CBDC: Promoting digital payments in Peru

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PREFACE

A Central Bank Digital Currency (CBDC) is sovereign money issued by the central bank in digital format, which can be held in accounts or through representations called tokens (digital representation with value). The CBDC can be created for payments between financial institutions (wholesale) or for use by individuals and businesses (retail), the latter being the field that generates the greatest interest, especially in emerging countries. In this regard, the design of a CBDC may imply a different allocation of roles and responsibilities between the central bank and the private sector.

The document* "CBDC: Promoting digital payments in Peru" is the first in a series describing the work developed by the Central Reserve Bank of Peru (BCRP) with the objective of determining the need, adequate design, and timing for implementing a CBDC by the BCRP.

Central banks around the world have been carrying out similar work, due to the benefits that the issuance of a CBDC may have on access and use of digital payments, support payments efficiency, reduce cash management costs, foster competition, and innovation, improve the monetary transmission mechanism, enhance financial stability, and strengthen the preference for local currency as a means of payment among the population.

This document shows the results of the research carried out by the BCRP with technical assistance from the International Monetary Fund, which covers topics such as a current overview of the payment systems in Peru, potential use cases of CBDC for unbanked people, and the relevant issues for the designing and implementation of a CBDC, that would complement the current means of payment in Peru.

A survey is issued with the publication of the document to learn the views of the stakeholders, including market agents, on key aspects contained in the publication.

Subsequently, the input from surveys will be utilized to carry out the next phase of exploration, including a more targeted assessment and testing ("Innovation Challenges") of specific aspects of digital payments, including CBDC. This next phase will convene and benefit from the views of technology providers, regulators, and experts from various fields.

The BCRP presents this document to the public as an important source of information that contributes to enriching the debate on the development of digital payments and the possibility to issue a CBDC to foster that development and financial inclusion in Peru.

* In the final version were involved José Aurazo, Jushua Baldoceda, and other members of the Department of Financial Infrastructures Analysis of the BCRP, under the supervision of Milton Vega, Deputy Manager of Payments and Financial Infrastructures, and Paul Castillo, Manager of Monetary Operations and Financial Stability. We thank José Luis Vásquez, Félix Santos, and María García who participated in initial versions, and Carlos Pereyra for his editorial comments.

CONTENT

GLOSSARY

ACH	**Automated Clearing House**
AML/CFT	**Anti-Money Laundering and Combating the Financing of Terrorism**
APDE	**E-Money Payment Agreement**
API	**Application Program Interface**
APT	**Card Payment Agreement**
ATM	**Automated Teller Machine**
BCRP	**Central Reserve Bank of Peru**
Big Tech	**Large Technological Companies/Platforms**
BIS	**Bank for International Settlements**
CBDC	**Central Bank Digital Currency**
DLT	**Distributed Ledger Technology**
EEDE	**Electronic Money Issuing Entities**
ENAHO	**Household National Survey**
IMF	**International Monetary Fund**
INDECOPI	**National Institute for the Defense of Free Competition and the Protection of Intellectual Property**
KYC	**Know Your Customer**
NPS	**National Payment System**
OSIPTEL	**Supervisory Agency for Private Investment in Telecommunications**
POS	**Point of Sale**
QR	**Quick Response**
SBS	**Superintendence of Banking, Insurance, and Pension Funds**
RTGS	**Real Time Gross Settlement**

EXECUTIVE SUMMARY

This document presents the key subjects considered by the Central Reserve Bank of Peru (BCRP) in exploring the adoption of a Central Bank Digital Currency (CBDC). A CBDC is defined as a digital liability of a central bank that can be used as money by the public. Currently, many central banks are considering the issuance of a CBDC for different purposes. Alfonso et al. (2022) shows the results of a survey conducted by the Bank for International Settlements (BIS), which indicates that central banks in Latin America and the Caribbean (LAC), as well as in other emerging economies, are evaluating the issuance of a CBDC with an aim to increase inclusion, efficiency, and security in the domestic payment system. A CBDC can be complementary to the set of existing payment instruments, including banknotes and coins issued by the BCRP, leading to a more efficient, inclusive, and safer payment system.

Like other LAC countries, Peru is still in transition from a cash-based economy to a more digital payments-oriented one. Although the value and number of digital payments have grown significantly in recent years, cash remains the main means of payment in retail transactions due to several challenges:

- On the demand side of payment services, from a consumer perspective: (i) low use of digital payments; (ii) low levels of financial inclusion; (iii) large informal economy; (iv) low financial literacy; (v) high costs of payment services and connectivity; (vi) unperceived costs of cash; (vii) low wealth levels; (viii) lack of trust in the financial system; (ix) limited smartphone and Internet coverage; (x) concerns related to privacy and security of personal data; and (xi) dollarization of the economy.

- On the demand side of payment services, from a business perspective: (i) low acceptance of digital payments; (ii) difficulties in fully understanding payment technologies; (iii) combination of high costs of payment services and low transaction volumes; and (iv) payees' preference for anonymity in cash payments (in part to avoid taxes).

- On the supply side of payment services, the main challenges are the following: (i) lack of interoperability between existing payment options; (ii) difficulties in identifying profitable and inclusive business models; and (iii) limited access points (ATMs and POS).

These challenges need to be addressed to achieve the following policy milestones: (i) higher use of digital payments among the unbanked population; (ii) low costs of payment services; (iii) more trust in payment systems; (iv) interoperability between existing retail payment options; (v) more competition (to foster lower fees and innovation); (vi) higher resilience of the digital retail payment system; and (vii) better governance of personal information generated by digital retail payments. It is also important to note that, based on technology adoption curves in other countries, financially underserved populations are not "first-movers" in adopting digital solutions.

The BCRP, in its role as regulator and supervisor of the National Payment System (NPS), is evaluating three possible options to address these challenges:

- Option 1: Status quo; i.e., continue with the current model of multiple competing payment systems, in the hope that market-based solutions will organically emerge.
- Option 2: Undertake policies to improve access and interoperability of existing payment systems.
- Option 3: Introduce a CBDC as a complement to the existing digital means of payment.

Option 1 is not viable, while Options 2 and 3 form complementary policy strategies. The first option ("wait and see") could magnify existing challenges in the NPS and would not help to achieve the policy milestones. On the other hand, options 2 and 3 are more likely to succeed in achieving the policy

milestones; hence, both options could be valuable strategies to overcome existing problems in the NPS and provide unbanked people with access to digital payments.

Careful CBDC design may help reduce some of the barriers to financial inclusion and interoperability of digital payments in Peru. Further studies are envisaged to identify the conditions for a CBDC to: i) provide the public with access to payment services that meet their needs; ii) offer other financial services, such as savings or budgeting capabilities; iii) generate transactional information that may enable users to be identified as credit subjects; and iv) provide the ability to digitally send and receive funds from other agents in the economy, regardless of their payment service providers.

The issuance of a CBDC is not intended to compete with existing digital payment services, but to expand access to payment services by unbanked people (and other segments of the population who only pay by cash). For a CBDC to meet this objective, an appropriate design is required to offer payment services like those offered by cash, but with the advantage of providing secure and efficient access to the digital payment ecosystem. In sum, a digital currency would be expected to join Peru's payment landscape. To this end, a CBDC in Peru should be characterized by:

- Instantaneous and final payments, at low or no cost, and geared to small-ticket transactions.
- Universally accessible, easy to use, and able to operate on- and offline.
- Multiple use cases, allowing person-to-person (P2P), person-to-business (P2B), and government-to-person (G2P) payments, and vice versa.
- Interoperability with bank accounts, e-money accounts, and other payment options.
- Application of limits on balances and transaction values.

While promoting financial inclusion is a major reason for exploring and potentially deploying a CBDC, it may also have positive impacts on several areas of interest for the BCRP. For instance, the CBDC issuance could also support payment efficiency, reduce cash management costs, improve competition and innovation, foster the monetary transmission mechanism, enhance financial stability, and strengthen the preference for local currency as a means of payment among Peruvians.

However, in no case, the CBDC adoption would imply stopping the issuance of physical money. The public would have at its disposal the two forms of money issued by the central bank, i.e., a CBDC would complement the means of payment that the central bank makes available to the public. In addition, it should fulfill a complementary role to the electronic payment instruments offered by the private sector in such a way that there is an adequate balance between the role of the central bank as issuer of legal tender and the innovations that the private sector can offer.

The CBDC adoption would not require changes to the Central Bank Act. However, considering that a CBDC is a digital form of banknotes and coins, it would be necessary to align BCRP norms with regulations on anti-money laundering/combating the financing of terrorism (AML/CFT), data privacy and protection, KYC requirements, and digital identification, among others.

The initial analysis and ongoing studies show that CBDC issuance involves challenges and risks that should be considered from the design stage. Some potential risks are: i) financial disintermediation (i.e., if people prefer a CBDC over bank deposits), risk that is low as long as the design of CBDC considers similar features as cash and value limits; ii) digital runs (as a CBDC may facilitate cash withdrawals and bank transfers during economic crises), which could be also mitigated with an adequate design of CBDC; iii) reputational risks to the central bank in case the operational and cybersecurity risks involved in the issuance of a CBDC materialize.

If it is decided that the issuance of a CBDC is desirable, the process of its introduction and scalability must be gradual, evaluating its benefits and potential costs or risks at each stage. It should be initially centered on unbanked people in large cities, based on mobile phones, geared to all gender and age groups, based on an intuitive and friendly interface, and available at low or no cost. It

can also be targeted to informal street vendors, as well as transportation and construction workers. Consumer experience and trust are key to CBDC success. From the experience in other countries, there may also be reasons to target businesses and citizens that are already digitally enabled as “early adopters” to encourage faster adoption by other segments of the population.

