities that could be engaged include payment system providers (PSPs) that offer similar services in the existing payments market, such as merchant acquirers, sub-acquirers or payment system facilitators, and independent sales operators (ISOs).

**Developers**, or technology providers, can also be viewed as important stakeholders. Developers include entities hired by central banks for CBDC infrastructure development and maintenance, or those hired by intermediaries to build and maintain software applications and services that interact with the CBDC ecosystem. Developers offer technical expertise on development and operations, security, interoperability, offline functionality, and scalability efforts for an efficient CBDC system.

Finally, **government entities and other regulators** are crucial for CBDC adoption. Their involvement could ensure regulatory compliance and promote the integration of CBDC into the financial system. Such entities could significantly influence adoption by serving as both advocates and beneficiaries, integrating CBDC into a variety of services, including tax collection, ID systems, and other public functions.

## The importance of stakeholder engagement

In implementing CBDC, stakeholder engagement is essential to understand needs, pain points, and interest levels. Central banks should adopt a balanced, inclusive, and iterative approach in stakeholder engagement to ensure the CBDC aligns with stakeholders' needs and overcomes market challenges, ultimately finding the right "Product-Market-Fit" for CBDC.

Early engagement with end-users should focus on identifying their needs and pain points, rather than directly questioning their willingness to use CBDC. Asking individuals directly if they would use a CBDC might not yield reliable responses, as their familiarity with and understanding of the product is likely limited. This could lead to conclusions that do not accurately reflect their future behavior or needs. Instead, focusing on understanding the challenges users face with current financial systems, such as high transaction fees or the importance of cash availability, provides valuable insights that can inform the design and functionality of CBDC to better meet public needs.<sup>18, 19</sup> It is equally important to understand why intermediaries might be unable or unwilling to address present challenges. These issues may stem from regulatory constraints or other specific requirements that a CBDC may not resolve.

Understanding users' behavioral choices when it comes to financial services is also key. End-user behavior in financial services is significantly shaped by the bundling of products, habitual engagement, and the associated costs of searching for and switching between financial intermediaries. End-users often

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<sup>18</sup> The Bank of Canada's [Digital Canadian Dollar Public Consultation](#) included questions such as: Which of the following methods of payment have you used in the last month to pay a merchant, an individual, or someone you know? What are the reasons why you use each method of payment? If you are currently using any digital payment methods, how concerned are you about the security of these methods when it comes to protecting your money from cyberattacks, theft, fraud, or tampering?

<sup>19</sup> See Kantar Public (2022) for a study on payment habits of citizens of the euro area and implications for a potential Digital Euro.

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prefer bundled services from one intermediary due to perceived ease and cost-effectiveness, which leads to infrequent comparisons with other providers. This behavior is heightened by the non-transparent nature of fee structures and high switching costs, making it difficult for them to seek potentially better options.

Moreover, social and cultural factors also influence consumer behavior. In many cultures, the social obligation to support family members, whether domestically or abroad, influences the choice of remittance channels. People might prefer informal channels because of convenience, trustworthiness, and cultural familiarity, even when digital payment options are available. Finally, trust in financial institutions varies widely across jurisdictions, with some countries showing a strong preference for cash due to historical instability in banking systems. Such deep-rooted behaviors will likely take time to change.

In the CBDC Adoption Questionnaire, one jurisdiction highlighted the importance of addressing users' concerns early on. They addressed frequently asked questions (FAQs) such as: What is a CBDC? How does it differ from other forms of money? Will it replace cash and mobile money? How will my privacy be protected? They also engaged users through demos in which users could experience wallet creation, topping up, and making payments through a proof-of-concept environment. During this exercise, a user perception survey was conducted in which 98.7 percent of users expressed eagerness to learn more about CBDC, and 79.7 percent revealed a strong inclination to use CBDC once launched.

When engaging with potential intermediaries, central banks should aim to understand the forces shaping existing market structures to effectively integrate them into the CBDC ecosystem. This encompasses understanding intermediaries' business models, incentive structures, and competitive pressures—to align intermediaries' incentives with the goals of the CBDC ecosystem. Box 1 provides an example of the IMF's technical assistance to support stakeholder engagement efforts in Peru. Addressing factors that might deter intermediaries, such as potential loss of profits and increased operational costs, is also critical to ensure that their involvement is mutually beneficial. In Annex 3, the business models and competitive landscapes in which potential intermediaries operate are discussed in more detail.

### **Box 1. Stakeholder engagement on CBDC in Peru**

In 2023, the IMF conducted a technical assistance mission to support the Banco Central de Reserva del Peru (BCRP), in their engagement with stakeholders as part of their research and development on CBDC. The mission's primary goal was to enhance BCRP's direct stakeholder engagement to understand their perspectives on a potential CBDC through a two-day interactive workshop with stakeholders. Invitations for the workshop were extended to diverse stakeholders within the Peruvian payments ecosystem, including banking and stock market regulators, PSPs, card networks, fintech and technology providers.

The workshop facilitated open dialogue and co-creation between stakeholders and central bank staff, with the first day focusing on stakeholder reactions following the BCRP's CBDC white paper publication, and the second day on designing a collaborative engagement program. The brainstorming resulted in identifying key activities and recommendations for BCRP to prioritize and take forward for the next phase of work. Overall, the workshop effectively demonstrated the central bank's commitment to collaboration and inclusive decision-making on CBDC, by directly involving stakeholders in the process.

International Monetary Fund (October 2023)  
[IMF Technical Assistance Report: Peru CBDC Stakeholder Engagement](#)

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## III. Preparing for CBDC Adoption

### The REDI Framework

In this section, a high-level framework, called the REDI Framework, is presented to help guide policymakers in preparing for and managing CBDC adoption. The framework entails regulatory strategies, communication initiatives, design choices, and incentive mechanisms that central banks can use to facilitate CBDC adoption:

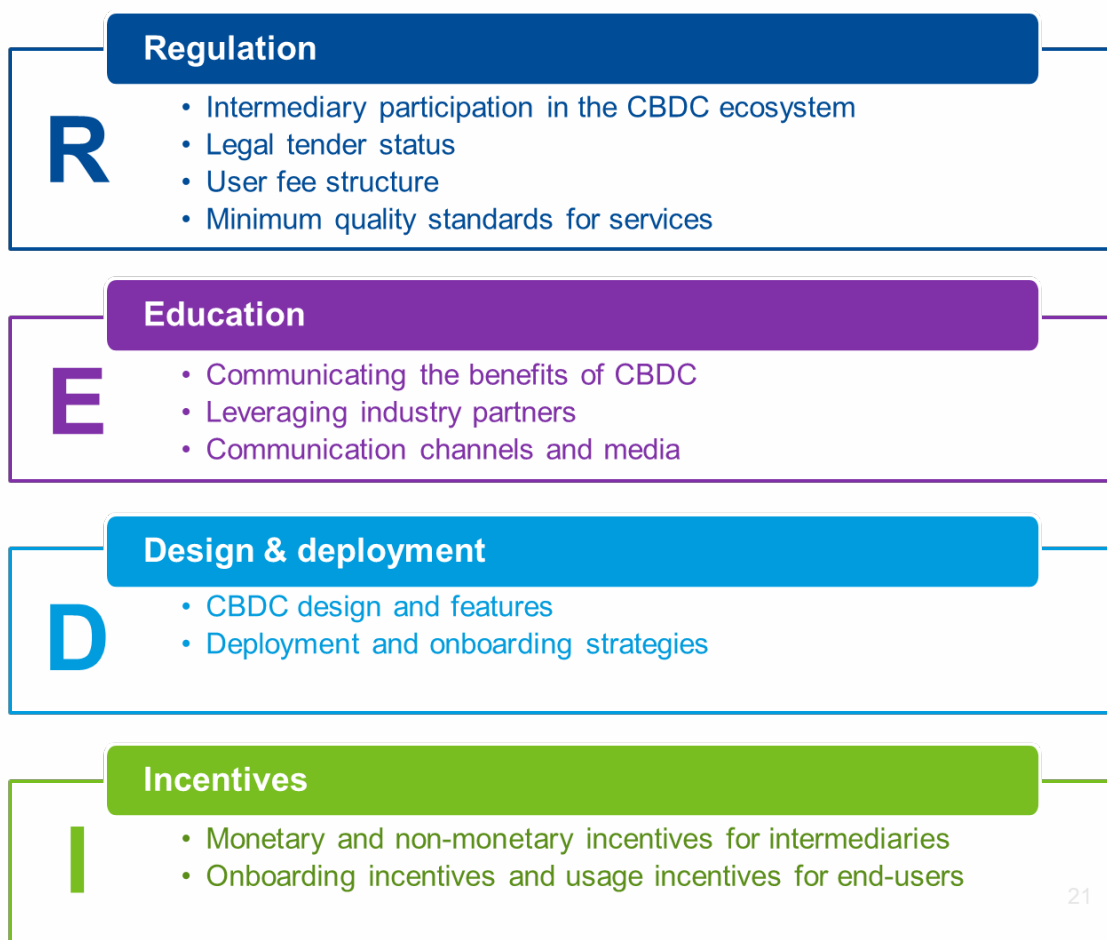
**Regulation:** First, the regulatory and legislative strategies that policymakers can use to foster CBDC adoption are examined, as well as their associated limitations and potential remedies. Key aspects include intermediary entry, CBDC's potential legal tender status, oversight of user fees, and establishment of quality standards.

**Education:** Communication strategies that central banks can employ to effectively inform and educate both end-users and intermediaries about CBDC are proposed, emphasizing the need to simplify information and make it universally accessible. This approach is crucial to build trust, counter misinformation, and ensure comprehensive engagement, regardless of users' financial literacy or technological access.

**Design and Deployment:** The ways in which central banks can prioritize the design, features, quality, branding, and overall user experience of CBDC are discussed to make it more appealing to both end-users and intermediaries. Strategies for policymakers to enhance deployment (roll-out) plans, streamline onboarding, and distribute and expand acceptance points to encourage CBDC adoption are explored.

**Incentives:** The ways in which central banks can provide both monetary and non-monetary incentives to end-users and intermediaries are also discussed, since incentives are essential for encouraging active participation. Without appropriate incentives, intermediaries may be hesitant or even resistant to act as distributors or integrate CBDC into their services, leading to low engagement and hindering the ecosystem's growth. Likewise, users may not see the value in adopting CBDC in everyday financial transactions, leading to limited uptake.

Figure 2. The REDI Framework for CBDC Adoption



Source: Authors.

## Regulation

This sub-section starts by exploring potential regulatory and legislative measures that can be employed by policymakers to prepare for CBDC adoption, along with their potential restrictions and trade-offs. Key aspects include intermediary participation, the legal tender status of CBDC, regulating or directly setting user fees, and establishing minimum quality standards.

### *Intermediary participation in the CBDC ecosystem*

From the perspective of central banks, the initial considerations surrounding intermediary participation entail two key questions: firstly, the determination of who should be granted entry, and secondly, whether this entry should be mandated or left to the discretion of the entities involved.



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In terms of entry, the key question is whether to limit participation to banks or include nonbank entities. Involving nonbank entities might be crucial especially for adoption because incorporating such entities could enhance accessibility for underserved customers. Furthermore, incentives differ between these two types of potential intermediaries. Banks may be reluctant to participate in the CBDC ecosystem, aiming to protect their existing services. In contrast, nonbank entities might be more eager to join, attracted by the potential for lower operational costs and access to new market opportunities.

Integrating nonbank entities could significantly expand the reach and accessibility of CBDC; however, they might also introduce complexities into the regulatory framework. Effective management of these challenges requires comprehensive regulatory adjustments to align nonbank standards with the strict security and operational requirements of incumbent financial institutions and the CBDC framework, ensuring stability and security.

The approach to entry rules varies across jurisdictions, both for FPS and CBDC initiatives. For FPS, exclusive access to only banks is imposed for CoDi in Mexico, Swish/BiR in Sweden and FedNow in the United States. As for CBDC, the People's Bank of China allows access to eligible commercial banks, PSPs, and telecom operators to act as e-CNY intermediaries. While the effects of such entry choices on end-user adoption remain unclear and understudied, a recent study on FPS systems by Frost and others (2024) finds a larger growth in the monthly volumes of FPS transactions when nonbank PSPs participate. Similar effects could arise with CBDC as there will be dependency on intermediaries. According to our CBDC Adoption Questionnaire, except for those that answered "Undecided," 65 percent of central bank respondents envision that both bank and nonbank PSPs could be CBDC wallet providers.

The second issue is whether policymakers should mandate specific intermediaries to support and distribute CBDC as part of their service offerings.<sup>20</sup> For instance, the legislative proposal for the digital euro mandates that credit institutions must provide basic digital euro services to residents of euro area member states upon request.<sup>21</sup> Similarly, in the realm of FPS, the Brazilian Central Bank requires institutions with more than 500,000 active customer accounts to participate in Pix.<sup>22</sup> This decision is regarded as one of the key factors contributing to the rapid success of Pix.<sup>23</sup> In contrast, no such regulation was mandated for intermediaries within the UPI system in India, yet the system has similarly experienced widespread adoption. This illustrates that various regulatory decisions can yield similar outcomes, especially when considering factors such as subsidies or fees, as will be explored later in this note. The Bahamas has begun preparing regulations that will mandate commercial banks to provide access to the Sand Dollar, likely to be effective within two years.<sup>24</sup>

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<sup>20</sup> The extent to which central banks can mandate participation in CBDC initiatives will vary across different jurisdictions, and this regulatory heterogeneity can significantly impact the feasibility of such mandates.

<sup>21</sup> For individuals without access to these services through traditional banks or who opt not to use them, the legislation will require member states to designate alternative providers, such as local authorities or postal offices, to ensure broad accessibility. For more details, see Article 14 in the [Proposal for a Regulation of the European Parliament and of the Council on the Establishment of the Digital Euro](#).

<sup>22</sup> For more details: [Pix Participants](#).

<sup>23</sup> See Duarte and others (2022) for further discussions.