In sum, this document provides initial information and analysis on the potential issuance of a CBDC and its possible features, whose dissemination is important to facilitate in a first stage a consultation survey of market agents on the main aspects contained in the document and, later, launch an "Innovation Challenge" allowing firms and market agents to review with more detail the working hypotheses that raise this document on the benefits of issuing a CBDC.

I. INTRODUCTION

This document presents the key issues considered by the Central Reserve Bank of Peru (BCRP) in exploring the adoption of a Central Bank Digital Currency (CBDC). A CBDC is defined as a digital liability of a central bank that can be used as money by the public. Currently, most central banks are considering the issuance of a CBDC for different purposes. Alfonso et al. (2022) show the results of a survey conducted by the Bank for International Settlements (BIS), which indicates that central banks in Latin America and the Caribbean (LAC), as well as in other emerging economies, are evaluating the issuance of a CBDC with an aim to increase inclusion, efficiency, and security of the domestic payment system. A CBDC can be complementary to the set of existing payment instruments, including banknotes and coins issued by the BCRP, leading to a more efficient, inclusive, and safer payment system.

Like other LAC countries, Peru is still in transition from a cash-based economy to a more digital payments-oriented one. Cash-based payments involve costs and risks related to the transportation and management of banknotes and coins. While the adoption of a variety of digital payment means has grown rapidly[1], the number and value of digital payments remain low in Peru compared to other LAC countries. In this regard, low financial inclusion confines large segments of the population to transact within a cash ecosystem.[2] As NPS regulator, the BCRP is determined to lead the shift towards greater digitalization, with CBDC adoption as a policy option.

Around 50% of Peru's adult population is unbanked. In this group, 76.6% live in urban areas, and 27.6% live in Metropolitan Lima. The main age group includes people 41-64 years old, which accounts for 38.3% of unbanked people. In addition, 47.5% of financially excluded people have a high-school education. Unbanked people are divided almost evenly between women and men. Regarding the type of job, unbanked people are almost entirely informal workers (95.7%). Moreover, the agriculture and trade sectors account for 38.5% and 20.6% of people who do not hold an account, respectively.

A careful CBDC design may contribute to fostering digital payments, helping to reduce some of the barriers to financial inclusion, and interoperability of digital payments in Peru. Further studies are envisaged to identify the conditions for a CBDC to: i) provide the public with access to a payment service that meets their needs; ii) offer other financial services, such as savings or budgeting capabilities; iii) generate transactional information that can enable users to be identified as credit subjects; and iv) provide the ability to digitally send and receive funds from other agents in the economy.

While promoting access to digital payments is a major reason for studying CBDC adoption, it may also have positive impacts on several areas of interest for the BCRP. A CBDC issuance could also support payment efficiency, reduce cash management costs, foster competition, and innovation, improve the monetary transmission mechanism, enhance financial stability, and strengthen the preference for local currency as a means of payment among Peruvians.

The CBDC issuance is not intended to compete with existing digital payment services, but to expand unbanked people's access to payment services**.** Appropriate design is required to enable a CBDC to provide payment services like those offered by cash, with the advantage of secure and efficient access to the digital payment ecosystem. It is envisaged that the digital currency will dovetail

[1] For example, electronic transfers, digital wallets, and payment cards.
[2] In Peru, financial inclusion is defined as access to, and use of, quality financial services by all segments of the population.

with Peru's current payments landscape. To this end, a CBDC for Peru should include the following features:

- Instant and final payments, at low or no cost, and enabling small-ticket transactions.
- Universally accessible, easy to use, and able to operate on- and offline.
- Multiple use cases for allowing person-to-person (P2P) and person-to-business (P2B) transfers.
- Interoperability with bank accounts, e-money accounts, and other payment options.
- Adequate application of holding and transaction limits for targeted customer segments.

In no case, the CBDC adoption would imply stopping the issuance of physical money by the BCRP. The public would have at its disposal the two forms of money issued by the central bank, i.e., a CBDC would complement the means of payment that the BCRP makes available to the public by offering a public service to those who cannot be served by existing payment options.

The CBDC adoption must be gradual, assessing changes in the legal and regulatory framework, as well as benefits and potential costs and risks, at every stage. Adoption should be initially centered in large cities, based on penetration of mobile phones, and geared towards all gender and age groups; and use an intuitive and friendly interface at low or no cost. It can also be targeted to people working as street vendors, in transportation, and as construction workers. Learning from technology adoption in other countries, there may also be reasons to target businesses and citizens that are digitally enabled as "early adopters" to encourage faster adoption by other segments of the population.

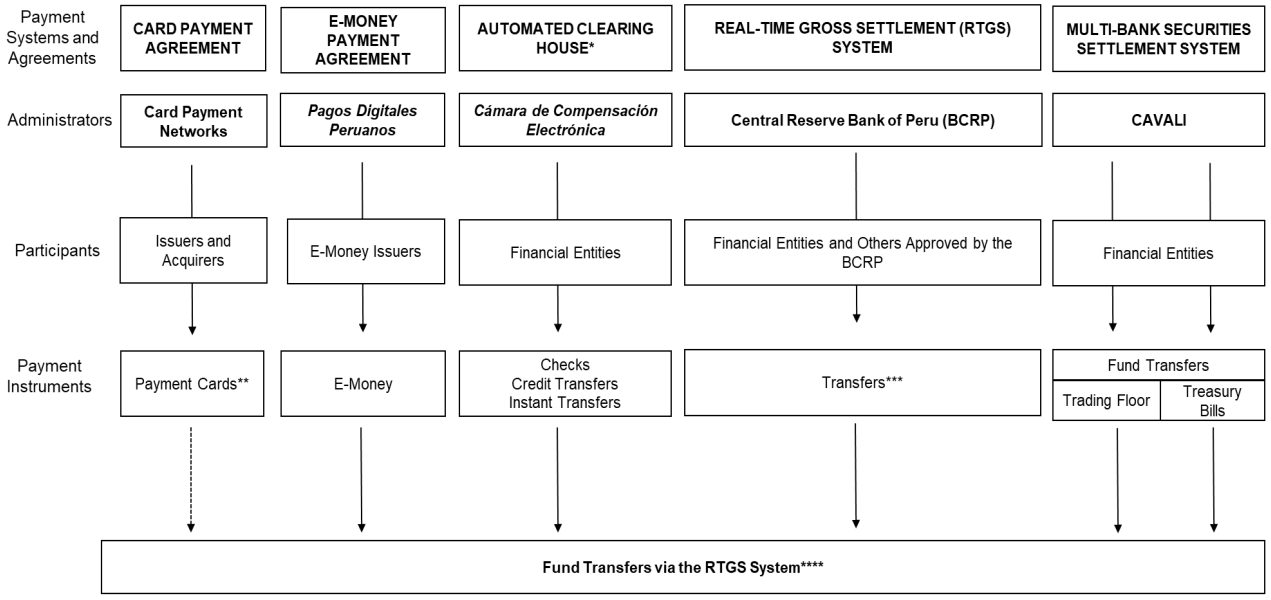
The remainder of the paper is organized as follows: the next section discusses the main short-run challenges in completing the necessary NPS improvements before a final decision to issue a CBDC; section III presents the Strategic Plan for developing digital payments; section IV discusses options for CBDC issuance; section V describes CBDC design issues relevant for Peru; and section VI presents the concluding remarks.

II. OVERVIEW OF PERU'S NATIONAL PAYMENT SYSTEM

A. NPS' Infrastructure

A national payment system is a set of arrangements, regulations, and infrastructures that enable consumers, businesses, and government to transfer funds from their accounts or credit lines to purchase goods and services, make financial investments, and pay for their obligations. A well-developed NPS facilitates and supports the objectives of financial and monetary stability; and fosters efficiency in transactions among economic agents.

Graph 1. Payment Systems and Agreements in Peru



* Clearing and settlement system for checks and other instruments.
** Settlement agents and payer banks participate in settlement operations.
*** Includes transfers between participants, on behalf of their clients, for operations in the FX and BCRP securities markets.
**** BCRP monetary operations are also settled in the RTGS system.

Source: BCRP

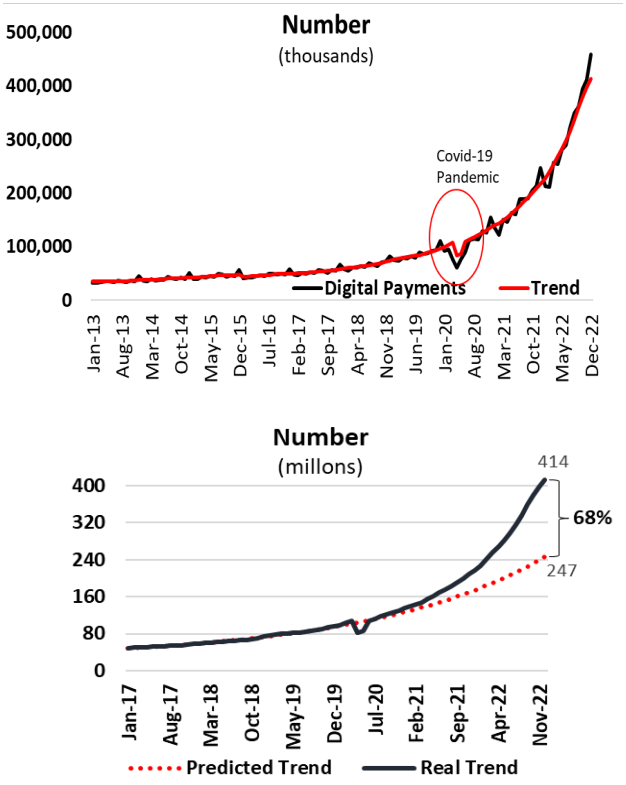
The main infrastructure in Peru's NPS is the Real-Time Gross Settlement (RTGS) system, owned and managed by the BCRP, which settles high-value transfers mainly between financial institutions. The NPS also includes the Automated Clearing House (ACH)—which processes retail or low-value transfers between financial institutions' clients—and E-Money Payment Agreements (APDEs) and Card Payment Agreements (APTs), among other Payment Agreements and Payment Service Providers. Recently, several innovations were introduced to improve user experience and efficiency, such as 24/7 immediate payments, digital wallets, and payments using QR codes.

B. Recent trends in digital payments

Digital payments in Peru have grown rapidly in recent years. The Digital Payments Indicator (DPI) shows a growing trend in the value and number of digital payments.[3] This growth was boosted by the COVID-19 pandemic and innovations in retail payments (24/7 immediate transfers, digital wallets, and QR code payments).

The COVID-19 pandemic shifted payments habits towards greater use of digital means. The divergence between the post-pandemic trend (blue line) and that predicted with pre-pandemic data (dotted red line) (a 68% difference) reflects the significant change in the population's habits during the COVID-19 crisis (Graph 2). Lockdowns and the need for contactless payments fostered the use of digital wallets and instant transfers by people and businesses, especially for small-ticket transactions (minimarkets, street food, restaurants, taxi service, etc.)

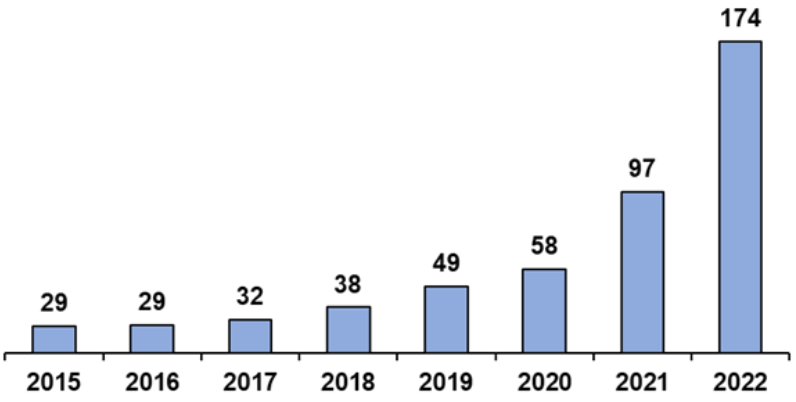
Graph 2. Digital Payments Indicator



Source: BCRP

Around 174 per capita digital payments were made in 2022, more than 5 times the 2015 level, reflecting the growing adoption of digital payments (Graph 3). However, this indicator is still below those recorded in other LAC economies, such as Brazil (351), Costa Rica (235), and Argentina (186) in 2021.[4]

Graph 3. Per capita digital payments



Source: BCRP

[3] The Digital Payments Indicator (DPI) is a monthly indicator published in the BCRP's Financial Stability Report. The DPI includes customer transfers via the RTGS, transfers via the ACH, intra-bank transfers, card payments, account debits, and electronic money transactions via the E-Money Payment Agreement.
[4] These preliminary indicators are calculated using CEMLA data (Yellow Book 2021).

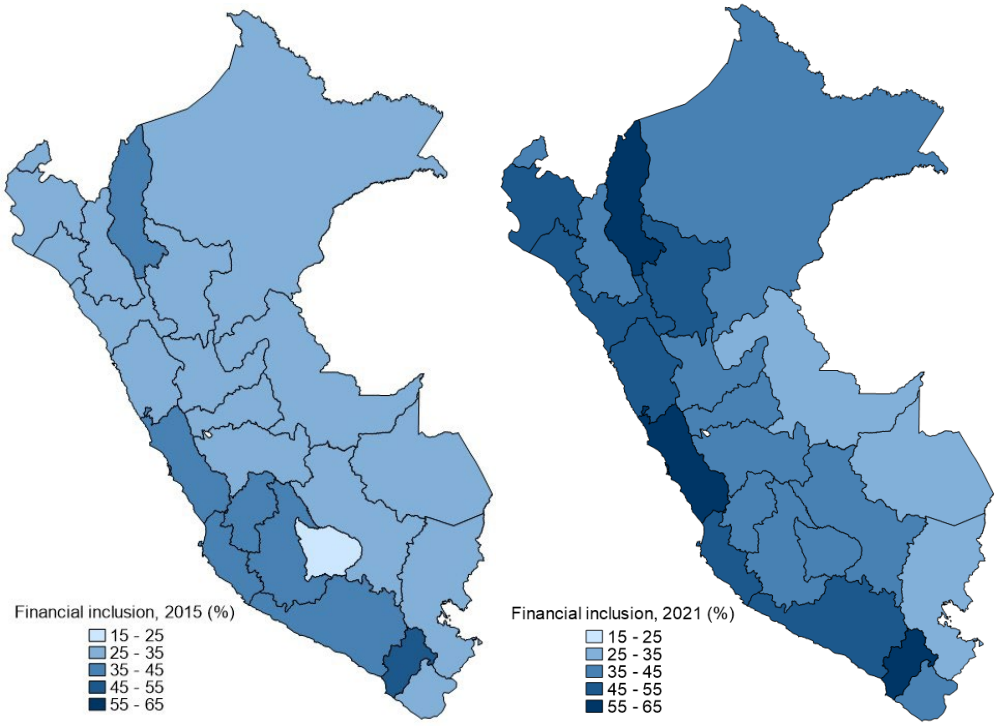
C. Main challenges in Peru's NPS

1. The demand side of payment services—Consumer perspective

From a consumer perspective, the main challenges on the demand side of payment services include: (i) low use of digital payments; (ii) low financial inclusion levels; (iii) large informal economy; (iv) low financial literacy; (v) high costs of payment services and connectivity; (vi) unperceived costs of cash; (vii) low wealth levels; (viii) lack of trust in the financial system; (ix) limited smartphone and Internet coverage; (x) concerns related to privacy and security of personal data; and (xi) dollarization of the economy.

In recent years, financial inclusion (possession of a bank account) within the adult population increased from 35% in 2015 to 49.7% in 2021, although most of this population continues to use cash as their only means of payment. According to Peru's National Household Survey (ENAHO), in 2021 only 49.7% of the population over 18 years of age had an account in the financial system (i.e., were financially included), of which 25.3% reported using means of payment other than cash (debit card, credit card, or Internet/cell phone payments) to purchase goods and services. Graph 4 shows the distribution of financial inclusion by region in 2015 and 2021, reflecting an improvement in coastal and highland areas.

Graph 4. Financial inclusion in Peru, 2015 vs 2021



Source: Own calculations using ENAHO.

As mentioned, the use of digital payments (debit cards, credit cards, and mobile/Internet banking) is still low, even among banked people. According to Aurazo & Vega (2021), the use of digital payments is more likely among people aged 25-40, with a higher level of education and formal employment, and those who live in urban areas or have Internet access. In addition, the probability of paying digitally increases for people in the top quintiles of per capita household spending, as well as for those who live in areas with high financial system presence.

The main reasons unbanked people in Peru do not open a bank account are high costs, lack of money, and distance to access points. Information collected by the 2021 Global Findex identifies the main reasons why people do not hold a bank account in several LAC countries (Table 1).

Table 1. Reasons for not holding a bank account
(% of the unbanked)

Country	Peru	Chile	Argentina	Brazil	Colombia	Ecuador
Unbanked (% of the pop.)	43	13	28	16	40	36
High costs	65	45	48	67	65	59
Lack of money	49	46	69	63	63	48
Distance	41	29	16	33	33	39
Distrust	38	49	34	25	38	31
Required documentation	33	26	22	30	43	28
A relative holds an account	27	22	19	44	24	40
Religion	11	4	1	14	12	12

Source: 2021 Global Findex.

According to ENAHO, lack of income continues to be the main barrier to opening an account in the financial system, as indicated by 78% and 91% of formal and informal workers, respectively. At the same time, it is worth noting that lack of trust is relatively more relevant for formal workers (14.8%).

Additionally, financial illiteracy in Peru is high. A survey on financial capabilities conducted by the Superintendence of Banking, Insurance, and Pension Funds (SBS) and the Development Bank of Latin America (CAF) identified that 37% of Peruvian adults had an adequate level of financial literacy as of 2019. Higher financial literacy would enable people to understand the benefits of using financial services and accessing financial products more suited to their needs.

Notably, Peru's large informal economy is one of the main factors underlying low financial inclusion and use of digital payments. In 2021, informal workers were 76.8% of the employed population (INEI, 2022). According to ENAHO, only 40% of informal workers had a savings account in 2021, indicating that they receive their daily income mostly in cash.

Moreover, the massive use of cash for retail payments imposes costs that are not always perceived by society. These costs are not only related to production, distribution, withdrawal, transportation, and verification, but also to the risks involved in cash transportation and on-site use. In this regard, cash is perceived to be free by final users, while bank accounts, e-wallets, and other digital stores of value are considered to involve account-related costs and transaction fees.

Another important point to consider is the limited smartphone and Internet coverage in rural areas, which restricts access to digital payments. According to the National Institute of Statistics and Informatics (INEI), as of December 2021, 75.8% of the population over 6 years of age accessed the Internet; however, only 47.3% of the population accessed the Internet in rural areas. According to OSIPTEL, Peru's telecommunications regulator, 70.6% of the population over 12 years old had a smartphone in 2021, versus 49.1% in rural areas (OSIPTEL, 2022). However, the development of digital payment technologies and CBDCs is creating alternatives that do not depend on the use of the Internet or smartphones.

Finally, Peru is a dollarized economy where it is possible to hold dollar accounts in the financial system for savings purposes and to carry out transactions. A portion of both financially included and non-included people are accustomed to hold and manage dollars for retail transactions. In this context, individuals can react quickly to a depreciation episode by substituting foreign currency for their domestic currency holdings, either in cash or in the form of bank deposits. Although the share of foreign currency in the financial and payment systems has declined, Peruvians have the freedom to decide which currency to use for trading, saving, and setting prices; i.e., the local currency as a means

of payment constantly competes with the dollar. An efficient payment system further strengthens monetary policy by promoting the use and acceptance of the local currency.