<sup>24</sup> For more details: [Bahamas to regulate banks to offer cbank digital currency](#)

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Mandating participation could help expedite adoption but may impose significant operational and financial burdens on smaller institutions. To address these concerns, mandates are typically imposed on larger, well-established intermediaries, while smaller entities are often given the option to participate voluntarily. This setup could inadvertently lead to a shift in the client base from smaller to larger intermediaries, as smaller entities may find it challenging to meet the financial and logistical demands of CBDC implementation. To effectively promote participation, it is crucial to design participation requirements that ensure inclusivity for all entities, including smaller ones. Incentives might play a more essential role in encouraging the participation of smaller or newer entities. Different types of incentives will be discussed in detail at the end of this section.

### *Legal tender status of CBDC*

Designating CBDC as legal tender could specifically boost merchant acceptance, focusing directly on them rather than intermediaries. This approach has been considered or already adopted by several countries. For instance, the legislative proposal for the digital euro, issued by the European Commission, proposes granting legal tender status to the digital euro to ensure its acceptance throughout the euro area. Similarly, the Bahamian Sand Dollar is recognized as legal tender, thus mandating its acceptance across the nation. Implementing such a status often requires legislative amendments to accommodate digital forms of money like CBDC.

The definition of legal tender varies among legal systems. Under the strictest definitions, this requirement extends to compel merchants to accept a currency that has legal tender status. This is the case in the EU, but not in the United States and Canada. This implies that even if legal status were granted to CBDC in such jurisdictions, it would not affect acceptance on the merchant's side.

In jurisdictions where legal tender status mandates merchant acceptance, designating CBDC as legal tender could facilitate adoption, especially in two-sided retail payments. This legal designation could greatly simplify the complexity of coordination required in these types of payments by transforming the adoption challenge into a predominantly one-sided issue, allowing central banks to focus their efforts on encouraging consumer adoption. However, legal tender status alone may not be sufficient to ensure widespread usage. This is evident in many jurisdictions where, despite cash being legal tender, its use is declining in favor of more efficient and secure payment alternatives. This has been similarly witnessed with the launch of the eNaira, where despite having legal tender status in Nigeria,<sup>25</sup> users prefer to use mobile money over CBDC due to more well-established networks.

However, granting CBDC legal tender status may burden smaller merchants who may find the transition to digital payments cumbersome or costly. To mitigate this, policymakers can incorporate specific exemptions for the legal tender requirements. For instance, in the legislative proposal for the digital euro it

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<sup>25</sup> eNaira's legal tender status means that it relinquishes debt if tendered. This however does not imply a legal obligation to accept eNaira under any circumstances given the technical limitation on acceptability by the counterpart (for example, direct or indirect access to the eNaira network).

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has been proposed that enterprises with fewer than 10 employees or with an annual turnover or balance sheet not exceeding 2 million euro, as well as non-profit legal entities, may refuse the digital euro unless they accept comparable digital payments. Allowing smaller merchants to opt out of accepting digital legal tender could initially seem advantageous, however it might result in consumers preferring larger merchants who accept CBDC. This underscores the need for targeted support in helping small businesses navigate CBDC adoption challenges. Specific merchant incentives are discussed at the end of this section.

In countries where many merchants are small or do not accept digital payments, mandating CBDC as legal tender could be marginal. Many of these merchants would likely fall under exemptions designed to ease their transition, such as those for small businesses with minimal turnover or staffing. As a result, despite legal mandates, the actual adoption and daily use of CBDC might remain limited, affecting only a small portion of the overall market. This underscores that even under strict regulations, significant scope remains for providing incentives to encourage broader acceptance of CBDC.

Finally, it is crucial to recognize that designating CBDC as legal tender can have significant implications for government operations, especially within the realms of treasury and tax administration. This change demands a well-orchestrated response from the ministries of finance and associated agencies to ensure that they are prepared to integrate CBDC into their financial transactions and operations effectively.

### **Governing user fee structures**

Regulating end-user and intermediary fees is another crucial regulatory tool that can be used to facilitate CBDC adoption. Policymakers must decide whether to impose regulations from the onset or allow the market to initially set fees and intervene later if market failures occur. Immediate regulation is essential in monopoly-prone markets or where regulatory intervention might be difficult to implement later. When regulating fees, there are two main options: setting fees directly or imposing caps. Capping end-user fees can promote CBDC adoption by lowering costs and making transactions more affordable,<sup>26</sup> but setting these caps too low may discourage intermediary participation. This is an area where central banks may need to collaborate with competition and antitrust authorities.

Capping fees for basic CBDC services while allowing charges for additional, value-added services can potentially address the needs of both end-users and intermediaries. From the CBDC Adoption Questionnaire, it was found that all central bank respondents, except those that responded as “Undecided” believe that CBDC should be offered without fees, as should cash for basic personal payments (Annex 1). However, some envision the possibility of charging fees for value-added financial services. For instance, the European Commission has proposed that while basic digital euro services should be free of charge for consumers, fees can be applied for additional services provided by

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<sup>26</sup> Huynh and others (2020) found, from Canadian survey data, that central banks can enhance customer acceptance by focusing on key features like transaction costs, ease of use, availability, and security, in that order of importance. Furthermore, a Deutsche Bundesbank survey (2021) found that German consumers prefer a digital euro that is free of charge.

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intermediaries.<sup>27</sup> While consumers will not be charged, merchants might still incur fees from intermediaries. However, one challenge with this approach will be defining which services are considered basic and which are value-added. There may be some intermediate cases where views may not converge easily (such as for recurring payments).

Additionally, policymakers could regulate fees that intermediaries could potentially charge to other intermediaries within the CBDC ecosystem. This is particularly important if one group of end-users is exempt from fees, necessitating some form of compensation for the intermediaries serving them. This could be addressed similarly to interchange fees in card-based payment systems, where acquirer banks compensate issuing banks. The digital euro legislative proposal also highlighted the necessity of an inter-PSP fee to compensate service providers distributing the digital euro, especially since they cannot charge consumers for basic digital euro payment services. On the other hand, Brazilian central bank prohibits the charging of inter-PSP fees for Pix transactions, disallowing any form of remuneration—either directly or indirectly—between the payment service providers of both payers and payees.<sup>28</sup>

Determining the appropriate fee levels and caps for CBDC related services is not straightforward. Policymakers may struggle to set optimal fee levels for CBDC services, needing to balance affordability for users with profitability for intermediaries. They might need to consider appropriate margins, factoring in both operational costs and potential profits. This involves examining industry averages and adopting best practices from other public services, ensuring fees remain competitive and aligned with broader economic objectives while ensuring cost recovery and public accessibility. The European Commission's proposal for the digital euro outlines regulation for fees, such as the merchant service charge or inter-PSP fees, to ensure they do not exceed the lower of actual provider costs, including a reasonable profit, or fees for comparable payment methods.<sup>29</sup> So far, the Bank of Russia is the only central bank to have publicized fees set for transactions involving digital rubles (Box 2).

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<sup>27</sup> For more details: [Digital Euro Legislative Proposal](#).

<sup>28</sup> For more details: [Pix Participants](#).

<sup>29</sup> To ensure these fees remain fair and uniform across the euro area, the ECB will regularly monitor, adjust, and publish fee caps, setting a maximum fee to foster competition among intermediaries while aligning fees with the true costs of offering digital euro services plus a reasonable margin.

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## Box 2. Digital ruble fees for businesses in Russia

Starting on January 1, 2025, the Bank of Russia (CBR) will set fees for transactions involving digital rubles. Businesses accepting payments for goods and services will face a fee of 0.3 percent of the transaction amount, capped at ₺1,500. Housing and utility companies will be charged a fee of 0.2 percent, with a maximum limit of ₺10. Business-to-business transfers will incur a fixed fee of ₺15 per transaction. However, until the effective date, the CBR will implement a zero-fee period for digital ruble transactions on its platform. Additionally, individuals and businesses can open a digital ruble account on the CBR's platform without any fees. The pilot testing of the digital ruble is to be completed in several stages during 2023 and 2024, involving a limited number of clients from 13 banks, with a gradual adoption expected to begin in 2025.

Bank of Russia (August 3, 2023)  
[Fees for digital ruble transactions approved](#)

### *Establishing minimum quality standards for services*

Central banks can establish technical and operational standards for services within their CBDC ecosystem, including benchmarks for end-user experience, privacy, and security. The ability to set these standards, however, can vary based on local legislative frameworks, such as restrictions and requirements in privacy laws, and the prevailing technological landscape.

Setting minimum quality standards for CBDC systems could enhance user trust and ensure systemic stability by guaranteeing that transactions are both secure and efficient. While quality standards can contribute to a more robust system, they can simultaneously increase implementation costs of the parties that need to fulfill them. If intermediaries offer a service or product that needs to fulfill specific minimum quality standards, such as a wallet, then they would also have to bear the additional costs of providing such a quality level. This can be particularly challenging for smaller intermediaries. In this regard, central banks can explore providing a "white-label" wallet to smaller intermediaries, which helps to the prescribed quality standards as well as contributes to a level playing field (discussed further in the Incentives subsection).

One example for balancing high-quality standards in CBDC systems with the varying capabilities of intermediaries is to adopt a system of proportional regulation. By establishing basic security and efficiency standards for all and applying more stringent requirements for larger (or more critical) intermediaries, this could help maintain stability while minimizing burdens on smaller entities. Central banks can further support smaller operators with technical assistance or phased implementation periods.

Once minimum standards are in place for services (such as user interfaces), central banks could decide between enforcing standardization or enabling differentiation by intermediaries. Standardization could provide a level playing field and ease regulatory compliance, while reducing the risk of fragmented or inconsistent service qualities. For end-users, standardization can help simplify the learning/switching processes and provides consistent user experiences. Brazil's Pix system exemplifies successful standardization; it standardizes the user experience/user interface (UX/UI) across all providers, simplifies the process for individuals to switch between providers, and for companies to integrate Pix via a

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standardized API. However, too much standardization could potentially limit innovation and reduce incentives for intermediaries to develop new technologies and services.

On the other hand, differentiation can address the distinct needs and preferences of specific end-user segments, especially in niche markets. Intermediaries can differentiate through loyalty programs, personalized financial advice, niche payment solutions, enhanced security features, user experience customization, and value-added analytics.

## Education

This sub-section delves into how policymakers can craft effective communication strategies to educate stakeholders and build awareness about CBDC, which will be key in fostering adoption. Central banks play a pivotal coordination role by facilitating communication and alignment among various stakeholders. Central banks can act as a central point of communication, and also leverage industry partners which may be more familiar with consumer education.

Possible approaches for effective communication strategies are listed and discussed below. Central banks are not required to adopt every approach; but rather to thoughtfully assess which approaches would most effectively foster awareness within their jurisdiction's ecosystem.

### *Communicating the benefits of CBDC*

- **Provide clear and easy-to-understand information on CBDC benefits and counteract misinformation:** Given the central bank's authoritative position and responsibility for the CBDC's development and implementation, the central bank should take the lead in CBDC communication and educational efforts.<sup>30</sup> Central banks can also leverage industry partners to undertake educational initiatives to provide clear and easy-to-understand information to the general public, to highlight the benefits of CBDC and counteract any misperceptions or misunderstandings.

Educational initiatives should guide consumers step-by-step on how to securely handle digital wallets, conduct transactions, and monitor their holdings, alongside promoting understanding of associated risks, such as cyber threats. Offering information in multiple languages can also be helpful, where the population is ethnically diverse or multilingual. In India, the National Payments Corporation of India launched a campaign to advocate UPI as an easy, safe, and instant payment method (Box 3).

Moreover, communication initiatives should aim to highlight the specific needs and concerns of different end-users, which may be different depending on the jurisdiction. Policymakers should consider the convenience of segmenting the potential addressees of communication efforts and

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<sup>30</sup> Gradstein and others (2021) outline tools and practices for financial sector authorities to improve the effectiveness of financial education initiatives.

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tailoring messages accordingly, while at the same time acknowledging that some groups may not be convinced to use CBDC for a variety of reasons, thus the need to balance efforts. For consumers, it is vital to emphasize not only the functionalities and benefits of CBDC but also its privacy features. Assuring users that their privacy will be respected to a degree similar to cash is crucial for building trust and acceptance. Furthermore, integrating CBDC education with broader financial literacy programs can create synergies that enhance understanding of CBDC as a financial inclusion instrument among potential users.<sup>31</sup> For merchants who are likely to compare CBDC with existing payment methods, clearly articulating fee transparency and instant settlement times in communication efforts can help merchants with their decision-making.

From the CBDC Adoption Questionnaire, one jurisdiction shared that misinformation led some users to mistakenly view CBDC as a cryptocurrency. Other users have not grasped the concept of interoperability, believing that they must activate multiple digital wallets to transact with others. As such, the central bank has focused its messages on explaining CBDC versus cryptocurrency, interoperability of CBDC across available digital wallets, and highlighting the convenience and ease of use of CBDC for day-to-day spending. Marketing/PR firms assisted with these efforts.

### Box 3. Leveraging creative content to educate users about UPI in India

The National Payments Corporation of India launched the “UPI Chalega” campaign in 2020 to educate Indian smartphone users on the correct use of UPI for daily transactions and to encourage a shift towards UPI for routine expenses in various settings like shops, petrol stations, restaurants, and online payments. A significant element of the campaign is its creative engagement through a character named Mrs. Rao. Mrs. Rao advocates for UPI as a solution to cash crises in humorous TV commercials that critique reliance on cash. The campaign uses a comprehensive media mix, including TV, cinema, outdoor, digital, and radio, directing audiences to the UPIChalega.com website. This site features instructional videos on safe UPI use, covering topics from registration to transaction security, aiming to instill a new habit of mobile-based transactions among users.

The campaign, now in its third phase, introduces users to novel features like UPI LITE for rapid low-value transactions, UPI AUTOPAY for recurring payments, and UPI Interoperability for smooth transfers across all UPI apps. The campaign has significantly contributed to UPI's growth, making it a popular payment choice by highlighting its safety and versatility across transactions.

National Payments Corporation of India (August 2023)  
[NPCI-Launches-3rd-Edition-of-UPI-Adoption-and-Safety-Awareness-Campaign-UPI-Chalega](#)

- **Educational resources should also be provided for intermediaries:** It is important to extend educational resources not only to the end-users but also to intermediaries, such as banks and other service providers. By equipping them with comprehensive information on CBDC, including its technical requirements and operational framework, they can better plan and adapt their systems and processes.

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<sup>31</sup> See Lannquist and Tan (2023) for complementary policies that could be beneficial to accompany the deployment of a CBDC seeking to improve financial inclusion.