2. The demand side of payment services– Merchant's perspective

The NPS also faces challenges from a merchant's perspective: (i) low acceptance of digital payments; (ii) preference for cash anonymity; (iii) difficulties in fully understanding technologies for accepting digital payments; and (iv) high costs of payment services.

Merchants' level of acceptance of digital payments is relatively low in Peru. According to INEI, in 2019 there were 7.6 million productive units in the informal sector. Out of this group, there were around 3 million formal businesses as of end-2021. However, only around 1.2 million merchants accepted card payments as of December 2021.

Additionally, many small merchants cannot accommodate the technologies and devices needed to accept electronic payments. Moreover, they have difficulties fully understanding them or keeping updated. Furthermore, adopting new technologies adds costs and compresses their low-profit margins. Therefore, the default option is not to accept digital payments.

Finally, the costs of payment services are considered high relative to the low volume of transactions. INDECOPI (Peru's agency for the defense of competition and protection of intellectual property) reported in its *Market Study of Payment Card Services in Peru* that merchant discount rates,[5] as a weighted average, showed a downward trend between 2015 and June 2019. However, the current level is still high compared to rates in other LAC countries like Mexico and Colombia.

3. The supply side of payment services

The main challenges on the supply side of payment services, mainly represented by financial entities, are the following: (i) lack of interoperability; (ii) access barriers to existing payment systems, schemes, and agreements; (iii) difficulties in identifying profitable and inclusive business models; and (iv) limited access points.

One of the major challenges facing the NPS is the fragmented nature of the retail payment industry due to a lack of interoperability among existing payment options. Table 2 shows that the interconnection ratio within the RTGS system is 100%, followed by the ACH with an interconnection of 72%. For their part, interconnection ratios for APDE–Bim and the ecosystems developed by digital wallets are below 50%.

[5] Estudio de Mercado de los Servicios de Pago con Tarjetas: https://www.indecopi.gob.pe/documents/51771/6194832/Estudio+de+Mercado+de+los+Servicios+de+Tarjetas+de+Pago/0e3c7847-00de-ab5c-ec0d-dfbbf1bae458

Table 2. Interconnection in Payment Systems and Agreements
December 2022

Total number per type		Payment Systems		APDE	Digital Wallets	
		RTGS	ACH	Bim	Yape	Plin
Banks	18	18	17	7	3	4
Financial Entities	10	10	5	5	0	0
Municipal S&Ls	12	12	10	9	6	3
Rural S&Ls	6	6	1	1	0	0
Total	46	46	33	22	9	7
Interconnection ratio*		100%	72%	48%	20%	15%

(*) The interconnection indicator is the ratio of the number of participants over the total. It considers the participants that hold deposit accounts for the public.
Source: BCRP

Digital wallets, offered mainly by major banks, are closed schemes for transfers between participants' clients, i.e., wallets are not interoperable. In addition, the e-money clearing operator (PDP-Bim) also works as a closed loop, i.e., it does not interconnect with other issuers of e-money or regular bank accounts (e.g., through the ACH).

Finally, point-of-sale (POS) devices, automated teller machines (ATMs), bank branches, and bank agents are highly concentrated in Lima. According to the SBS, Lima and Callao have the highest density of access points (total access points per square kilometer) compared with Puno or Loreto, located in the southern- and northernmost limits of Peru. Therefore, the rural population has access to a limited number of channels for financial transactions, which are also generally expensive. This situation further increases the friction of using cash, making it difficult for people to easily deposit or withdraw money.

The above-mentioned issues in Peru's NPS are like those faced by other LAC countries, where central banks have implemented public sector payment solutions and have introduced open banking,[6] as well as other changes for improving competition in the payments market (Box 1).

[6] Open Banking is a global trend that encourages players in the financial ecosystem to share banking data and services with third-party financial service providers, after obtaining the explicit consent of the customer.

BOX 1
SUMMARY OF "RETAIL PAYMENTS IN LATIN AMERICA AND THE CARIBBEAN: PRESENT AND FUTURE" (Alfonso et al., 2020)

Retail payment services in LAC countries are characterized by high costs and insufficient access for large swathes of the population. To overcome these limitations, some of the major LAC central banks have taken the lead in introducing fast retail payments and developing an open banking ecosystem. Several others have launched central bank digital currency pilots. This shift towards digital payments is likely to receive further momentum from the Covid-19 pandemic.

Relative to other regions, retail payment services in LAC continue to involve high costs for end-users and be of subpar efficiency, partly reflecting low competition among financial institutions and limited compatibility among payment solutions. Along with low-income levels, high informality, and reduced financial literacy, high costs contribute to limiting access to electronic and digital payments for large swathes of the region's population.

However, central banks and other public authorities have recently launched important initiatives to improve national payment systems, which complement developments in the private sector. In recent years, the region has seen a sharp rise in the number of Fintech firms offering more convenient ways to pay; and Big Tech firms have begun to integrate payment services into their e-commerce or social media platforms. However, private sector incentives are not always aligned with the need of expand payment services among all the segments of the population.

Central banks are the ultimate source of trust in money and payments, and therefore play a key role in maintaining the safety and integrity of payment systems, as well as ensuring that private sector innovation is channeled towards improving competition, securing consumer protection, enhancing financial inclusion, and preserving financial stability.

III. STRATEGIC PLAN FOR DEVELOPING DIGITAL PAYMENTS

With an aim to promote access and use of digital payments, by 2028 the BCRP envisages an NPS where innovative and interoperable payment services and instruments, supported by secure, efficient, and accessible infrastructures, effectively meet the payment needs of individuals, businesses, and government.

In this regard, the BCRP considers implementing policies on three fronts:

Strengthen regulation

- Review of the legal and regulatory framework (Payments Law, Electronic Money Law, and secondary legislation) to improve NPS access, security, competition, interoperability, and innovation. The review should also cover the existing legal conditions for open banking and CBDC issuance.

- Issue new regulations to enforce interoperability, promote market transparency (especially regarding fees in the market for payment cards), regulate payment service providers, and develop open banking in Peru (Box 2).

Modernize and develop new infrastructure

- Modernize the RTGS infrastructure to incorporate improvements in functionalities, operating hours, access, cyber resilience, and security, as well as new technologies (including the ISO 20022 messaging standard), thereby strengthening security, efficiency, and scalability, as well as promoting interoperability.

- Improve existing payment infrastructures and services by assessing barriers that limit access and use of services in ACHs, bank accounts, and e-money arrangements. In this regard, the BCRP conducted a survey of the industry to explore the barriers limiting the development of e-money in Peru (Box 3).

- Evaluate the implementation of a public retail payment platform, built by the BCRP, where all retail payment service providers would be interconnected, thereby facilitating a fully interoperable environment where economic agents can transfer funds at low or no cost, regardless of their payment service providers.

- Evaluate CBDC issuance to facilitate unbanked people's access to digital payments and complement the existing digital means of payment in Peru. CBDC issuance can also support payment efficiency, reduce cash management costs, foster competition, and innovation, improve the monetary transmission mechanism, and strengthen financial stability.

Strengthen coordination and dissemination

- Establish a forum to discuss NPS issues with the private and public sectors.

- Seek agreements with other authorities on common issues such as open banking, market transparency, financial inclusion, digital infrastructures, and data privacy and protection.

- Coordinate with the Ministry of Finance and other major public sector actors to promote digitization of G2P payments.

BOX 2
NEW REGULATIONS ON INTEROPERABILITY AND CARD PAYMENT AGREEMENTS

In the last quarter of 2022, the BCRP issued new regulations on i) interoperability in payment services; and ii) Card Payment Agreements.

INTEROPERABILITY IN PAYMENT SERVICES

On October 7, the BCRP issued Circular 024-2022-BCRP, which mandates digital wallets (Yape and Plin), as well as entities that offer instant payment functionalities (instant transfers and payments through QR codes), to become interoperable by March 31 and June 30, 2023, respectively. Under interoperability, users can make digital transfers/payments to any person or merchant, regardless of the digital wallet, functionality, or mobile application they use, or the financial institution where they keep their accounts.

The main aspects of the Circular are:

a. The obligation to interoperate for regulated entities that provide digital wallets and instant payment functionalities (immediate transfers and payments through QR codes).
b. Principles to promote interoperable payment services that are efficient, secure, accessible, easy to use, readily available, and of high quality.
c. User experience guidelines to promote the adoption of digital payments and prevent practices that hinder the use of interoperable payment services.
d. Transparency of privately determined commissions and fees.
e. Implementation by stages.

CARD PAYMENT AGREEMENTS

On November 10, 2022, the BCRP issued Circular 027-2022-BCRP on Card Payment Agreements (APT by its acronym in Spanish) to enhance efficiency in the provision of card payment services and promote information transparency (effective January 1, 2023).

The Circular considers the following aspects:

a. Its scope covers card payment networks (card brands), issuers, acquirers, and payment facilitators.
b. The APT Administrator is the legal entity that manages, directs, and supervises APT operations in accordance with the arrangements and procedures established for the card payment service. The card payment network is the APT administrator.
c. Establishes principles derived from the BIS guidelines for financial market infrastructures, a set of international standards for promoting payment efficiency and security.
d. Establishes a BCRP registry (purely) informative where card payment networks, issuers, acquirers, and payment facilitators must register.
e. Card payment networks must disclose the interchange fee on their websites and update it on a quarterly basis. In addition, acquirers and payment facilitators must disclose the merchant discount rate.
f. Card payment networks, issuers, acquirers, and payment facilitators must submit information to the BCRP periodically.