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For example, the Federal Reserve offers in-depth educational content on the FedNow Service<sup>32</sup> to financial intermediaries who want to learn more or participate, including an online Instant Payments University explaining the benefits of instant payments, closed vs. open loop systems, deferred vs. real-time settlement, and the payment process (authorization, transmission, acceptance, receipt). The FedNow website also features Q&A and interviews from financial institutions who are “early adopters,” as well as provides resources on technical overview and a planning guide.

### *Leveraging industry partners*

- **Collaborate with the industry to create two-way channels for disseminating information and collecting feedback:** Active two-way engagement can help foster a sense of ownership and commitment among stakeholders, which is essential for long-term success and continuous improvement of the CBDC ecosystem. This could be done in partnership with banking associations, Fintech associations, merchant associations, business chambers, etc. in the form of public consultations, surveys or polls to collect feedback. For example, the Bank of England issued a Consultation Paper on the digital pound to collect public feedback (Box 4). The Bank of Thailand also published a directional paper on its retail CBDC with an online feedback form aimed at collecting ideas from PSPs, technology companies, academics, regulatory bodies and the general public.<sup>33</sup>

#### **Box 4. Issuing a consultation paper on the digital pound in the U.K.**

In February 2023, the Bank of England and HM Treasury issued a Consultation Paper on the digital pound. This initiative attracted significant public interest, receiving over 50,000 responses. Recognizing that individuals vary in their ability and willingness to use online tools, a range of channels was set up for respondents to reply including email and by letter. Among the online respondents, 99 percent identified themselves as individuals, while 1 percent represented organizations, including large firms, small and medium enterprises, and sole traders.

The consultation invited feedback on twelve questions generally related to the design of a digital pound. Key concerns highlighted by respondents included the impact on cash accessibility, privacy, and financial autonomy. The Bank of England and HM Treasury will use the feedback received in the consultation process to further inform and shape priorities in the design phase and noted that there would be further public consultation prior to the introduction of primary legislation by the Government.

Bank of England (January 2024)  
[Response to the Bank of England and HM Treasury Consultation Paper](#)

- **Leverage credible partners to extend the reach and effectiveness of communication efforts:** Central banks could identify and collaborate with influencers (e.g. industry experts, credible figures, community leaders within the financial, tech, or social media realms), who can help spread positive user experiences. Encouraging influencers to create diverse content such as reviews, tutorials, and

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<sup>32</sup> The FedNow Service is an interbank instant payment system introduced by the Federal Reserve in July 2023, designed to enable depository institutions across the US to offer immediate payment settlement to their customers on a 24/7/365 basis.

<sup>33</sup> For more details: [The Way Forward for Retail Central Bank Digital Currency in Thailand](#).



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testimonials, can help humanize the CBDC concept among their followers on a personal level. Additionally, central banks could collaborate with schools or universities to spread CBDC awareness among the younger population, who tend to be quicker to adapt to new technology. Hungary is the first country to conduct a retail CBDC pilot among 8–14-year-old students, which the central bank refers to as “the future users of CBDC”.<sup>34</sup>

- **Work with local organizations to conduct in-person outreach programs to reach last-mile communities:** Central banks could collaborate with local organizations or regional authorities to organize informational roadshows and distribute educational materials to target last-mile communities. These communities, often characterized by limited access to digital infrastructure or financial literacy, can benefit greatly from direct engagement. The Central Bank of the Bahamas has recruited Sand Dollar Ambassadors to conduct outreach activities in local communities (Box 5).

### Box 5. Deploying Sand Dollar Ambassadors in The Bahamas

In March 2023, the Central Bank of The Bahamas (CBOB) initiated the recruitment of Sand Dollar Ambassadors to promote and support the adoption of Sand Dollar. These ambassadors, drawn from diverse age groups, will provide assistance to users and merchants in New Providence, Grand Bahama, and the Family Islands, and participate in public promotional events. They will also offer on-demand guidance on Sand Dollar usage. The recruitment of the first batch of Ambassadors was completed by April 2023, and their primary role is to encourage sustained adoption outreach throughout 2023 and 2024. The CBOB also outlined an outreach calendar for 2023, aiming to engage with individuals, businesses, and local government representatives. The outreach activities will involve technical and educational presentations on Sand Dollar and collaborations with mobile payment providers to increase merchant participation, including participation in the Annual Financial Literacy Fair, offering hands-on Sand Dollar demonstrations.

Central Bank of the Bahamas (April 3, 2023)  
[“Press Release: Public Update on The Bahamas Digital Currency Sand Dollar”](#)

### Communication channels and media

- **Launch a dedicated portal as official “one stop shop” for CBDC information:** Central banks may establish dedicated portals to serve as official sources for CBDC information. This could be in the form of online webpages where the public can access educational content, FAQs, or even live chat support.<sup>35</sup> For example, the European Central Bank (ECB) has a dedicated webpage to the digital euro highlighting FAQs and featuring podcasts on “debunking myths about the digital euro”.<sup>36</sup> In countries with less internet penetration, a hotline or customer service number could also allow the public to seek information or report issues.

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<sup>34</sup> For more details: [Hungary’s gamified CBDC pilot designed for children](#).

<sup>35</sup> Generative artificial intelligence (AI) technology could be leveraged to create a multilingual chatbot, ensuring that the bot focuses solely on advising users on CBDC. Such an approach could help assess sentiments in real time and monitor trending questions, which can help central banks adjust their communication strategies and educational efforts reactively.

<sup>36</sup> For more details: [Digital euro](#).

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- **Deploy a combination of traditional and social media for broad and inclusive outreach:**

Traditional media outlets play a pivotal role in ensuring accurate information about CBDC is disseminated. Press releases, press conferences, and collaborations with the media are ways to disperse informative content, address concerns, and correct any misconceptions. Social media platforms are also essential to reach diverse demographics. Maintaining an active presence on popular platforms can enable the central bank to share official content, including infographics and videos.

When inquired about public awareness campaigns in the CBDC Adoption Questionnaire, one jurisdiction shared their external communication efforts to build awareness and ensure transparency by actively putting out CBDC material via its website, social media channels, podcasts, media outlets, as well as sent central bank staff to participate in speaking engagements and conferences.

## Design and deployment

This sub-section explores how central banks can design CBDC to foster its acceptance and adoption by potential users. It also discusses deployment or roll-out strategies, such as by prioritizing the implementation of selected use cases, targeting specific user groups, and leveraging intermediaries in creating an extensive network of CBDC distribution and acceptance points. Possible approaches for designing and deploying CBDC are listed and discussed below. It is important to note that approaches will vary across jurisdictions, depending on market needs.

### *CBDC design and features*

- **Ensure user-centric features and seamless/intuitive UX/UI design:** The design of CBDC can emphasize universal access and user-friendliness. Having a user-friendly UX refers to the overall user experience (beyond merely interacting with the CBDC technology or interface) from onboarding, to using, and leaving the CBDC system. Central banks can work closely with intermediaries to ensure that the UX is designed with features that focus on ease of use, security, and accessibility. This entails developing an intuitive and multilingual user interface, simple transaction processes, and ensuring compatibility across various devices. Moreover, usage can be further enhanced by offering features like 24/7 availability, instant settlement, and interoperability with bank accounts and other digital wallets. Lastly, security measures such as robust encryption, two-factor authentication, and transaction alerts can help protect user data and prevent fraud.

One jurisdiction, in response to the CBDC Adoption Questionnaire, shared that they are conducting extensive research to ensure open access for different user groups. Access issues and solutions are being investigated based on cell, internet and electricity coverage, device costs, and type of disability. Solutions for the blind, deaf and cognitively impaired are also being considered.

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- **Expand use case offering for greater utility and access:** To broaden the reach of CBDC, central banks may consider expanding use cases to support offline functionalities and facilitate programmable payments, for instance. In a recent study on FPS adoption, Frost and others (2024) find greater monthly volume growth in FPS transactions with an increase in the number of use cases and cross-border connections. In their setup, possible applications encompass P2P payments, merchant payments, bill payments, cross-border transactions, scheduling future payments, bulk payments, and request-to-pay functionalities. Enabling similar use cases for CBDC may be useful to facilitate end-user adoption.

In Australia, the Reserve Bank of Australia invited industry participants to propose use cases to demonstrate how CBDC could enhance payment and settlement services. The proposals included enhancing government program delivery, collecting/crediting general sales tax, automating utility and rental payments, facilitating micropayments, time-based streaming payments, and wage payments.<sup>37</sup> A pilot in Australia (Box 6) also demonstrated the potential of CBDC to support uninterrupted financial transactions during emergencies and extending accessibility to those with limited technological skills or internet access, by utilizing technologies like near-field communication technology (NFC) and Bluetooth for device-to-device transactions. This approach is particularly beneficial for underserved and remote communities, ensuring financial inclusion and continuity. Moreover, broadening expanding CBDC access to include non-local users, such as tourists, as seen in China (Box 7), can broaden the user base that could adapt CBDC adoption.

### Box 6. Testing offline eAUD payments on campuses in Australia

The Southern Cross University in Australia conducted an eight-week pilot program, partnering with ANZ Bank, to test the use of a CBDC for offline payments at on-campus vendors. A number of students were provided with NFC-enabled smartcards pre-loaded with eAUD to make purchases at selected vendors on the universities' Gold Coast and Northern Rivers campuses. The initiative was prompted in part by the 2022 Northern Rivers floods, which disrupted traditional banking services for weeks. The pilot aimed to showcase how a university, or similar organizations, can use CBDC to provide immediate financial support in emergency situations where online connectivity is unavailable. Students found the use of eAUD for purchases to be as seamless as traditional payment methods, offering certainty in scenarios where internet access is compromised.

Southern Cross University (2023)  
[Digital currency pilot - Southern Cross University](#)

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<sup>37</sup> For more details: [Australian CBDC Pilot for Digital Finance Innovation – Project Report](#).

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## Box 7. Making e-CNY wallets available to short-term visitors in China

The e-CNY app is available for download on Google Play and App Stores worldwide, making it accessible to short-term visitors e.g. foreign tourists. Users can use their local mobile phone number from over 220 countries/regions to open an anonymous tier IV wallet upon arrival in any pilot city in China (however they cannot open a wallet from abroad). Visitors do not need a Chinese bank account or provide any identification.

Visitors have two options for conducting e-CNY payments. The first option is to “top up as you pay,” by linking Visa and Mastercard cards or Chinese and Hong Kong bank accounts to their e-CNY wallets. With this option, there will be no leftover e-CNY balance in their wallets after each payment—eliminating the need for any currency conversion upon leaving China. Another option is to top up their wallets in specific amounts, by converting RMB or foreign currency banknotes over the counter or transferring from FPS accounts (the latter is for Hong Kong users only).

[China produces CBDC guide for tourists in English— Ledger Insights— blockchain for enterprise](#)

- **Build trust in CBDC in terms of privacy protection:** Privacy is likely to be the most impactful concern among users. Central banks, in close engagement with data protection authorities, can foster trust among users by designing CBDC systems within privacy frameworks that safeguard personal and transactional data from abuse.<sup>38</sup> The importance of financial data privacy was surfaced in the Digital Canadian Dollar Public Consultation,<sup>39</sup> where users expressed a strong preference for privacy control features. Concerns about government overreach and individual privacy were also revealed, suggesting a need for CBDC designs that strike a right balance between privacy protection and regulatory compliance. To this end, central banks could consider introducing tiered wallets, with different levels of KYC verification and varied transaction/balance limits, to help balance user’s privacy needs against regulatory compliance requirements.
- **Ensure cybersecurity in the CBDC ecosystem:** Resiliency to cyber-attacks is another important factor in building trust in CBDC, as any successful attack or data breach could erode public trust and confidence with systemic implications. CBDC exists in an ecosystem comprising various stakeholders and interconnections and being a high-value target for nation states and cyber criminals, central banks should aim to design CBDC ecosystems to be among the most cyber-resilient payment systems, including against technology risks.<sup>40</sup>
- **Ensure integration and interoperability with existing systems, without requiring upgrades:** Central banks can lower the entry barrier for merchants by ensuring CBDC is integrated with existing domestic payment systems and CBDC transactions can be processed using existing infrastructure, such as POS terminals. Closely related to integration, interoperability of CBDC is also crucial as it reflects the ability of different payment systems to communicate and transact with each other efficiently and securely. A 2023 survey by the Bank for International Settlements (BIS) on CBDCs

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<sup>38</sup> See Murphy and others (2024) for further discussions.

<sup>39</sup> For more details: [Digital Canadian Dollar Public Consultation Report](#).

<sup>40</sup> See Bharath and others (2024) for further discussions.

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revealed that interoperability with domestic payment systems was rated as a crucial design feature by both advanced economies (75 percent) and EMDEs (78 percent).<sup>41</sup>

Most importantly, intermediaries and merchants will be more likely to embrace the CBDC system if it does not require significant upfront investments or upgrading current terminals. For example, in China, the e-CNY has been integrated with the current QR code system and made interoperable with existing private digital payments solutions through a “Unified QR Code”. A red dot is added to the left-hand corners of the QR code to signal that it is e-CNY compatible. Users can scan the QR code to make payments with any wallet app. This Unified QR Code simplifies the use of e-CNY. Merchants only need to display one QR code, which can be used by all digital payment applications.

- **Allow for CBDC data to be used with value-added tools and services:** Central banks may design CBDC systems to ensure compatibility for integrations with third-party tools and services. For example, integrating CBDC with analytics and reporting tools can help merchants track sales trends, manage inventory, and optimize financial planning—particularly beneficial for large retailers and corporates. Furthermore, access to real-time financial data through CBDC transactions can enhance forecasting accuracy and enable more dynamic business responses to market changes.

### *Deployment and onboarding strategies*

- **Implement selected use cases to target certain users for initial uptake:** As mentioned in Sections I and II, retail CBDC is a two-sided market and attempting to scale both sides (consumers and merchants) at the same time may be challenging. Thus, rolling out use cases to target one side of the market may be one approach to generate initial momentum. For example, Swish, a retail payment service in Sweden, initially catered to P2P transactions but has since gained widespread adoption across most market segments (Box 8). Similarly, M-PESA, which originated in Kenya and now has expanded to more than eight countries in Africa, originally offered primarily P2P payments.

Use cases such as government (G2P) and corporate (B2P) payouts can also potentially encourage momentum. Getting CBDC into users’ wallets through such payouts can entice recipients to make future payments from the CBDC that they receive. Government agencies could help trigger the process of CBDC issuance by making payouts in CBDC, such as for social welfare payments and fiscal stimulus programs, which can also potentially promote financial inclusion.<sup>42</sup> However, it is important to note that for G2P use cases, coordination with treasury and tax administration agencies may be needed to encourage the creation of such use cases, especially in developing countries where the government share of the formal economy is substantial. For B2P or corporate payouts,

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<sup>41</sup> See Di Iorio and others (2024) for more details.

<sup>42</sup> According to the World Bank Global Findex 2021, receiving payments directly into an account acts as a catalyst for other financial services, a behavior observed in both developing and high-income economies. In developing economies, the proportion of adults involved in digital payments increased from 35 percent in 2014 to 57 percent in 2021, with a notable 83 percent of those who received digital payments also having made one. Additionally, the majority of adults who received a digital payment were more likely than non-recipients to save, borrow, and store money. This suggests that government-initiated digital inflows, such as receiving payouts in CBDC, could provide an entry point for the unbanked to enter the financial system.

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such as for employee wages and benefits in the case of India (Box 9), mandating staff to use the CBDC may run counter to consumer protection rules in certain countries.<sup>43</sup>

The selection of use cases may impact the actual operational needs of the CBDC system, which would need to be taken into account upfront in the design stage. For example, government and payroll payments may require the CBDC system to support bulk transactions. Lastly, policymakers should take into consideration complementary policies that could be beneficial to accompany the deployment of a CBDC, especially in instances where CBDC is viewed as a gateway to financial inclusion. For further information on expanding adoption for financial inclusion and identifying barriers to inclusion, see Lannquist and Tan (2023).

### Box 8. Scaling P2P payments and beyond via Swish in Sweden

Launched in December 2012 by six major Swedish banks, Swish is a payment system that facilitates instant transactions between parties through a mobile app linked to the user's bank accounts. Upon launch, Swish initially focused on low-value P2P payments, by using only cell phones, combined with zero user fees. Previously, bank transfers required knowing the payee's account and routing numbers, whereas cash transfers were old-fashioned and unsafe.

Swish has since broadened its capabilities to include merchant and e-commerce transactions, along with newer features like QR codes and a request-to-pay function. By 2014, it expanded to include small businesses, charities, and sports organizations among its users. The introduction of e-commerce functionality came in 2017, followed by the integration of POS payment services into retail cashier systems in 2018. As of 2023, Swish reported over one billion annual transactions with more than 8 million private users, 93 percent of whom send or receive a payment every month, indicating its widespread adoption and utility.

Swish  
[Swish— För en enklare vardag sedan 2012](#)

### Box 9. Paying employee benefits with e-Rupee in India

Since December 2023, several banks in India have begun using the e-rupee to disburse employee benefits to employee's e-rupee wallets instead of to their salary accounts. This initiative helped the e-rupee to meet the Reserve Bank of India's (RBI) target of one million transactions per day. The move is part of an effort to boost e-rupee adoption, with the RBI encouraging banks to use CBDC for employee compensation. The e-rupee pilot was launched by the RBI in December 2022, aiming to provide a digital alternative to physical cash. Although transactions initially averaged 25,000 a day by the end of October 2023, linking the e-rupee to the UPI has broadened its use case. The RBI anticipates increased adoption by non-financial firms, similar to the banking sector, to further boost transactions. As of now, the e-rupee user base has grown steadily to about 4 million users in January 2024, up from 3 million in December 2023.

Reuters (2024)  
[India's digital currency transactions top 1 mln/day in Dec](#)

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<sup>43</sup> For instance, mandating any group of users (staff or non-staff) could generate conflicts of interest where a regulated institution is mandating use of a certain product, but if there is a failure or disruption, the liability would be unclear. It may also restrict access and choice for one demographic, which may pose as a regulatory and competition issue in certain countries.

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- **Leverage intermediaries to offer both physical registration and eKYC for onboarding users:** Central banks can leverage intermediaries to reduce registration hurdles for consumers with varying digital/financial literacy. Physical registration points, such as bank branches or designated registration centers, can provide a tangible and familiar way for users who may be less comfortable with digital technologies to open a CBDC account. eKYC procedures, utilizing digital ID and/or biometrics scanning, offers a convenient and fast-track method for digitally savvy users to onboard. Leveraging aliases (phone numbers, email addresses, QR codes) can also help simplify user onboarding. One jurisdiction, in response to the CBDC Adoption Questionnaire, shared that they will allow individuals to self-onboard for the lowest tier wallets which do not require KYC/AML procedures, alleviating the need for an authorized intermediary to validate their wallets before usage. They will test the self-onboarding process, before it is launched to the wider public.
  - **Leverage local intermediaries to provide cash-in/cash out points:** This can help facilitate a smooth transition from traditional currency to CBDC. Banks can be a good starting point for users to open CBDC accounts and obtain CBDC through conversion of cash or bank deposits. Enabling physical currency withdrawals from traditional ATMs using CBDC balances can also cater to users who are already banked. Beyond the banking network, local players such as postal networks have extensive reach and can also serve as distribution points, especially in rural and remote areas. Shops, supermarkets, and other retail outlets can also act as physical cash-in/cash-out points and reduce deployment costs. This model has been successfully used by mobile money systems in several countries. In Africa, one of the key factors contributing to M-PESA's success is its extensive cash-in/cash-out network.<sup>44</sup>
  - **Conduct iterative pilots before launch:** Given the novel nature of CBDC, adopting a flexible and iterative approach is essential for understanding its feasibility, benefits, risks, and implications. The IMF has proposed the 5P methodology to help guide policymakers in managing CBDC projects, accommodating different country contexts.<sup>45</sup> A CBDC pilot, a key stage before the final production phase, is crucial for finalizing the necessary capacity, onboarding stakeholders, testing all aspects of the CBDC solution, and providing quality assurance. Piloting is usually done through iterative steps with specific goals to validate stakeholder and operational readiness before official launch. Pilots can also help central banks observe how users interact with the CBDC system, evaluate its user-friendliness, and gather user feedback for further refinement.

## Incentives

This sub-section discusses various forms of monetary and non-monetary incentives that central banks may consider providing to intermediaries and end-users to encourage their active participation. It is

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<sup>44</sup> There are over 600,000 active agents in the M-PESA network across Kenya, Tanzania, the Democratic Republic of Congo, Mozambique, Lesotho, Ethiopia, Egypt. Users can deposit cash at any M-PESA agent, such as kiosks, grocery stores, pharmacies, gas stations and mobile phone retailers. The agent credits their M-PESA account with the equivalent digital money.

<sup>45</sup> See Soderberg and others (2023), and Tourpe and others (2023) for more details.

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important to note that offering monetary incentives to stakeholders may have fiscal consequences and carries the risk of such incentives being misused. The incentives listed below are extensive; central banks would need to carefully select the right mix of incentives that best align with targeting intermediaries and end-users in their specific jurisdiction.

### *For intermediaries*

- **Lower entry costs and/or provide subsidies for consumer-facing intermediaries (e.g. distributors):** Policymakers can help cover initial system development costs, integration expenses, and other operational costs related to CBDC implementation—at least during the initial stage, through subsidies, tax benefits, or other financial support mechanisms. This could be particularly appealing for smaller entities that may lack the technological infrastructure to accommodate or integrate with CBDC. Such subsidies were provided by the Indian government in the case of UPI and were crucial for intermediary participation, especially since intermediaries were not permitted to charge end-user fees. Furthermore, central banks could waive participation fees. For example, the Federal Reserve’s FedNow service has offered waiving certain fees to boost early adoption among financial institutions, including eliminating the US\$25 monthly fee (saving \$300 annually) and reducing the US\$0.045 fee per credit transfer for the first 2,500 transfers each month, potentially saving up to \$1,350 a year.<sup>46</sup>

Findings from the CBDC Adoption Questionnaire show that most jurisdictions are still undecided on subsidizing potential costs associated with CBDC transaction, with 25 percent of respondents stating no subsidies will be provided, and 13 percent intent on providing subsidies (Annex 1).

- **Minimize fixed and variable costs of merchant-facing intermediaries (e.g. acquirers):** The acquiring market features a concentration of a few direct acquirers linked to card networks and numerous sub-acquirers indirectly connected through these acquirers. This market configuration is largely due to the significant fixed costs associated with establishing and maintaining payment systems, and variable costs such as transaction processing and POS system maintenance, which vary for acquirers based on service volume. Additionally, acquirers face variable interchange and network access fees, which are paid to card issuers and networks.

To enhance their participation in the CBDC ecosystem, it is crucial to devise strategies that lower these costs. For example, minimizing initial investment in CBDC infrastructure by offering it as a public good or waiving fees for acquirers (such as not imposing inter-PSP fees, i.e. interchange fees) can encourage their engagement. Adopting simpler technologies like QR codes (or ensuring compatibility with existing QR codes) for CBDC transactions can cut down variable maintenance costs associated with traditional POS devices.<sup>47</sup> Furthermore, reducing or regulating intermediary fees akin to interchange fees would lower transaction costs for acquirers within the CBDC system.

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<sup>46</sup> For more details: [2024 FedNow® Service pricing now available.](#)

<sup>47</sup> In jurisdictions where QR codes are not common, there is the challenge of deploying a new technology for a quick uptake.



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This approach has been implemented by Brazil's central bank within the Pix system, where such fees between intermediaries are prohibited, thereby reducing costs for acquirers significantly.<sup>48</sup>

- **Permit intermediaries to build and charge for value-added services:** Allowing intermediaries to charge end-users for additional value-added services on top of CBDC can provide a direct revenue stream from CBDC engagements. This model encourages intermediaries to actively promote and support the CBDC system as they can monetize these services directly. It could also stimulate innovation and development of new financial products and services around the CBDC ecosystem, enhancing the overall value proposition for end-users.
- **Allow for monetization of end-user data with user' consent:** By leveraging CBDC transaction data with users' consent, intermediaries can enhance credit assessments, cross-sell financial products or services, and use CBDC applications as channels for targeted advertisements. This utilization could enable not only diversified revenue streams but also allow for the personalization of financial services. Intermediaries such as fintech and Big Tech companies, which have already invested in business models that capitalize on data, might find these incentives particularly beneficial.<sup>49</sup> Allowing them to access CBDC data can offer deep insights into user behavior and preferences, enabling the development of more accurately targeted products for end-users. In similar fashion, merchant-facing intermediaries offering value-added services could benefit from having data access. They could provide merchants with detailed analytics services that offer insights into consumer behavior, spending patterns, and demographics. However, this approach does raise concerns regarding data privacy,<sup>50</sup> which will be discussed further in Section IV.

Findings from the CBDC Adoption Questionnaire show that 50 percent of respondents are still undecided about whether intermediaries would be able to collect and utilize CBDC transaction data. Among the other 50 percent, central banks are working towards allowing PSPs to collect and use CBDC transaction data with consent, in accordance with relevant laws and regulations (Annex 1).

- **Impose constraints to diminish the store of value appeal of CBDC:** Particularly for depository institutions like commercial banks and credit unions, implementing central-bank-imposed holding limits or tiered remuneration<sup>51</sup> for CBDC would significantly affect these intermediaries' willingness to participate in the CBDC ecosystem. Many central banks are looking into such restrictions on their CBDC offerings. Bindseil (2020) and Bindseil and Panetta (2020) propose limiting potential deposit outflows in the EU by setting a €3,000 digital euro holding cap per individual. Li, Usher, and Zhu (2024) discover that, in Canada, even a very high holding limit of \$25,000 can cause a significant

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<sup>48</sup> For more details: [Pix Participants](#).

<sup>49</sup> Granting data access to Big Tech companies could have potential drawbacks, necessitating a careful evaluation of the long-term effects to formulate or refine regulations that ensure a level playing field among incumbents, fintech startups, and Big Tech. This is crucial for mitigating risks to financial stability, market integrity, and consumer protection, as detailed in the paper by Bains and others (2022).

<sup>50</sup> See Murphy and others (2024) for more details.

<sup>51</sup> Remuneration is classified as tiered when the interest rates applied to holdings vary among different levels, which are established based on specific thresholds.

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reduction in CBDC holdings. However, the impact of these constraints on intermediaries' readiness to participate has not been comprehensively analyzed, leaving their true effects unclear. Moreover, it is important to stress that while such constraints might encourage traditional deposit-taking financial institutions to participate, they might also discourage participation of non-depository intermediaries, who might otherwise utilize attractive CBDC store of value features to draw in end-users.

- **Offer exclusivity agreements to intermediaries:** Central banks can strategically grant exclusive rights to specific intermediaries for providing CBDC services within certain regions or for particular user groups. This approach helps minimize direct competition among intermediaries, enhancing profitability and encouraging focused service provision. This form of exclusivity is comparable to territorial exclusivity in the retail sector, which motivates enhanced service delivery and customer engagement.<sup>52</sup>

For instance, granting MNOs exclusive rights to administer CBDC-related services in rural or underserved areas—where they already possess infrastructure, but traditional banking services are sparse—can motivate their participation. This leverages existing telecommunications infrastructure to extend financial inclusion. In contrast, in urban areas with robust banking infrastructure, exclusivity could be given to commercial banks, utilizing their extensive customer networks and capability to provide a broader range of services alongside CBDC distribution.

While such strategies could promote participation by targeted intermediaries, they can also inadvertently lead to the formation of local monopolies. This, in turn, could lead to higher costs for end-users due to lack of competition. Therefore, careful consideration must be given to balancing exclusivity with the need to maintain competitive pricing and service quality. This could be remedied by having contracts of limited length that help intermediaries in the initial stages but allow for competition later on.

- **Enhance intermediary credibility with CBDC white-label solutions:** As a non-monetary incentive, central banks can provide white-label CBDC wallet solutions that intermediaries can brand as their own, merging technological reliability with strategic branding to attract and retain customers. This allows intermediaries to utilize technology backed by the central bank without bearing substantial development costs. This association with the central bank can add a layer of credibility and bolster consumer trust. In response to the CBDC Adoption Questionnaire, one jurisdiction shared their experience in developing a white-label wallet, which firms may rebrand and offer to their customers, to facilitate firms' easy entry into the CBDC ecosystem.