BOX 3
SURVEY: BARRIERS TO E-MONEY DEVELOPMENT IN PERU

The Survey was sent to 31 financial entities with an aim to identify "general barriers" to e-money development—including a section on APDE-Bim—as well as possible solutions. The main general barriers identified by respondents were:

a. **Lack of a sustainable business model for participating entities.** Possible solutions are to reduce regulatory requirements that imply additional operation costs, mainly associated with reliability, KYC, and VAT exemption. In addition, sustainable monetization models that create expectations among participating entities encourage them to sustain innovation efforts that can provide value for customers in an environment of security and adequate user experience.

b. **Lack of interoperability with other electronic money issuers**, which indicates the lack of capacity of participating entities to interconnect. In this regard, respondents mention the possibility of conducting operations with other dominant digital wallets.

Regarding APDE-Bim:

c. **Lack of interoperability with other Electronic Money Issuing Entities (EEDES by its acronym in Spanish)**: participants point out that the necessary infrastructure for enabling interconnection between existing wallets is not yet in place. Such facilities are key for providing greater payment options, thereby encouraging the use of electronic money.

d. **APDE-Bim generates a cost for use of the channel by a participant different than the issuer**: participating entities consider the cost of commissions to be a major obstacle, which is not attractive to end customers, thereby generating rejection and reducing the number of transactions. As a possible solution, it is suggested that a minimum or no fee be established among participating entities through new cooperation agreements.

The survey identified other issues, such as: i) outflows from the electronic money ecosystem, which generate higher transaction costs; ii) lack of ACH access to interconnect banked and unbanked users; and iii) the need to limit the cost of cash-out.

To address these challenges, it is necessary to promote the use of electronic money among businesses to reduce cash-out; modify the Law on Payments to grant EEDES access to the ACH (which in turn would imply creating an interbank code for e-money accounts); and reduce the cost of cash-out by generating alternative sources of income through value-added services.

IV. CBDC AS A STRATEGIC POLICY OPTION

A CBDC operating on a public retail payment platform would allow all retail payment service providers would be interconnected (closed payment schemes, financial institutions including those not connected to the ACH, e-money issuers, and payment service providers), and additionally, it would offer the possibility to the unbanked to access digital payments. In this scheme, transfers could be made from CDBC wallets to bank and e-money accounts, and vice versa, under an interoperable framework.

The CBDC issuance can bring benefits to the public, especially Peru's unbanked population because it would be more affordable and reliable than other means of payment. A CBDC would complement rather than replace existing means of payment.

A. Potential advantages

If designed properly from technology, policy, regulation, and user experience perspectives, a CBDC may provide the following advantages for Peru's payment ecosystem:

- **Foster access and use of digital payment among unbanked people.** Digital payments are considered the entry point for digital financial services; and having access to a transactions account is the first step toward broader financial inclusion (Auer et. al., 2022). In the case of Peru, a high use of cash is reported, even among banked people; thus, a CBDC can be especially helpful for low-income households and for those located in remote areas. In addition, a CBDC that ensures overall interoperability among diverse payment instruments would reduce transaction costs for end users and improve noticeably the user experience.

- **Generate important efficiency gains in payments markets by facilitating interoperability and incentivizing greater adoption of digital payments and reducing the need for cash.** It is important to notice that cash is costly to society in terms of time, management, and illegal activities. In contrast, a CBDC can increase social welfare by reducing the costs and risks of using cash. Unlike other digital payment alternatives that use bank accounts or electronic money accounts, a CBDC is a direct liability of the central bank, therefore, it could generate greater confidence as a payment instrument, which in turn would foster a higher adoption. Additionally, a CBDC would offer the possibility of making digital payments without the need to open a bank account or have an internet connection (offline solution); which is crucial for the adoption of digital payments among the unbanked population far from the main cities.

- **Enhance monetary policy effectiveness by fostering financial inclusion. In the event of increasing bank access, by facilitating greater financial inclusion, the financial system could expand, and, consequently, the monetary policy transmission mechanism would be more powerful** (Mehrotra & Yetman, 2014), by extending the interest rate influence of the central bank to a greater number of financial services and products.

- **Contribute to preserving the achievements of lower dollarization in retail payments.** One of the natural barriers to the dollarization of transactions is the facility offered by the domestic currency to make small-ticket payments. Alternative means of payment like foreign currencies, stable coins, and cryptocurrencies could break this balance, and in turn induce to retail dollarization, particularly if domestic inflation is higher than inflation in dollars. A CBDC would maintain the ability to compete with domestic currency by providing low-value digital payments efficiently, at a low cost, and with a wide reach.

- **Promote financial innovation in a regulated environment, thereby facilitating new agents' operations in the payments market**. One of the main risks faced by non-banking companies that offer financial services based on innovative technologies is the need to manage the funds they receive from the public, a challenge faced, for example, by EEDEs or stablecoins. To reduce the credit risk, the funds received by these entities are invested in top-quality assets; which, despite their nature, face market and liquidity risks, so the possibility of replacing these funds with CBDCs would eliminate these risks and allow a greater number of companies to offer innovative digital payment services, without Facing the aforementioned risks would facilitate the entry of new agents into the market and would improve the ability to share information on transactions of the unbanked with financial institutions.

- **Contribute to promoting the introduction of programmable payments**, which have the potential to personalize the use of money, which would allow conditional transfers, among others, to be able to be used on purchases for a pre-selected set of goods and services, increasing the efficiency of this type of government policies.

B. Potential risks

The issuance of a CBDC, depending on the design chosen, could introduce some risks that must be quantified and carefully addressed from the design stage of a CBDC, including:

- **Financial disintermediation.** According to the design of a CBDC, it can work as a substitute for transactional bank deposits, or as an efficient substitute for cash. This will depend on the characteristics of each CBDC. The three basic characteristics of cash issued by the central bank are: i) immediate and final settlement, ii) anonymity of transactions, and iii) wide availability. If a CBDC maintains these same characteristics, it will compete with cash and not so much with bank deposits. On the contrary, if a CBDC pays interest rates, it will compete directly with bank deposits, so part of the deposits could move towards CBDC accounts, affecting the ability of banks to intermediate, with the consequent potential effects of a lower supply of credit and higher interest rates that, depending on the degree of competition in the credit and deposit market, may be reflected in lower margins for financial institutions, which could also generate incentives to take more risks. In this sense, if a CBDC is designed to offer an interest rate, it could have implications for lending and intermediation by the banking sector. The impact of financial disintermediation would weaken the effectiveness of the monetary policy. For instance, a reduction in the total amount of bank lending would diminish the importance of bank credit in the transmission of monetary policy. This risk is significantly mitigated if the CBDC maintains characteristics like those of physical money issued by the central bank.

- **Digital bank runs. Bank runs, in a framework of panic about the solvency or liquidity of a particular financial institution, have been always present in financial systems.** In this regard, the withdrawal of funds can be in cash or through transfers to other institutions electronically. In this context, if a systemic problem arises, a CBDC may be a destination for funds leaving from troubled banks, whenever no amount limits are established for their use. The systemic risk is already reduced in the current system through effective banking prudential regulation, deposit insurance, liquidity facilities provided by the BCRP, and resolution frameworks.

- **Cyber risks and lack of flexibility to make changes to the technology that the CBDC is based on.** Currently, the banking industry is subject to cyber-attacks that, if materialized, could create risks for the implementation of monetary policy and financial stability. A CBDC could face similar risks, which leads to stronger cyber risk mitigation mechanisms at the central bank and at entities distributing a CBDC. Likewise, the dependency of the design and implementation of the CBDC on a technology provider requires creating capabilities so that the team that manages the infrastructure that allows a CBDC to circulate must have the flexibility to meet urgent needs for modifications, updates, and improvements. without depending on a particular technology provider.

These are minimal capabilities that must be built in central banks, so sufficient time is required to achieve this level of technological capability.

- **Reputational risk to the central bank.** In the event of technical failure, low adoption, CBDC use for illicit activities, or other negative outcomes associated with the CBDC network could hurt the central bank's reputation. For this reason, the technological and communications equipment, and the design of a CBDC must also incorporate the necessary elements to manage these risks effectively.

C. Challenges

- **Need to create a consensus about the added value that a CBDC to the payments market.** Although according to the analysis carried out by the Legal Department of the BCRP, the introduction of a CBDC would not imply changes to the Central Bank Act, it is required to create the consensus of market participants, regulatory agencies and the general public on the contribution of a CBDC in the payments market. In this context, it is relevant to assess the need to strengthen the regulatory framework, regarding, among others, AML/CFT, the protection of confidential and sensitive personal data and digital identification (Box 4).

- **The publication of this document is a first step in the strategy that the BCRP has designed to achieve the objective of disseminating the benefits of a CBDC**. This strategy includes: i) a survey to market participants on the content of the document, ii) carry out one or more activities (Challenge) with the aim of conceptually evaluating the benefits and design of a CBDC, which gives rise to continue with other stages of the work, such as the development of a prototype.

- **These activities have been carried out in various central banks around the world, with different levels of progress. However, up to date, there are few countries that have advanced to the stage of issuing a CBDC.** As of December 2022, out of the 114 countries that had begun to explore CBDC issuance, 11 had launched a CBDC (eight Eastern Caribbean countries, Jamaica, The Bahamas, and Nigeria).[7] Due to risks and complexities related to the issuance of a CBDC, it is convenient to implement a careful and iterative approach to understand and address them, considering the facts in each country (Box 5).