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<sup>52</sup>Mathewson and Winter (1984, 1994) first demonstrated that exclusive territories motivate intermediaries to enhance services like product demonstrations or investments in quality. They showed that in the presence of intrabrand competition, intermediaries tend to free ride on each other's services, reducing the overall service quality. Granting exclusive territories helps mitigate this free-riding problem. For more recent papers on this topic, especially when there is competition between suppliers, see Salvatore and Reisinger (2011).

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White-label wallets already exist in the cryptocurrency world. Circle, the issuer of USDC, one of the largest stablecoins in terms of market cap, introduced Programmable Wallets in August 2023. This service allows developers to easily integrate and manage crypto wallets in their applications, thus enhancing user access to digital assets and cryptocurrencies including USDC.<sup>53</sup>

- **Encourage participation of developers and Fintech firms:** The participation of developers and Fintech firms is important for building a vibrant CBDC ecosystem, to meet the evolving demands of end-users in an increasingly digital economy. This can be facilitated through various approaches such as leveraging robust and widely used coding patterns, clearly documenting APIs, and by providing software development kits (SDKs), along with sandbox environments for safe testing, and by organizing hackathons for creative solution development.

In response to the CBDC Adoption Questionnaire, one jurisdiction highlighted holding a CBDC Hackathon to attract participation of innovators. Another jurisdiction gave the example of a Fintech regulatory sandbox, used to encourage experimentation by fintech firms to explore value-added services and UX design to differentiate their CBDC wallets, as well as consider their pricing models.

Conversely, another jurisdiction responded that if the CBDC platform gives access to settlement in central bank money and enables smart contracts/payments—that would be an incentive in itself for fintech companies. However, additional factors would need to be considered, such as eligibility criteria for accessing the platform and governance structure.

### **For end-users**

- **Offer onboarding incentives:** The initial uptake of CBDC can be encouraged through strategic onboarding campaigns. Such programs could include sign-up bonuses in which new users receive a one-time deposit of CBDC upon successful account registration.<sup>54</sup> For example, in Jamaica, the first 100,000 Jamaicans to register for a Jam-Dex wallet after April 1, 2022, received a JD\$2,500 deposit (about US\$16).<sup>55</sup> Other campaigns could be in the form of airdrops or lotteries in which users perform a certain action or register to be entered into a lottery. For example, in October 2020, the People's Bank of China airdropped via lottery 10 million e-CNY to 50,000 residents in Luohu district in Shenzhen province. Each resident received 200 e-CNY (about US\$30) into their e-CNY digital wallets. The e-CNY could be used at certain retail outlets in Luohu within a specified time.<sup>56</sup>

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<sup>53</sup> The introduction of Programmable Wallets presumably enhanced the wider adoption of USDC, with the number of USDC wallets with a balance of at least US\$10 growing by 59 percent to reach about 2.7 million in 2023. For more details: [Welcome to the Era of Open Money: Circle Launches 2024 State of the USDC Economy Report](#).

<sup>54</sup> In some jurisdictions, providing incentives to end-users may create frictions with the overall legal framework (e.g. preserving fair competition). In addition, offering remunerated CBDC can be viewed as an incentive for end-users. However, remuneration raises policy concerns for central banks, particularly regarding its potential impact on financial stability. For this reason, most central banks are considering a nonremunerated CBDC. Therefore, remuneration is not recommended as an incentive for end-users within our REDI Framework.

<sup>55</sup> For more details: [\\$2500 Incentive For Jamaicans To Get Digital Wallet](#).

<sup>56</sup> For more details: [The digital yuan/RMB is securing a seat at the table](#).

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- **Offer usage incentives:** Once users are onboarded, the focus shifts to encouraging regular and sustained use of CBDC as a daily payment instrument. Here, rewards for usage could be implemented, such as cash-back offers, discounts, or loyalty points for transactions made with CBDC. This approach ensures that the advantages of CBDC are not just recognized at the point of sign-up but are continuously experienced through regular transactions. For example, during the 2023 Lunar New Year Holiday, regional governments of the e-CNY pilot zones handed out 180 million yuan in digital yuan red packets and discount coupons to encourage spending.<sup>57</sup> Similarly, in Jamaica, consumers will receive two percent cashback on purchases for goods/services using the Jam-Dex (Box 11).
  - **Offer merchant-specific incentives:** Some incentives can be targeted specifically to merchants such as subsidies for initial setup costs, reduced transaction fees for the first year, tax exemptions, or rewards for achieving certain transaction volumes, etc. Similar programs have been deployed to promote mobile and electronic payment usage. For example, in 2020, the Moroccan government introduced a five-year total exemption from taxes for transactions made by mobile payment with small merchants.<sup>58</sup> As for CBDC, in Jamaica, the government has by provided incentives for small merchants (Box 11). Ardic and others (2022) illustrate further country examples of fiscal and financial incentives to increase the acceptance of electronic payment by merchants, and Allen and others (2022) identify key predictors for adoption and usage of digital payments.

### Box 10. Providing incentives to boost JAM-DEX adoption in Jamaica

The Jamaican Government plans to boost the adoption of its CBDC, JAM-DEX, by introducing two new incentive programs. The first is a Small/Micro Merchant Incentive Program targeting small businesses such as restaurants, gas stations, and personal-care services. The first 10,000 merchants onboarded as of April 1, 2023, will receive JD\$25,000 worth of JAM-DEX upon registration and onboarding. To qualify, merchants need to provide necessary documentation, including business registration certificates, proof of bank account, and valid tax compliance certificates. In addition to the cash incentive, onboarded merchants will receive a “JAM-DEX Accepted Here” sticker for display at their locations.

The second incentive program, the Wallet-holder Individual Loyalty Program, focuses on consumers. Starting April 1, 2023, users will receive two percent cashback on total purchases for goods and services in JAM-DEX, up to a maximum spend of JD\$5,000. Loyalty points earned will be applied to the user's wallet at the end of each month. These initiatives are applicable only for the 2023/24 financial year.

Bank of Jamaica (March 2023)  
[Gov't Provides Incentives to Boost JAM-DEX Use](#)

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<sup>57</sup> For more details: [Digital yuan sales during Lunar New Year up from last year.](#)

<sup>58</sup> For more details: [Mobile payment and financial inclusion in Morocco.](#)

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## IV. Policy Considerations

The adoption of CBDC necessitates careful consideration and prioritization of certain policy issues. Policymakers should consider how CBDC adoption aligns with overall policy objectives for CBDC, and whether there are any potential conflicting objectives that may arise in the pursuit of adoption. Policymakers also need to navigate trade-offs between different policy measures, including those intended to calibrate adoption. Some measures may promote a specific policy objective, or reduce an identified risk, but may make the CBDC less attractive. Likewise, measures designed to provide incentives to certain actors to promote adoption may also turn out to be off-putting to others. Understanding and appropriately addressing these trade-offs are crucial steps in the journey of CBDC adoption. In this section, several areas for further consideration are highlighted.

### Sustainability of the CBDC system

Central banks face a critical decision in determining whether to issue CBDC as a public good, while simultaneously ensuring its stability and sustainability. Offering CBDC as a public good is heavily reliant on jurisdiction-specific market dynamics and needs. One key factor revolves around the extent to which the private sector adequately serves the population's financial needs. If a significant portion of the population remains underserved or excluded by existing private sector offerings, the central bank may view CBDC provision as a means to bridge this gap and stimulate adoption by addressing gaps in financial inclusion. In such scenarios, CBDC can be positioned as a public good, serving as a reliable and universally accessible medium of exchange, thereby fostering its adoption among underserved communities. Moreover, the introduction of CBDC could spur competition among financial institutions and PSPs, encouraging further innovation and potentially reducing costs for consumers.

However, to implement CBDC as a sustainable public good, central banks will need to carefully navigate the issue of cost recovery, as it directly influences the formulation of pricing strategies that are fundamental to facilitating adoption. The challenge lies in devising a pricing model that recoups the substantial costs associated with developing and maintaining the CBDC infrastructure, while simultaneously ensuring that the pricing does not act as a deterrent to potential users. In some jurisdictions, there is a legal obligation to recover the full cost of providing payment services. For example, under the Monetary Control Act of 1980, the Federal Reserve Bank must establish fees for "priced services" to recover all the direct and indirect costs associated with its payment and settlement system service over the long run.<sup>59</sup> While many other central banks also charge for payment services, not all will aim to fully recover the costs. Ultimately, it is up to each jurisdiction to establish a pricing strategy that supports the long-term sustainability of the CBDC system.

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<sup>59</sup> For more details: [The Fed - Payment System and Reserve Bank Oversight](#).

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A central bank may choose to bear all costs associated with the initial development of CBDC infrastructure. Full funding of CBDC infrastructure provided by the public sector can accelerate the adoption of CBDC by eliminating direct costs for financial intermediaries. However, this approach presents trade-offs regarding the effective use of public funds and the fiscal burden it imposes. The decision to fully fund CBDC development and maintenance from public funds must be weighed against other public spending priorities and long-term viability. Findings from the CBDC Adoption Questionnaire show that 41 percent of central banks anticipate splitting the CBDC investment costs with intermediaries, while 6 percent will bear all investment costs. The remainder are undecided (Annex 1).

Alternatively, establishing an appropriate cost-recovery model between the central bank and participating intermediaries can help distribute the financial burden equitably. A central bank may choose to transfer all or some of the operational costs to financial intermediaries, who can then pass on some costs to users in the form of fees. This approach can align the usage of CBDC with actual costs. However, if intermediaries impose high fees on transactions, this could deter potential consumers and merchants from adopting CBDC, negatively affecting its uptake and any goals of enhancing financial inclusion. To address this challenge, a tiered fee model can be implemented that offers low or no fees to smaller users, reducing the financial burden on those the policy aims to benefit most. Additionally, setting regulations on the fees that intermediaries can impose on users can further protect consumers and ensure that the benefits of CBDC are accessible to all. These measures help balance the need for cost recovery with the goal of financial inclusion.

Lastly, a central bank may offset some of the costs with seigniorage generated by CBDC.<sup>60</sup> CBDC, like cash, is a liability of a central bank which can generate seigniorage, depending on the level of remuneration rate for CBDC and to the degree that CBDC is exchanged with private money such as bank deposits and e-money. Generally, the more CBDC is adopted, the more seigniorage a central bank can earn. Seigniorage can offset some costs of developing and implementing CBDC.

## **Integrity of the CBDC system**

Ensuring privacy of transactions can make CBDC an attractive payment instrument for end-users and can lead to greater uptake but may pose challenges for regulatory authorities in maintaining financial integrity. For CBDC to be an attractive payment instrument, it is essential to enable some privacy into its design, as users increasingly prioritize data security and privacy in their financial transactions in the digital age. However, this balance can lead to difficulties in monitoring and preventing illicit activities. This challenge could be addressed by implementing tiered wallet systems, where different levels of KYC allow for varying degrees of transaction or holding limits. Such a system enables regulatory authorities to maintain financial integrity while providing users with a range of privacy options based on their level of verification.

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<sup>60</sup> A forthcoming IMF Fintech Note titled “Implications of Central Bank Digital Currencies for Monetary Operations” will cover implications of CBDC on seigniorage.

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Similarly, there are inherent trade-offs with cybersecurity that arise when making CBDC systems accessible and user-friendly. While such designs potentially increase adoption, they also heighten the challenge of maintaining stringent cybersecurity measures. Bharath and others (2024) provide discussions on such trade-offs.

Lastly, allowing for the monetization of CBDC data can incentivize intermediaries' participation in the CBDC ecosystem, but may raise concerns regarding users' privacy. Users who feel uneasy about how their transaction data is used and shared might not adopt CBDC as much as they wish otherwise. To address these concerns, several mechanisms could be implemented. First, allowing users to opt-in or opt-out of data sharing gives them control over their data. Second, adopting design principles that prioritize anonymization and data minimization can protect user identities and reduce the amount of data collected. Finally, establishing regulatory conditions that dictate specific scenarios where data usage is permitted ensures that data is only used in a manner consistent with users' privacy expectations and legal standards. Murphy and others (2024) discuss such trade-offs in further detail.

If coupled with the appropriate privacy frameworks and cybersecurity measures, the introduction of CBDC could significantly enhance trust in the financial system by providing users with a reliable, central bank-backed digital payment option and infrastructure for settlement.

## Financial stability

One final consideration is how to carefully balance driving CBDC adoption with the overarching goal of maintaining financial stability. The introduction of CBDC could contribute to financial stability by increasing the resilience of the banking system.<sup>61</sup> However, widespread adoption of CBDC could introduce risks concerning financial stability, mainly due to potential bank disintermediation and the risk of bank runs. CBDC may encourage people to move their deposits from commercial banks to CBDC even in normal times, and more rapidly during financial uncertainty, which could destabilize the banking sector.

Such risks could be mitigated by offering nonremunerated CBDC and imposing limits on transaction sizes, withdrawals, or wallet balances. Through these measures, the attractiveness of CBDC over bank deposits can be reduced, thereby helping to maintain financial stability. A forthcoming IMF Fintech Note titled "Evaluating Implications of CBDC for Financial Stability" will discuss risks and safeguards in further detail. Additionally, Carapella and others (2024) find that that quantity tools like access limits, transaction size limits, and holding limits on CBDC may have potential adverse side effects of discouraging CBDC usage if not implemented properly and inappropriate limits may not prevent flight to safety in CBDC.<sup>62</sup>

However, given the absence of defined adoption targets for CBDC in many jurisdictions, finding the balance between adoption and financial stability will require further analysis.

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<sup>61</sup> See Luu and others (2023) for further discussions.

<sup>62</sup> See Carapella and others (2024) for further discussions.

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## V. Concluding Recommendations

Promoting CBDC uptake will likely be a gradual process, as with the introduction of any novel payment product. Even if low adoption persists, the introduction of CBDC could still enhance trust in the financial system, increase stability against tail risks, and spur competition among PSPs. A summary of recommendations is as follows:

- **Thinking about adoption:** Central banks are encouraged to consider CBDC adoption from the start of their CBDC journey, as successful CBDC adoption will require strategic policy and design choices that target end-user and intermediary involvement from the outset. Central banks should also set KPIs and success metrics to measure and evaluate adoption, in line with policy objectives.
- **Stakeholder engagement:** Early engagement with end-users should focus on identifying their needs and pain points, as well as social and cultural factors that influence their financial behavior. In engaging with potential intermediaries, central banks should aim to understand their business models, incentive structures, and competitive pressures.
- **Regulation:** Central banks, with relevant policymakers, can take regulatory and legislative measures to foster CBDC adoption, including setting rules around intermediary participation, potentially granting legal tender status for CBDC, governing user fees, and establishing minimum quality standards for services. Such strategies are dependent on respective regulatory and legal frameworks.
- **Communication:** Central banks can disseminate information and counteract misinformation on CBDC, through official portals, traditional and social media. Central banks can also leverage industry partners to extend the reach of consumer education.
- **Design:** CBDC design should prioritize universal access, ease of use, and security. Central banks may consider enhanced functionalities such as offline capabilities and programmable payments. Interoperability and integration with existing systems without costly upgrades can make intermediaries and merchants more likely to embrace the CBDC payment system.
- **Deployment:** Implementing selected use cases (such as P2P, G2P or B2P payments) may help generate initial momentum. Intermediaries should provide both physical registration and eKYC, for users with varying digital/financial literacy. Utilizing local intermediaries like postal offices to provide cash-in/cash-out points can help expand the CBDC network in rural and remote areas. Iterative pilots can be conducted to validate stakeholder and operational readiness before launch.
- **Intermediary incentives:** Central banks can consider both monetary and non-monetary incentives to encourage intermediary participation. This could include exclusivity agreements, subsidies for setup costs, and allowing for CBDC data monetization or charging for value-added services. Providing white-label wallets and SDKs can also encourage developers and fintech companies to participate.
- **End-user incentives:** Incentives might include sign-up bonuses, airdrops or lotteries upon onboarding. Once onboarded, usage incentives could be implemented, such as cash-back offers and discounts on CBDC transactions. Incentives targeted specifically to merchants could include subsidies for setup costs, reduced transaction fees, tax exemptions, or volume-based rewards.
- **Further considerations:** Certain policy issues, including sustainability of the CBDC system, ensuring integrity of the system, and balancing adoption with financial stability, will need to be explored further.



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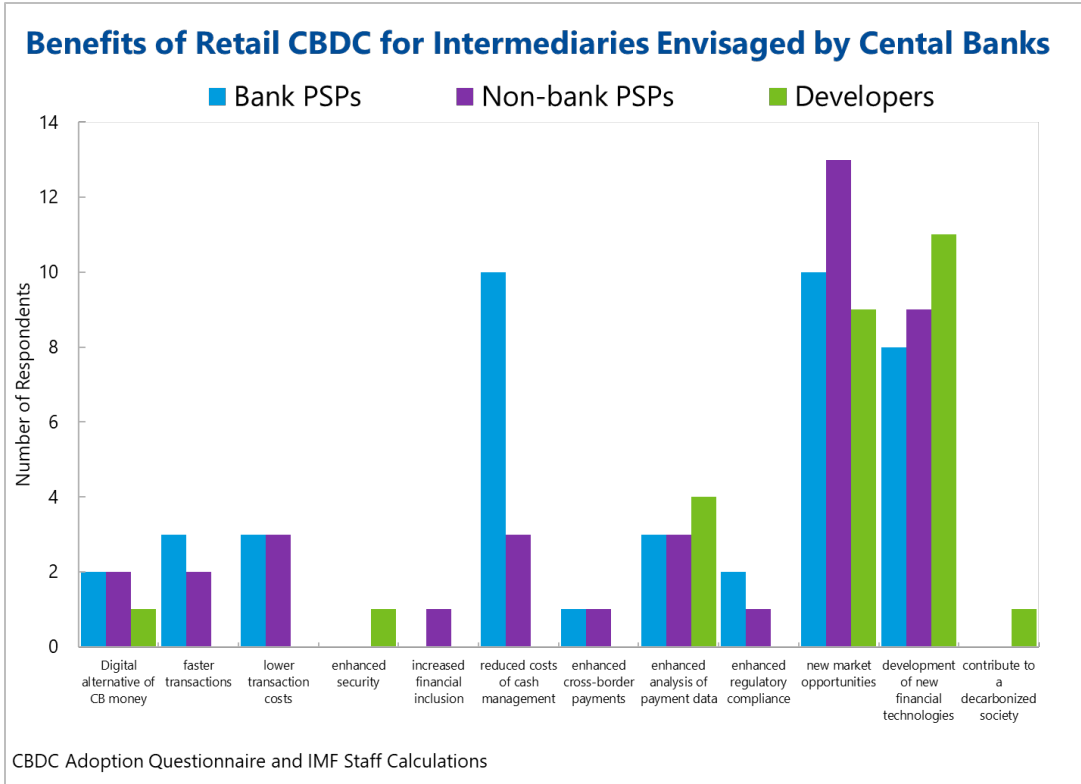
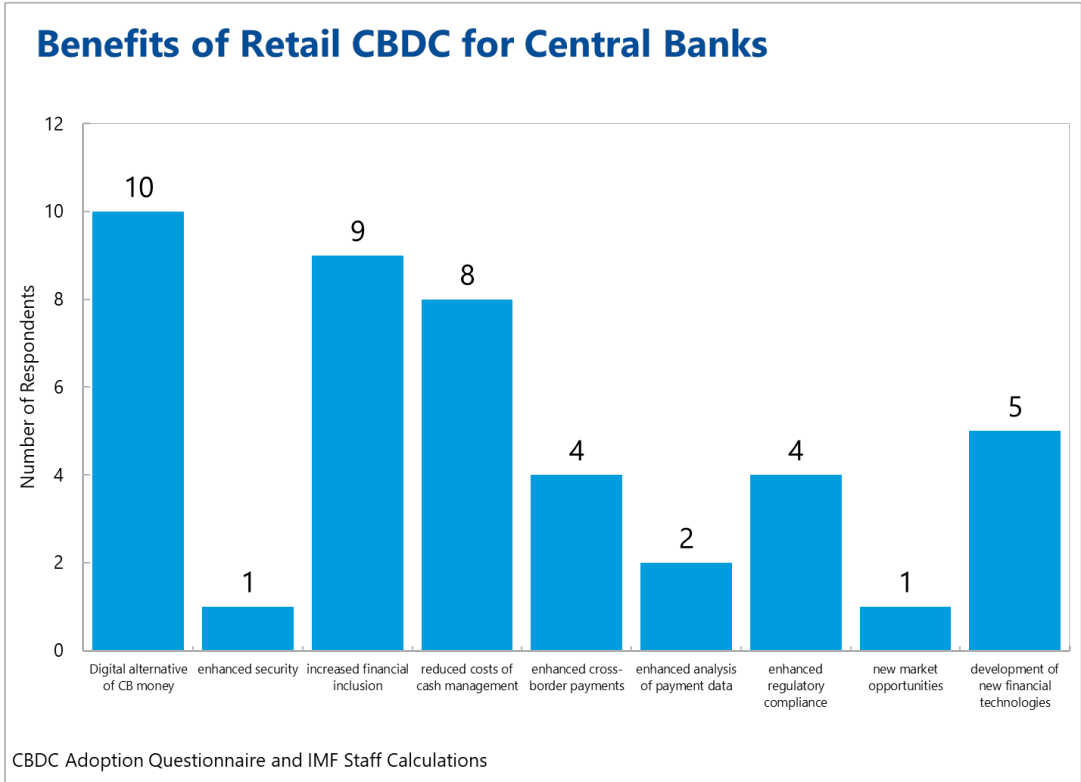
# Annex 1. CBDC Adoption Questionnaire Findings

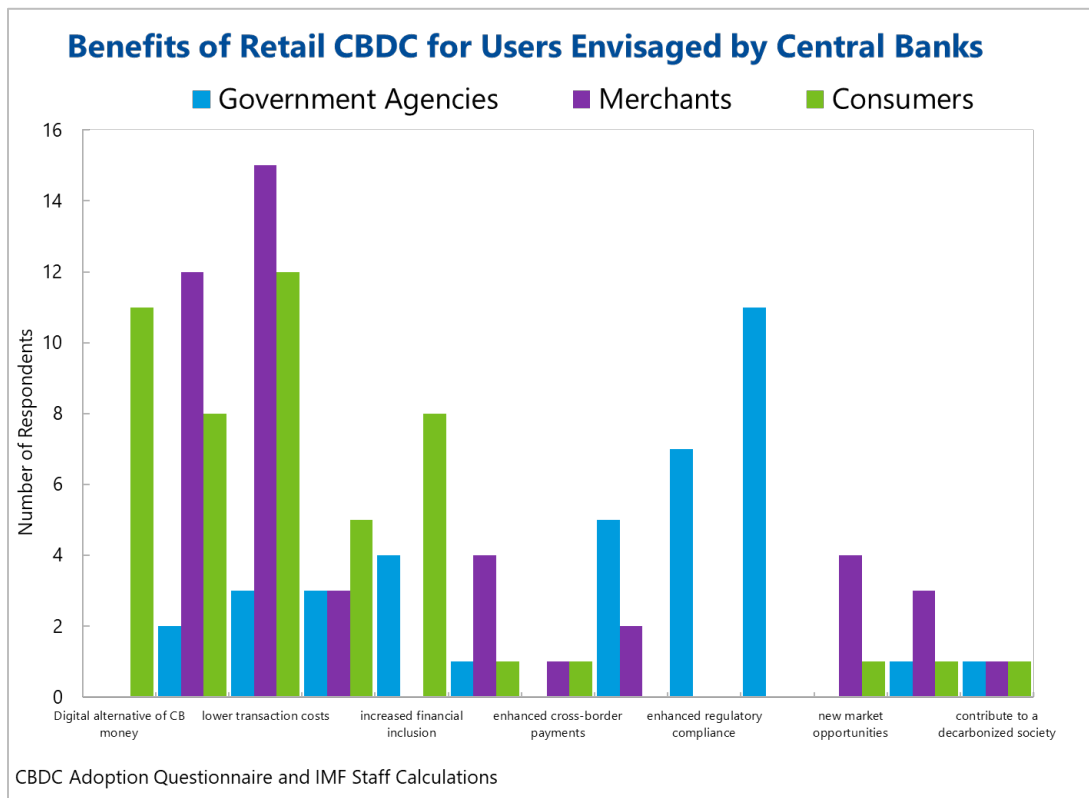
In March 2024, the authors sent a questionnaire to 26 central banks and monetary authorities (collectively referred to as “central banks”), with the objective of gathering initial thoughts on CBDC adoption. The jurisdictions selected as candidates for the questionnaire span a broad geographic range and differ in their stages of CBDC exploration, from early research to advanced implementation, including those undecided on issuance, conducting pilots/proof-of-concepts, or having launched a CBDC.

A total of 18 responses to the questionnaire were received. These include five jurisdictions from Europe, four from the Americas, four from Africa, four from Asia Pacific, and one from the Middle East. The names of the central bank respondents are not disclosed due to confidentiality reasons. Insights from the responses are summarized below.

## 1) Benefits of Retail CBDC for Stakeholders

- Central bank respondents believe that a CBDC can benefit a variety of stakeholders, although the benefits vary. For central banks, CBDC as a digital alternative to central bank money and increased financial inclusion were the most common potential benefits. For intermediaries such as PSPs and developers, central banks view CBDC as a potential for introducing new market opportunities and development of new financial technologies. For users such as consumers and merchants, central banks expect CBDC to offer conveniences and cost improvements, including faster transactions and lower transaction costs. Lastly, for government agencies, central banks view CBDC as beneficial for enhanced regulatory compliance and increased law enforcement.





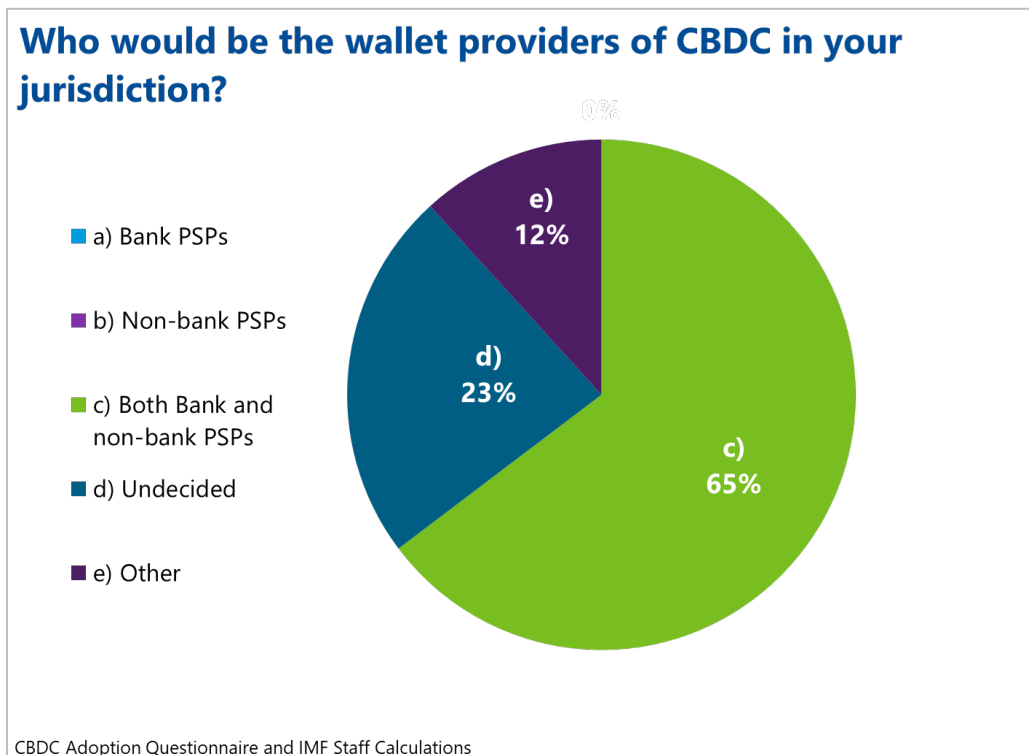
## 2) CBDC Adoption Goals and Monitoring

- Out of the 18 central banks that responded, 17 have not set specific adoption targets for CBDC. Only one jurisdiction noted that they have a target annual growth adoption rate (+20 percent year-over-year) for CBDC but did not specify the base metric for measuring adoption. One jurisdiction noted that they have no target CBDC adoption rate, which is similar to how they do not predetermine banknote usage rates.
- Monitoring and evaluation methods for CBDC remain undecided for most respondents. However, a few central banks have established indicators to trace the usage and adoption of CBDC. For example:
  - One jurisdiction monitors adoption using indicators including the usage (transaction type) of CBDC, amount of CBDC in the hands of the public, number of CBDC wallet holders, CBDC as a percentage of currency in circulation, and the number of CBDC wallet holders who previously did not have a bank account.
  - Another jurisdiction proposed the following metrics for measuring CBDC usage: (i) daily transaction volumes; (ii) number of direct participants, which can be further grouped by service level if not all participants provide the same scope of services; (iii) number of indirect participants, such as merchants; (iv) number of supporting participants, such as technology service providers; (v) uptake of use cases; (vi) transaction throughput; (vii) operating costs, etc.