- **Finding an adequate balance between the role of the central bank as issuer of legal tender and the innovations that the private sector can offer.** In recent years, the private sector has made important innovations in the payment system that have fostered the adoption of digital payments, thanks to improvements in the user experience, such as payments using QR codes, the use of digital wallets and immediate transfers 24/7. The central bank has accompanied these innovations with its own regulation in such a way that they are carried out efficiently, in a competitive environment. Thus, BCRP has issued the regulation of payment services with QR Codes, which established the technical standards and allowed the development of payments with QR, Circular No. 003-2020-BCRP (February 2020); the regulation of Immediate Transfers which defined principles, obligations and security and operational aspects of this service available 24 hours a day, 7 days a week, Circular N° 0012-2022-BCRP (May 2022), and the Regulation on Interoperability which implemented the Interoperability Strategy of the Central Bank to generate the massive adoption of payments and generate greater efficiency, competition, and the best possible user experience, Circular No. 024-2022-BCRP (October 2022).

[7] Additionally, more than 20 countries will take significant steps towards implementing CBDC pilots in 2023. The European Central Bank will launch a pilot test in 2023; and Australia, Thailand, Turkey, Brazil, India, South Korea, and Russia intend to start or continue such tests.

- **Interoperability is very important due to its potential positive effects on the welfare of consumers, businesses, and the economy.** It positively impacts the way users can carry out their transactions, saving them time and resources at the time of payment or transfer. Likewise, interoperability promotes competition and therefore improves the quality of the supply of payment services. Additionally, greater efficiency is generated due to the reduction of costs to provide services; boosting the productivity of the economy and in general, improving the well-being of people who can carry out their transactions at a lower cost.

  In this context, **the Regulation defines interoperability as the ability of a payment service (digital wallet, functionality, or mobile application) to allow its users to make a payment to any person or business, regardless of the entity that provides services to the payer or the beneficiary**. In addition, it establishes that all those entities that provide digital wallet services, immediate payment functionality embedded in mobile banking applications, immediate transfers in mobile banking applications, and others that the BCRP determines, are obliged to interoperate. The date for the first stage is March 31st, 2023, in the second stage which ends on June 30th, 2023, the digital wallets and bank accounts of financial entities with immediate transfer services must be interconnected with each other and with digital wallets. In the following months, the strategy will be detailed so that Fintech and Big Tech, and EEDEs are also integrated into the interoperable payment ecosystem.

BOX 4
LEGAL CONSIDERATIONS FOR CBDC ISSUANCE

Central Bank Law

Article 42 of the Central Bank Law (Law 26123) establishes that the issuance of banknotes and coins is an exclusive function of the State conducted through the BCRP. Although there is no explicit provision authorizing the issuance of a CBDC, the law does not include a definition of banknotes and coins, which means they are not limited to any form, i.e., they can be either physical or digital. Therefore, the BCRP is allowed to issue banknotes and coins both in physical and immaterial form, including a CBDC.

Similarly, article 43 grants legal tender status to BCRP banknotes and coins, which must be expressed in the national currency. It also imposes an obligation to accept banknotes and coins at face value. Given that banknotes and coins can be either physical or immaterial, no reform would be needed for CBDC issuance.

Moreover, article 63 authorizes the BCRP to receive deposits with no restrictions. This means that the BCRP is allowed to open current accounts, including with the public. Therefore, no legal reform would be needed for the BCRP to issue a CBDC to the public.

In conclusion, no legal amendments to the Central Bank Law would be required to allow CBDC issuance.

AML/CFT regulation

A CBDC may pose financial integrity risks arising from its nature (e.g., retail or wholesale, cross-border or domestic), characteristics, design (e.g., anonymity), and surrounding ecosystem (body of service providers, intermediaries, and users). Therefore, it would be important to review AML/CFT regulations in case of CBDC implementation.

BOX 5
ISSUANCE OF CBDC IN LAC COUNTRIES

According to Alfonso et al. (2022), 85% of LAC central banks are doing research on CBDCs, the same percentage as in the BIS survey's global sample, although LAC central banks are more interested in retail CBDCs. Central banks in LAC countries and other emerging/developing markets seek mostly to improve financial inclusion, efficiency, and safety in their payment systems. Additionally, despite the importance of remittances for the region, the efficiency of cross-border payments is not a prominent motivation. The following table summarizes the main CBDC projects in LAC economies.

Features of the main CBDC projects in LAC

	Ecuador	Bahamas	East Caribbean	Jamaica
Architecture*	Direct	Hybrid	Hybrid	Hybrid
Infrastructure**	Centralized	DLT and centralized	DLT	Centralized
Cross-border use	Only domestic use	Only domestic use	Only used by residents	Only domestic use
Use without Internet access	Available	Possible	Possible	Possible
Personal user data	Held in the central bank platform	Only accessible by the user's wallet provider	Only accessible by the user's financial institution	Only accessible by the user's wallet provider
Transaction log	Held in the central bank platform	Central bank keeps record of all transactions and individual holdings	Held in the blockchain	Central bank can access the retail record but not the identity
Status	Operative in 2014-2018	Operative	Operative	Operative

(*) The BIS considers three CBDC architecture models: direct, indirect, and hybrid. In the direct model, the central bank has a direct obligation to CBDC users (e.g., through accounts at the central bank) and manages retail payments. In the indirect model, retail payments are handled by intermediaries and the central bank settles funds in wholesale accounts. In the hybrid model, the central bank has a direct obligation to users, with a messaging layer operated by intermediaries, who periodically send copies of transactions to the central bank.

(**) The infrastructure can be based on a conventional centrally controlled database; or on a distributed ledger technology (DLT), where data are stored in a decentralized manner.

Source: BIS

D. Target population of CBDC in Peru

The objective of a CBDC within the framework of the payment system in Peru is to give the unbanked population access to digital payments, so it is important to know their characteristics to prepare an implementation strategy.

Among the main characteristics of Peru's unbanked population, the microdata provided by ENAHO 2021 suggests that 76.6% live in urban areas and 27.6% live in Metropolitan Lima. The main age group includes people aged 41-64, which accounts for 38.3% of the unbanked. Regarding educational levels, 47.5% of financially excluded people have a high-school degree. At the gender level, unbanked people are divided almost evenly between women and men. Concerning the type of job, unbanked people are almost entirely informal workers (95.7%). Moreover, the agriculture and trade sectors account for 38.5% and 20.6% of people who do not hold an account, respectively (Annex, Table A.1).

Regarding the household features of unbanked people, almost 3 out of 4 live in non-poor households and only 4.6% live in extreme poverty. Additionally, 44.6% live in households with Internet access and 96% have access to a cell phone. Moreover, just 4.8% of unbanked people receive Pension 65[8] and 11% receive JUNTOS.[9] Finally, 39.3% of unbanked people belong to households with a monthly per capita expenditure of PEN 501-1,000,[10] while 11.9% belong to households with a monthly per capita expenditure of less than PEN 250 (Annex, Table A.2).

Finally, unbanked people are excluded from financial services. The data indicate that 19.3% of unbanked people have saved informally (with a friend or relative, or under the mattress); only 2% have received or granted a loan; and close to 79% have neither saved nor borrowed money.

E. Potential CBDC use cases in Peru

In line with the project of a CBDC, its design, and implementation should be focused on granting access to the unbanked population to digital payments. Therefore, the CBDC use cases are those in which cash is the main payment instrument for the unbanked. Consequently, the issuance of a CBDC is not intended to replace the use of other digital means of payment used by the financially included population. The introduction of a CBDC should contribute to having an ecosystem involving all agents in the payments chain: customers, merchants, wholesale goods distributors, government, financial institutions, and payment service providers. In this vein, the following is a selection of cash flows that can be digitalized using a CBDC in which users mainly pay by cash:

1. Person-to-person payments (P2P payments)

Remittances where at least one of the agents is unbanked

People may need to send money to other cities of the country, e.g., to provide funds to family members. This is particularly important in Peru, as a high proportion of the population is concentrated in Lima (about one-third of Peruvians live in Lima). When the receiver or the sender does not have a bank account, they currently have the following options to send money:

a. Send money through a financial institution via services such as a *giro*.
b. Send via a transport company.
c. Travel and carry the cash personally.

In the case of *giros*, issuing financial institutions need a wide network of agents or agencies for enabling users to send/withdraw money nationwide. The cost of these services in financial entities is PEN 5 (around USD 1.25) as a minimum. The shipping cost per package is at least PEN 8 (around USD 2). In the third case, costs are even higher, considering the time spent queuing up at the bank teller or traveling. In all cases, the cash main not be available before one business day. In addition, people must consider the time it takes to get to the nearest branch or agent and the fact they are not 24x7. All these aspects negatively affect the quality of service and well-being of the user.

Rent payments

Unbanked people who rent out commercial places or houses and only use cash, generate the need for tenants to also use cash. A person who rents an apartment needs to maintain enough cash on a recurring basis each month. In this scenario, the cash should be transported, with the possible

[8] A monetary incentive to provide protection and support to people aged 65 and over in extreme poverty.
[9] A program of conditional social cash transfers.
[10] The exchange rate by end of December was PEN 3.83 per 1 USD.

risk of loss or theft (which increases given the recurring nature of rent payments). The average cost of renting an apartment in Lima is PEN 2,718 (around USD 696) and renting a commercial place can be even more costly, thus the demand for cash from these agents can be relatively high compared to their level of income.

2. Person-to-business payments (P2B payments)

Payments to businesses

People who make daily purchases from street vendors or small merchants in markets, bakeries, and newsstands, among others, use cash as a means of payment and more recently use digital wallets; however, its adoption is still limited, particularly in remote areas of the country where cash is still the king. The average household expenditure for a minimum food consumption basket is PEN 503 (approx. USD 128) per month, i.e., PEN 16.7 (approx. USD 4.3) per day. In this context, it is common for buyers and sellers to use only cash. In the markets, a large part of the payments is made in cash between retail distributors, many of them individuals, and wholesalers, which in turn reinforces the cash ecosystem, to the extent that these agents tend to only receive cash from the people who buy the various products they sell.

E-commerce

E-commerce growth has accelerated in Peru, especially after the pandemic. Although most businesses accept digital payment methods, not all businesses accept cash payments for e-commerce transactions. The unbanked population can make online purchases using payment gateways that accept payment cards. Having no other alternative, people make purchases in person using cash, or make deposits with cash collectors (which involves transporting cash to the point of sale).