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### 3) Participation of Intermediaries

- Central banks are considering various ways to encourage PSPs' participation as distributors/intermediaries in the CBDC ecosystem, which include:
  - Technical integration:
    - Designing the retail CBDC as an open infrastructure, making it accessible to various PSPs with low barriers to entry, ensuring easy integration with existing systems at minimal configuration costs.
    - Providing APIs and sandbox environments that enable PSPs to develop and test new services and products using the CBDC platform.
    - Organizing hackathons and other innovation challenges to encourage the development of new applications and services based on the CBDC platform.
  - Incentives:
    - Allowing intermediaries to charge fees to merchants and other PSPs for CBDC transactions, making their participation financially viable.
    - Establishing incentive models that create mutual benefits for all stakeholders involved, making participation in the CBDC ecosystem more attractive to PSPs.
  - Regulations:
    - Enforcing mandatory distribution obligations for credit institutions and establishing a balanced compensation system that motivates PSPs to promote and support the CBDC.
    - Mandating that all new payment platforms demonstrate interoperability with the CBDC from the outset.
  - Education and communication:
    - Offering training and technical support to help PSPs upgrade their systems to handle CBDC transactions, reducing the technical challenges associated with adoption.
    - Including banks and nonbanks in advisory groups to gather input and ensure their needs and concerns are addressed in the development of the CBDC.
- Except for those that answered “Undecided,” 65 percent of central banks envision that both (commercial) bank and nonbank PSPs could be CBDC wallet providers.



#### 4) Participation of Developers and Fintech Firms

- Two jurisdictions shared examples on how they plan to create an environment for Fintech firms and developers to actively engage and innovate within the CBDC ecosystem, including:
  - Building wallet management modules to be common and easy to access for fintech firms and developers.
  - Operating a fintech regulatory sandbox, which could be used to encourage experimentation by fintech companies as they explore value-added services and user experience design to differentiate their CBDC wallets and consider their pricing models.
- One jurisdiction noted that the creation of a modern, efficient payment platform that allows settlements in central bank money (CBDC) and supports smart contracts and payments would itself serve as a sufficient incentive for fintech firms. However, further consideration on the expansion of access criteria for central bank systems would be needed.

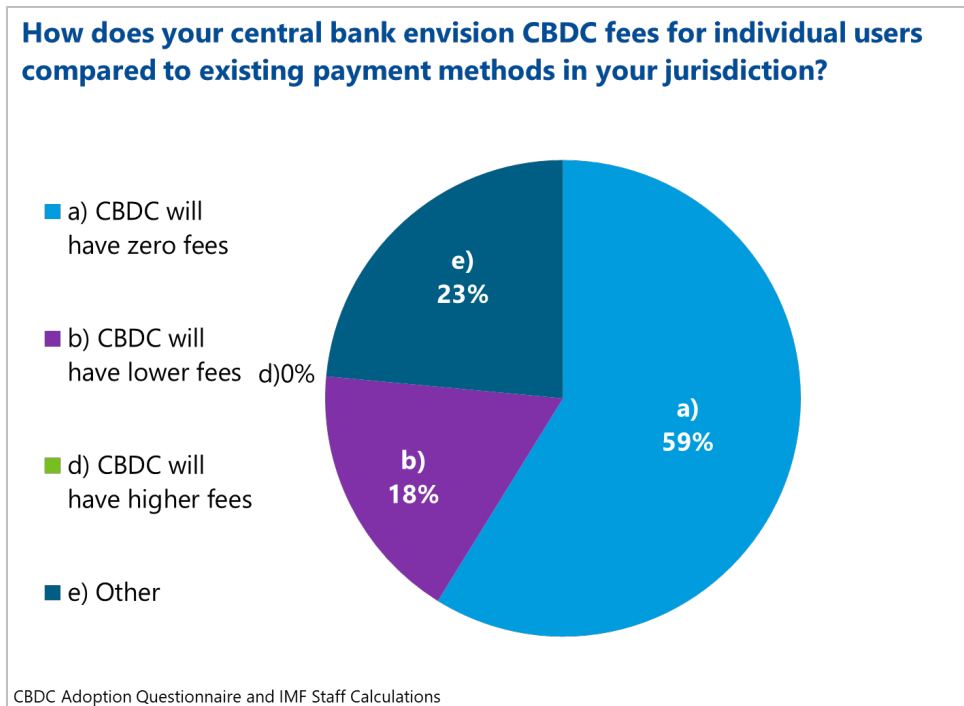
#### 5) Participation of Government Agencies

- In jurisdictions that have launched or piloted CBDC, central banks are working with government agencies to create initial use cases for CBDC, with the goal of expanding its adoption across wider sectors. Examples of efforts raised by respondents include:
  - Government-to-person (G2P) payments, such as social welfare disbursements, to introduce efficiencies in the distribution of funds by government agencies.
  - As part of its legal tender status, require government agencies to accept CBDC for person-to-government payments, such as taxes or fees. This requirement will normalize the use of digital currencies in everyday transactions.

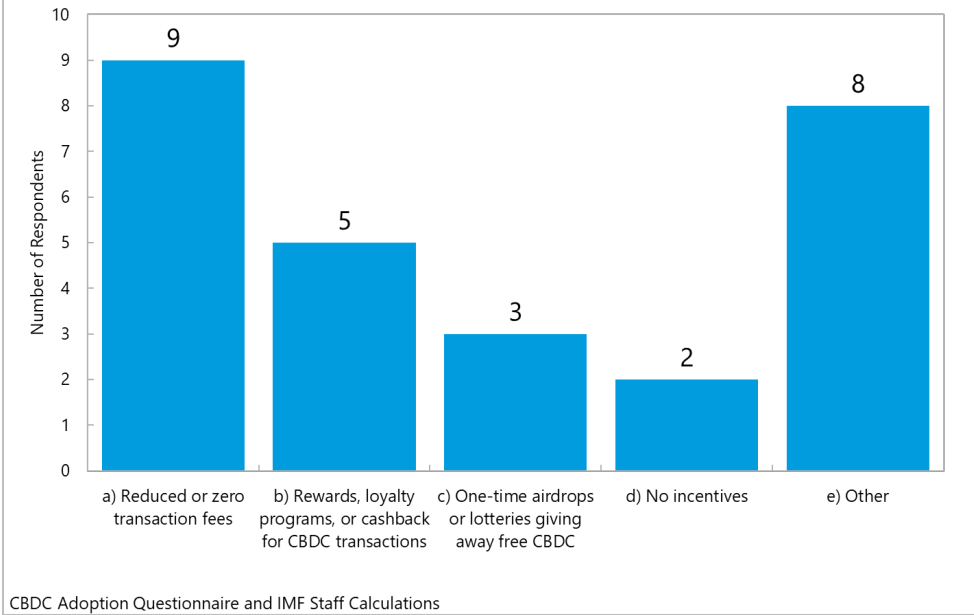
- Encourage government agencies, NGOs, and business owners to reward their loyal customers with CBDC instead of banknotes and other forms of electronic money.
- Encourage religious organizations, including churches and mosques, to accept and give donations and offerings in CBDC.

## 6) Incentives for Individual Users

- All central banks, except those that responded as "Undecided," believe that CBDC should be offered without fees to individual users, as should cash for basic personal payments. However, some envision the possibility that intermediaries, including commercial banks, might charge lower fees for value-added financial services than those currently charged for other payment methods such as e-money.

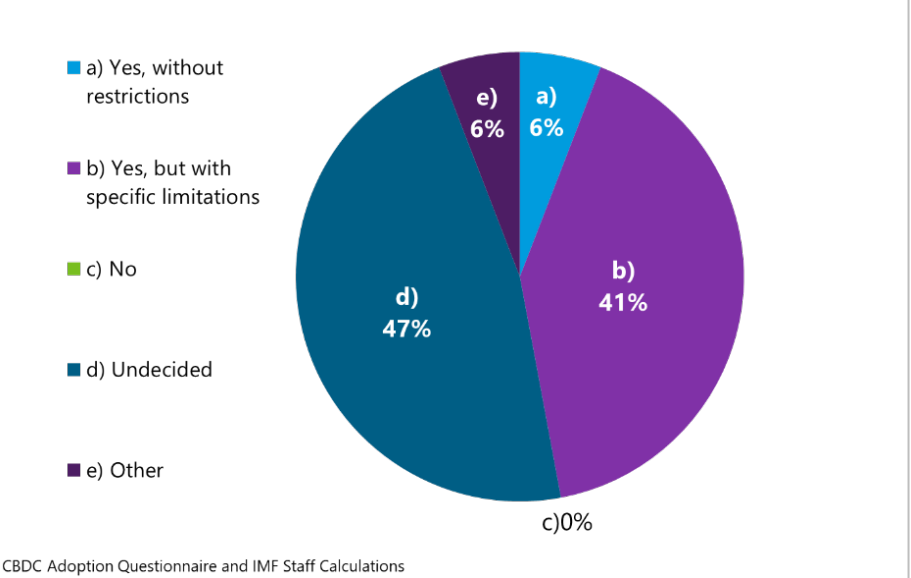


**What incentives, if any, would your central bank consider providing for individual users to facilitate the initial phases of CBDC adoption?**



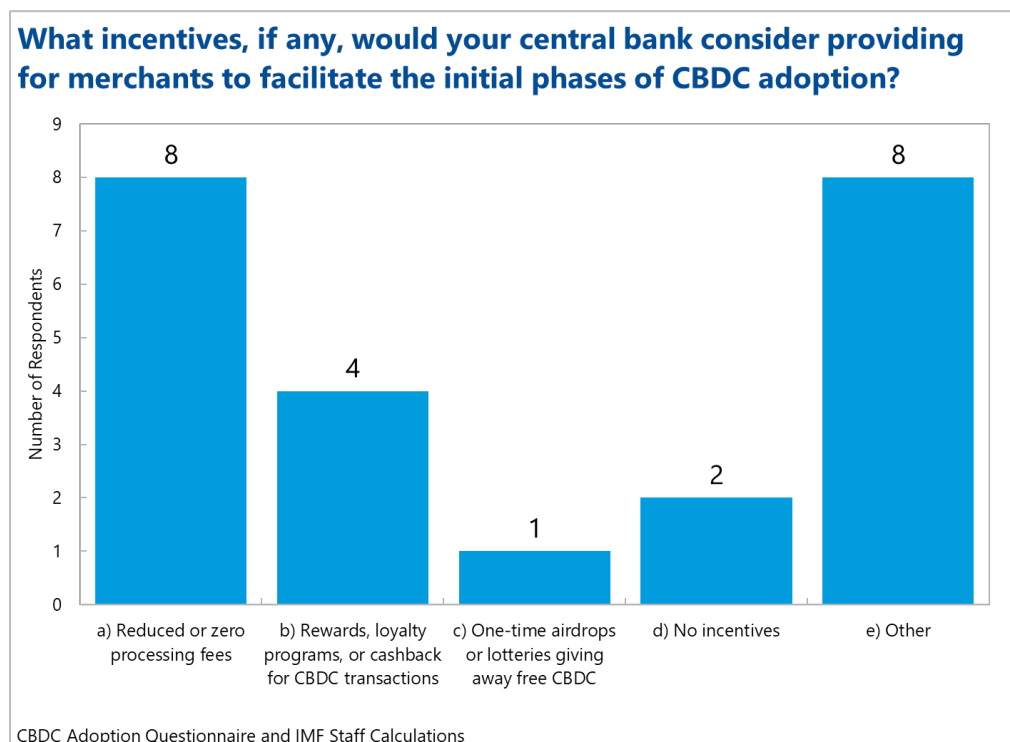
- While 50 percent of respondents are undecided on whether intermediaries would be able to collect and utilize CBDC transaction data as an incentive strategy to encourage their participation, the remainder are working towards allowing PSPs to collect and use CBDC transaction data with consent in accordance with relevant laws and regulations, as they believe it could enhance the value of CBDC, even though it is not currently considered part of an incentive strategy.

**Will PSPs be permitted to collect and utilize CBDC transaction data (with user consent) as part of the incentive strategy?**



## 7) Incentives and Onboarding for Merchants

- Except for central banks that answered “Undecided,” most jurisdictions are considering offering incentives such as rewards and loyalty programs to merchants during the initial phase of the CBDC launch. Such incentives could be offered both directly from the central bank and indirectly through intermediaries. One central bank responded that, although they have no plans to directly provide incentives to merchants or individuals, they will let PSPs decide independently on providing incentives to their customers.



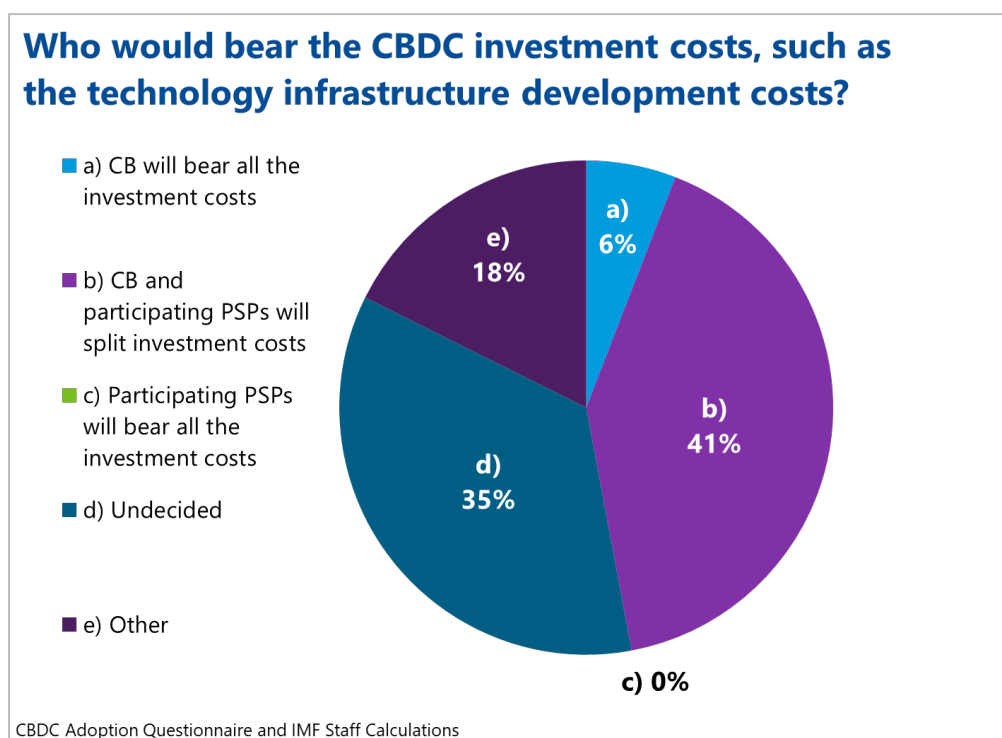
- In order to sustain adoption among merchants and individual users over time beyond the initial onboarding, jurisdictions are considering various strategies like educational campaigns, incentive programs, integration with existing systems, and phased implementations to promote and sustain CBDC adoption. Examples of strategies raised by respondents include:
  - Continuous public education and awareness campaigns on the use cases and security issues regarding CBDC, through a mix of various media.
  - Introduce incentive programs like loyalty programs, cashback rewards, tax incentives, or exclusive discounts for CBDC transactions and encourage government agencies, NGOs, businesses to reward customers in CBDC.
  - Enhance user experience through interoperability with existing payment systems and integration into government systems.
  - Grant legal tender status to CBDC to ensure acceptance.
  - Offer adjacent payment features to create stickiness in customer behavior and increase the number of PSPs providing value-added services.



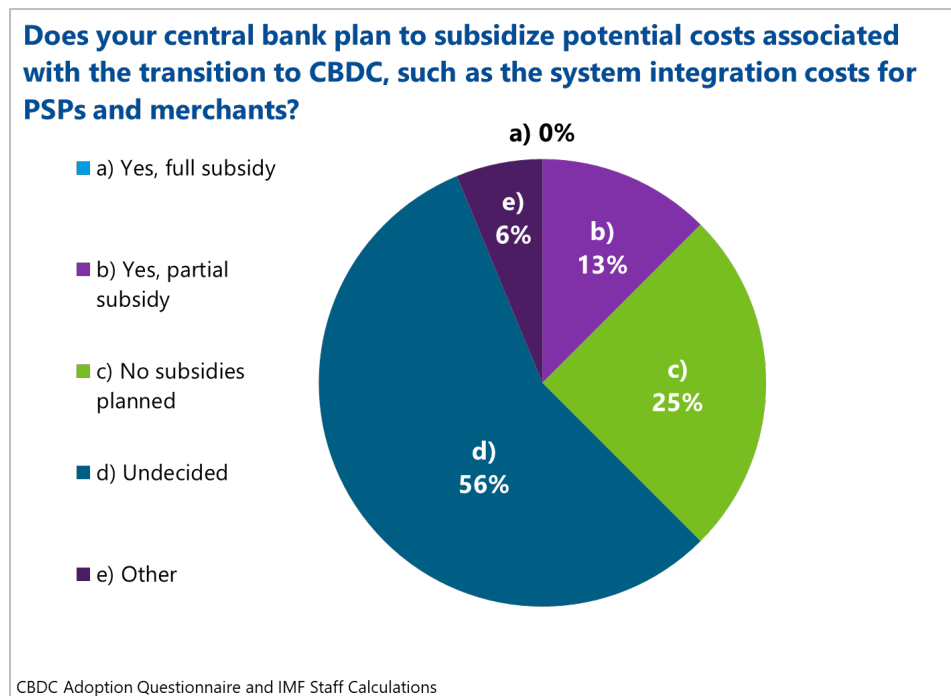
- With regards to the central banks' plans for the onboarding process for merchants (both online and brick-and-mortar) and individual users for CBDC, as well as the involvement of PSPs in the onboarding process, all respondents are conducting or planning to conduct the onboarding process including KYC/AML procedures through intermediaries, typically PSPs.
- Some countries are planning to provide guidance for the onboarding. Specific onboarding strategies include:
  - One jurisdiction envisions providing user-friendly onboarding processes that cater to both online and brick-and-mortar businesses and streamlined processes through digital channels to individual users.
  - Two jurisdictions plan to introduce tiered wallets with lower KYC requirements in onboarding for financial inclusion purposes.

## 8) Cost Recovery

- 41 percent of central banks anticipate splitting CBDC investment costs with participating PSPs, and 6 percent of central banks answered that they will bear all the investment costs. The remainders are still “Undecided”.
- More than 50 percent of central banks believe they are responsible for covering most of the development and implementation costs of the CBDC system and network, while PSPs are responsible for the costs related to integrating their systems with the CBDC platform and developing new products that utilize CBDC features.



- Central banks are still largely undecided on subsidizing potential costs associated with the transition to CBDC, such as the system integration costs for PSPs and merchants. A quarter of respondents stated they would not provide any subsidies.



## 9) Education and Awareness

- Among the jurisdictions that have conducted studies to explore CBDC, many of them gathered insights from users through various channels, including consultations based on white papers, public surveys, pilot testing, face-to-face engagements, etc. The research topics includes current consumer payment behaviors, benefits of retail CBDC over other payment instruments, and public perception of CBDC. Most of the countries which have not done so either recognize the need, or plan to do so.
- The countries which have already launched or piloted CBDC have conducted public awareness campaigns. The outcomes are generally positive, including resulting in more wallet activations. However, some countries conducting pilots face limited public awareness due to limited scope. Most of the countries which have not done so recognize the importance of such campaigns, although modality has not been decided.

## Annex 2. Sample KPIs for CBDC Adoption

Some examples of general KPIs for CBDC adoption as well as KPIs for two specific policy goals are presented below. These KPIs are not meant to be exhaustive or prescriptive; policymakers are encouraged to refine the KPIs further in setting up their jurisdiction-specific CBDC monitoring and evaluation frameworks.

### 1. General KPIs

Stakeholders	KPI	
Central bank	CBDC in circulation	Total value of CBDC in circulation.
	Transaction volume	Total number of CBDC transactions conducted over a specific period.
	Transaction value	Total value of all CBDC transactions over a specific period.
	Average transaction size	Average value of CBDC transactions, providing insights into how CBDC is used.
Intermediaries	Intermediary participation	Number of intermediaries acting as CBDC wallet providers or integrating CBDC into their service offerings; Number of existing banking and payment systems integrated with CBDC.
	Intermediated transactions	Total number and value of CBDC transactions processed by various intermediary types e.g. commercial banks, nonbank PSPs, etc.
	Intermediary satisfaction	Scores to measure satisfaction and identify barriers still faced by intermediaries.
Users	Registered individuals	Number of individuals that have registered for a CBDC digital wallet or account.
	Registered merchants	Number of merchants that have registered for a CBDC digital wallet or account.
	Active users	Number of CBDC digital wallets or accounts that have made more than [x] transactions over a specified period.
	User satisfaction	Scores to measure satisfaction and identify barriers still faced by users, collected from user surveys and feedback.

## 2. KPIs for promoting financial inclusion and access to payments

Stakeholders	KPI	
Intermediaries	CBDC cash-in/cash-out points	Number of people living within [x] kilometers of a CBDC cash-in/cash-out point.
	Growth rate of intermediaries in rural vs. urban areas	Growth rate of intermediaries engaging with CBDC in rural areas compared to urban areas over a specific period.
Users	Consumer adoption rate in rural vs. urban areas	Registrations of CBDC wallets among individuals in urban areas versus rural areas.
	Merchant adoption rate in rural vs. urban areas	Registrations of CBDC wallets among merchants in urban areas versus rural areas.
	Usage rate among previously unbanked	Proportion of individuals who did not have a bank account but began using CBDC.
	Increase in banked population	Growth in the number of individuals who have access to banking services following the introduction of CBDC.
	Volume of microtransactions	Total number and value of CBDC transactions below a specified value threshold.
	Low-income households	Percentage of low-income households opening and maintaining a CBDC account

## 3. KPIs for facilitating payment system efficiency and resilience

Stakeholders	KPI	
Central Bank	Network availability and reliability	Total uptime (or downtime) of the CBDC network over a specified period.
	Transaction processing speed	Number of transactions processed by the CBDC network per second.
	Security incidents	Number and severity of security breaches or incidents affecting the CBDC network.
Intermediaries	Intermediary participation	Percentage of financial intermediaries that have adopted the CBDC system.
	Improvement in transaction speed	The improvement in average time it takes for a consumer transaction to be completed using CBDC compared to previous methods.
	Transaction fees	Transaction fees for payments processed using CBDC compared to traditional payment methods (i.e. CBDC fees for merchant vs average MDR).
	Diversification of payment options	Number of different payment methods merchants can offer with CBDC integration.

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## Annex 3. Existing Market Structures Relevant for the CBDC Ecosystem

This annex provides a short outline of the existing entities and their market structures that could interact and be integrated within the CBDC landscape. Their roles, revenue streams, competitive dynamics, and the evolving nature of financial services are discussed in response to technological advancements. The discussion aims to equip policymakers with the necessary insights to design a CBDC system that effectively interacts with current market structures while fostering CBDC adoption.

The business models of potential intermediaries in the CBDC ecosystem are diverse. Traditional financial institutions (Fis), such as commercial banks and credit unions, offer comprehensive banking services, including deposits, loans, and credit cards. Their business model relies on interest from loans, cross-selling opportunities, and transaction fees. They also leverage extensive customer data for tailored services. Their costs include maintaining extensive branch networks, regulatory compliance, IT infrastructure updates, and customer acquisition. Commercial banks operate on a for-profit basis, while credit unions function as not-for-profit entities. However, other potential intermediaries such as nonbank financial institutions and postal service operators follow different business models. Nonbank financial institutions leverage consumer data from user engagement to offer personalized services and digital financial products, ranging from payments to consumer financing and insurance, showcasing a blend of non-financial and financial services revenue streams. Postal service operators, often under government ownership, may operate as non-profit or for-profit entities, with revenue streams stemming from delivery fees, financial services fees, and government subsidies.

On the merchant side, a layered structure exists among intermediaries providing various services. Acquirers directly link merchants to card networks for processing payments, whereas sub-acquirers rely on acquirer infrastructures to offer similar services. ISOs promote these services and may also provide supplementary services to merchants with existing agreements with other acquirers. Cost-wise, acquirers bear significant fixed costs for system establishment and maintenance, which sub-acquirers avoid by utilizing established networks. Additionally, acquirers face variable costs per merchant for services such as customer support and POS system maintenance, which are fixed fees to merchants but vary for acquirers depending on the volume of service. They also incur variable interchange and network access fees, payable to card issuers and networks.<sup>63</sup>

Many jurisdictions are witnessing significant transformations, driven by the entry of fintech firms and Big Tech digital platform companies that challenge traditional financial institutions. These new entrants leverage advanced technology and personalized products to enhance service efficiency, reaching

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<sup>63</sup> For merchants, the primary cost for card-acquiring services is the Merchant Discount Rate (MDR), which encompasses several fees paid to their acquirer. This fee includes interchange fees paid from the merchant acquirer to the card issuer, scheme fees to operators like Mastercard and Visa, and the acquirer's net revenue covering additional costs and profit margin.

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consumers often inaccessible to traditional financial institutions.<sup>64</sup> This shift has put pressure on traditional financial institutions, which have traditionally relied on physical locations and personal relationships, and now struggle with legacy technology and regulatory constraints that often do not apply to these agile, technology-driven competitors.<sup>65</sup> The emergence of Fintech and Big Tech firms, with their established consumer trust and solid customer bases, presents a challenge to traditional banking models, especially in EMDEs where financial systems are less mature and access to financial services is more restricted.<sup>66</sup> On the merchant front, acquiring markets are usually very concentrated with only a few acquirers dominating the market.<sup>67</sup> In some jurisdictions, sub-acquirers have enabled merchants to accept multiple card networks at points of sale, overcoming the limitations of main acquirers that had exclusive agreements with single networks (such as Visa and Mastercard). This approach helps small and medium-sized merchants avoid the higher costs associated with contracting multiple acquirers. Therefore, sub-acquirers have increasingly improved financial access for merchants, especially by enabling card payments among smaller merchants, while also facing potential challenges with access fees and competition.<sup>68</sup>

Finally, the dynamics of competition vary significantly across different jurisdictions. Big Tech companies like Alipay and TenPay are dominating retail payment systems in markets such as China, while Google and PhonePe have captured a significant share of the third-party payment applications market in India. However, the involvement of Big Tech in the financial sector in the United States has been more limited.<sup>69</sup> Despite the intense competition, there is also collaboration between traditional financial institutions and new entrants, highlighting a complex interplay that reshapes the financial services landscape. As such, central banks should carefully consider how competition and collaboration interact when designing the CBDC ecosystem.

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<sup>64</sup> For more details: [Fintech and the digital transformation of financial services: implications for market structure and public policy](#).

<sup>65</sup> Xavier Vives, Digital Disruption in Banking and its Impact on Competition (Organisation for Economic Co-operation and Development, 2020).

<sup>66</sup> For more details: [Assessing the Impact of New Entrant Nonbank Firms on Competition in Consumer Finance Markets](#).

<sup>67</sup> For example, Welte and Molnar (2021) report that from 2010 to 2018, five companies dominated the acquiring services market in Canada, managing the majority of transaction processing. In 2018, the five largest acquirers in the US handled about 80 percent of transactions, showing a growing market share, while in Australia, four acquirers have consistently dominated the market, according to data from The Nilson Report.

<sup>68</sup> For more details: [Interchange fees, access pricing and sub-acquirers in payment markets](#).

<sup>69</sup> For more details: [Big Tech Firms in Finance in Emerging Market and Developing Economies](#).

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