Public transportation

Cash is the preferred means of payment in public transportation. As the latter is largely informal (including buses, vans, taxis, and motorcycle taxis),[11] users need to carry cash. In these kinds of payments, it is convenient to carry the exact amount of cash and avoid high-denomination bills, because otherwise, it could take time to get change.

Cash is relevant even in Lima's integrated transportation system. Although users of the *Metropolitano* and *Corredores Viales* transportation systems work with prepaid cards, the latter must be recharged in cash at bus stations, i.e., in general, users cannot recharge prepaid cards online or through payment cards.

3. Business-to-person payments (B2P payments)

Disbursement of wages in cash also creates problems for workers. In the formal sector, salaries are paid into bank accounts by legal mandate, while informal workers are more likely to be paid in cash and then carry the money on them (facing the risk of loss or theft). In addition, they must change money into low-denomination coins and banknotes to carry out daily operations (usually small-ticket payments).

[11] Only some taxis (specifically those operating through apps), and buses accept digital wallets or payment cards.

4. Government-to-person payments (G2P payments)

Social transfers issued by the government are deposited into bank accounts or digital wallets that are not commonly used for purchases, so the beneficiaries tend to cash-out all the funds. People without access to bank accounts or digital wallets can only withdraw these transfers at *Banco de la Nacion's* branches, which prevents them from having the money immediately. They also incur transportation and time costs to find an agent or that *Banco de la Nación's* branch. For their part, non-contributory pension payments aimed at poor people with disabilities can be collected at *Banco de la Nación* or its agents. In some cases, depending on the type of disability, pensions can be delivered in cash to beneficiaries' homes (implying the same costs and risks as in the previous case). By offering a payment instrument that is accepted in the same places that cash is accepted, a CBDC can help keep money flows received in money transfers primarily in the financial system.

Despite the government has begun to open DNI Accounts, its usage to make payments is still limited (Box 6).

BOX 6
DNI ACCOUNTS

A DNI account is a basic savings account offered by *Banco de la Nación* (BN) and linked to an account holder's national identity document (DNI) and cell phone. Activation and use are digital. DNI accounts can be used to receive government bonuses and make payments throughout the national territory. They are being opened progressively, following government instructions, in favor of beneficiaries of social programs.

Current functionalities

DNI account users can perform the following operations:

- Withdraw cash at ATMs and BN agents using a collection code sent to the cell phone.
- Recharge Bim wallets (e-money wallets) and perform operations with them; i.e., send money to other Bim wallets; recharge cell phones; and pay for (i) government fees (at Págalo.pe); (ii) loans (from eight financial institutions); (iii) QR-code purchases via the Izipay and Niubiz POS systems; and (iv) purchases via the GoPay and Red Digital networks.

5. Person-to-government payments (P2G payments)

Currently, the Pagalo.pe platform allows individuals to pay electronically for government services. Transactions can be made with debit/credit cards and electronic money, which excludes those unbanked of this payment facility. In this context, unbanked people must pay in cash and incur transportation costs and risks. Managing queues and cash also involves high costs. A CBDC would be accepted in the government's payment platform, so the unbanked would significantly reduce the costs and risks mentioned above.

F. Towards an implementation strategy

At the first stage of CBDC implementation, P2P and P2B payments should be prioritized. At this early stage, the target population is made up of unbanked citizens, mainly street vendors and transportation and construction workers, who make payments to other persons (P2P payments) and merchants (P2B payments) by cash. They live in urban or near-rural areas where Internet connectivity is poor or non-existent, but they have basic mobile phone access to SMS/USSD services. Additionally, the unbanked usually distrust the financial system; perceive financial products as expensive; and find it costly to open a bank account and access ATMs or bank agents. They seek a digital payment method to meet their P2P (e.g., money transfers to their families in rural areas or other cities) and P2B (e.g., purchases to small-size merchants) payment needs.

V. CBDC DESIGN CONSIDERATIONS

A. Operational models

The International Monetary Fund (IMF) identifies two operational models for CBDC issuance (IMF, 2022), which are defined below and should not be considered mutually exclusive.[12]

In the first model, called unilateral CBDC, the central bank issues a CBDC and performs all related implementation activities,[13] including distribution to, and interaction with, end users. This model is more complex from an operational perspective as the central bank must offer services to end users such as dispute resolution, participant authentication, and cybersecurity, tasks that central banks usually do not perform.

In the second model, called intermediated CBDC, the central bank issues a CBDC but delegates implementation to private sector companies (intermediaries) that interact with end users. The intermediary role can be played by financial entities, payment service providers, and cell phone operators. This model is similar in several ways to the one that currently exists for the creation of bank deposits.

B. Access technologies

The BIS defines two CBDC access technologies: account-based and token-based (Auer & Boehme, 2020).

In the case of an account-based CBDC, access is based on the identification of the account owner. This is the conventional model where a user maintains an account linked to their identity, and transactions are authorized if the latter can be verified. A transaction is recorded in the database by indicating its value and a reference to the user's identity.

In the case of a token-based CBDC, access is based on cryptographic knowledge. This means that a transaction is authorized if a CBDC user demonstrates knowledge of an encrypted value or a secret key. Thus, transactions retain a degree of anonymity, like cash payments in the physical world, but users risk losing money if they do not keep their key secret. Moreover, the authorities face the challenge of monitoring transactions under the AML/CFT regulatory framework.

C. CBDC features to foster digital payments

As mentioned above, the CBDC design should encourage Peru's unbanked population to adopt digital payments. Therefore, CBDC features should aim at overcoming the challenges facing existing digital payments (Table 3).

[12] Under a third model, called synthetic CBDC, private companies issue a CBDC backed by central bank assets. Therefore, strictly speaking it would not be CBDC, but a stable coin or a special type of electronic money.
[13] CBDC implementation involves the following processes: CBDC issuance; validation of transactions; updating of transaction records; measures associated with user due diligence (KYC) and combating illicit flows; user interface management (e.g., mobile application); and handling users' personal data and user service.

Table 3. Main CBDC Features

Feature	Description
Convenient	Easy to use; fast and simple digital onboarding process.
Accessible	No need for a bank account; interface operative in slow- or no connectivity situations.
Available/accepted	Available 24/7; universally accepted.
Intended for small-ticket transactions	Geared for small-ticket transactions. For higher value operations (above a cap) users resort to traditional financial services and products.
Convertible	Easily convertible to cash.
Access to multiple services	Geared for P2P, P2B, and P2G operations.
Access to personal transaction data	Users can keep an expenditure record that may facilitate access to other financial products.
Interoperable	Geared for transfers from CBDC wallets to bank accounts and from CBDC wallets to e-money accounts (and vice versa). Enabled to work with POS networks and QR codes.
Low-cost	Ideally, no cost on small balances and transactions for end-users; and possibly lower costs than in current payment systems for businesses.
Anonymity	CBDC anonymity is attractive to users operating in a cash ecosystem.

According to the information from ENAHO, most of the unbanked population is in large cities, therefore the strategy for a potential deployment of a CBDC should initially focus on the big cities. Under this strategy, a CBDC should be based on a distribution channel that reaches this population at low or no cost. It can also be targeted to informal street vendors, as well as to transportation and construction workers. Trust is very important, so the institutions that distribute the CBDC should offer a 24/7 line that guides users and allows them to resolve queries on dispute resolution.

From the use cases, CBDC design should consider the following:

a. **Wide availability, both on smartphones and regular phones, allows using the CBDC safely and efficiently**, **with an ample cash-in/cash-out network, to facilitate deposits into wallets.** Fees should be zero and the business models should seek to monetize in other payment flows or value-added services.

b. **Full convertibility with the local currency**, e.g., PEN 1,000 in private bank deposits would be equivalent to PEN 1,000 in CBDC.

c. **A feature for sending payment reminders (e.g., in the case of persons who rent out property)**, keeping track of payments, and scheduling recurring payments to the same account or person via a real-time mobile solution.

d. **Available for offline payments**, either through devices embedded in cell phones or stand-alone devices that may be used offline (as Internet access is uneven across the country). Implementing a single payment solution may diminish fragmentation in the transport system.

e. **A CBDC would provide a simple way to pay salaries into workers' wallets**, thereby reducing costs and risks to both firms and workers.

f. **Reliable and tiered authentication system** to identify the population targeted for social transfers and verify payment requests (the level of personal data required for authentication depends on the amount transacted).

g. **Connection to government payment platforms** like Pagalo.pe to avoid having to go to bank agencies.

D. Conceptual view

Considering what has been discussed until now; Graph 5 presents an initial CBDC conceptual view. This proposal consists of an intermediated CBDC model, with a CBDC issued by the BCRP and based on digital tokens, aimed to resemble, and improve the features of cash. Once issued, the digital tokens would be distributed among the population through financial institutions and authorized agents (Fintech, stores, etc.). The intermediated model allows the BCRP to maintain a central ledger of transactions and keep control of payment systems, in line with its supervisory role and its mandate to preserve financial stability.

Citizens would also be provided with any digital wallet to use CBDC, which allows storing digital tokens to make (and receive) payments[14] without necessarily holding a bank account. Ideally, CBDC payments would be free of charge for balances and small-ticket transactions. CBDC wallets could be recharged through transfers from banks or electronic money accounts, payments from other users, and cash deposits at financial institutions and authorized agents.

A registration process is required for obtaining tokens and activating digital wallets in an agile and affordable way. Users must complete the registration process for due diligence (KYC) at financial institutions or CBDC agents. The basic information for user registration should be the DNI number. For banked users, registration with a financial institution can be used.

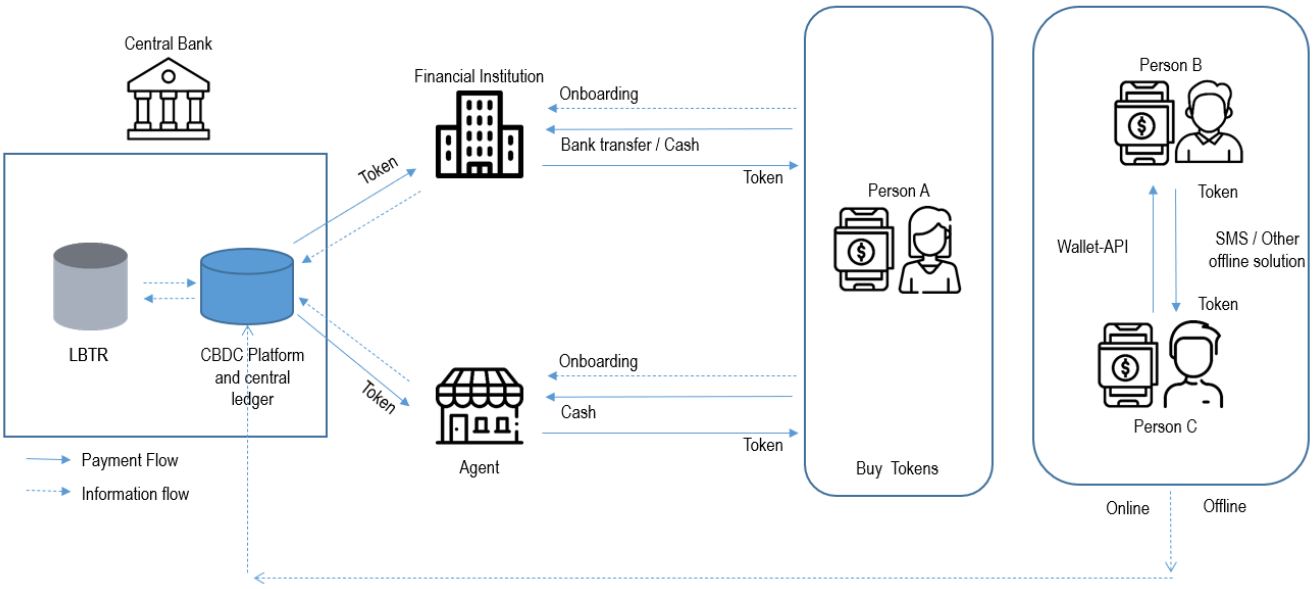
Authentication should be tiered based on the type and value of the transactions. Users would be able to opt for total anonymity for low amounts but will be required to provide more information for higher amounts or depending on the type of transaction, e.g., social transfers.

It should be possible to carry out payments and transactions even in places with no Internet connection (and in natural disaster scenarios where telecommunications are likely to collapse). In this regard, it is key to introduce an offline SMS-based system or other offline solutions.

Finally, a CBDC should be universally accepted and recognized as legal tender, i.e., all economic agents will be mandated to accept CBDC tokens and make the necessary arrangements to operate with them.

[14] P2P payments, P2B payments, and P2G payments, and vice versa.

Graph 5. High-level flowchart



E. Implementation strategy

The BCRP is currently exploring the feasibility of issuing a CBDC. While a conceptual model, based on selected use cases, and addressing the potential benefits and risks, has been identified, the BCRP expects to obtain more precise answers to open questions following an iterative approach ("5P" methodology) (Graph 6). This initial stage, called Preparation, finalizes with the completion of this document. The following stages involve a joint work with the private sector and relevant public authorities to further assess conceptual and architectural issues that may contribute to fostering digital payment adoption among the unbanked.

Having finalized i) the preparation stage, the remaining steps are: ii) proof of assumptions, iii) prototype, iv) pilot, and v) production. These stages are sequential and permanently active since a CBDC project requires continuous evaluation. Thus, during any part of the process, it will be possible to return to previous stages in search of new solutions. If a prototype is approved, the project would move on to a pilot phase where a production situation would be simulated with a small sample of the population. Finally, the approved pilot would move on to a production phase. This document is the first step in this strategy, which will be followed by a survey directed to the participants to receive comments and suggestions on the different aspects involved in issuing a CBDC, and an "Innovation Challenge", an activity that will allow the participation of third-party specialists who will examine the hypotheses that have been raised in this document about the possible role that a CBDC could play in the Peruvian economy.

Graph 6. Iterative approach ("5P" methodology)

VI. CONCLUDING REMARKS

A CBDC can be complementary to the existing set of payment instruments, including banknotes and coins, leading to a more efficient, inclusive, and safer payment system. It would also have the benefit of maintaining the properties of Peruvian currency as a means of payment in the digital world, which helps to consolidate people's preference for money issued by the central bank as a means of payment.

A CBDC is also a tool to foster financial inclusion and enhance the use of digital payments among unbanked people and may also have a positive impact on several areas of interest for the BCRP. Additionally, CBDC issuance could support payment efficiency, reduce cash management costs, foster competition, and innovation, improve the monetary transmission mechanism, and strengthen financial stability.

The BCRP has completed a research stage as a foundation for the proof-of-concept, prototype, pilot, and production stages, which will be developed with the participation of the private sector and other authorities. This research stage started with a stock-taking of the current payments system, which served to identify that low financial inclusion and lack of interoperability are the most important elements limiting the development of digital payments in Peru, and it is possible that a CBDC contributes significantly to solving these problems.

Finally, considering the features of unbanked people, the strategy for CBDC implementation should consider P2P and P2B payments that are potential catalysts for expanding the use and acceptance of a means of payment, considering the replacement of banknotes and coins in the cash-based payment flows. At this early stage, the target population is unbanked citizens, mainly street vendors and transportation and construction workers, who make payments to other persons (P2P) and merchants (P2B) by cash. They live in urban or near rural areas where Internet connectivity is poor or non-existent but have basic mobile phone access to SMS/USSD services. Additionally, the unbanked usually distrust the financial system, perceive financial products as expensive, and find it costly to open an account at bank branches or access ATMs or bank agents. They seek a digital payment method to meet their P2P (e.g., money transfers to their families in rural areas or other cities) and P2B payment needs (e.g., purchases to small-size merchants).

VII. ANNEX

Table A.1. Characteristics of unbanked people (% of unbanked), 2021

Total unbanked adults (% of adults)	50.3		
Area of residence		**Geographic area**	
- Rural	23.4	-Metropolitan Lima	27.6
- Urban	76.6	-Urban coast	21.9
Age range		-Urban highlands	18.7
- 18-24	18.6	-Rural highlands	15.8
- 25-40	30.7	-Rural Amazon	8.4
- 41-64	38.3	-Urban Amazon	5.3
- 65 and older	12.4	-Rural coast	2.4
Economic Activity Condition			
- Employed EAP*	68.0	**Economic Activity**	
- Unemployed EAP*	5.5	-Agriculture	38.5
- Not EAP*	26.5	-Fishing	0.8
Type of job		-Mining	0.8
- Informal	95.7	-Manufacture	6.8
- Formal	4.3	-Construction	7.9
Level of education		-Trade	20.6
- Elementary	29.5	-Transportation	8.7
- High school	47.5	-Government	0.9
- University	9.5	-Hotels	6.9
- Non-university	8.2	-Real Estate	1.4
- Other	5.3	-Teaching	0.5
Gender		-Other Activities	6.2
- Female	50.6		
- Male	49.4		

* Economically Active Population.
Source: Own calculation using ENAHO.

Table A.2.Household features of unbanked people (% of unbanked), 2021

Total unbanked adults (% of adults)	50.3		
Poverty status			
- No Poor	72.0	**Access to Internet?**	
- Poor	23.4	-Yes	44.0
- Extreme Poor	4.6	-No	56.0
Monthly per capita household expenditure			
- < PEN 250	11.9	**Access to mobile phone?**	
- PEN 251- PEN 500	38.7	-Yes	96.0
- PEN 501- PEN 1 000	39.3	-No	4.0
- > PEN 1 000	10.2		
Received Pension 65?		**Received JUNTOS?**	
- Yes	4.8	-Yes	11.0
- No	95.2	-No	89.0

Source: Own calculation using ENAHO.

REFERENCES

Alfonso, V., Kamin, S. & Zampolli, F. (2022). “Central bank digital currencies (CBDCs) in Latin America and the Caribbean”, BIS Working Papers N° 989.

Alfonso, V., Tombini, A. & Zampolli, F. (2020). “Retail payments in Latin America and the Caribbean: present and future”, BIS Quarterly Review, December.

Auer, R. Banka, H., Yaa Boakye-Adjei, N., Faragallah, A., Frost, J., Natarajan, H. & Prenio, J. (2022). “Central bank digital currencies: a new tool in the financial inclusion toolkit?”. FSI Insights on policy implementation N° 41. BIS, Basel, Switzerland.

Auer, R. & Boehme, R. (2020). "The technology of retail central bank digital currency", BIS Quarterly Review, Bank for International Settlements, March.

Aurazo, J. & Vega, M. (2021). “Why people use digital payments: Evidence from micro data in Peru,” Latin American Journal of Central Banking, 2(4): Article 100044.

International Monetary Fund (2022). “Behind the Scenes of Central Bank Digital Currency”, IMF Fintech Notes, February.

Instituto Nacional de Estadísticas e Informática (2022). “Perú: Comportamiento de los indicadores de mercado laboral a nivel nacional, Informe Técnico, trimestre: octubre-noviembre-diciembre 2021”, Marzo.

Mehrotra, A. & Yetman J. (2014). “Financial inclusion and optimal monetary policy”. BIS Working Paper No. 476, BIS, Basel, Switzerland.

Organismo Supervisor de la Inversión en Telecomunicaciones (2022). “Encuesta Residencial de Servicios de Telecomunicaciones (ERESTEL) 2021”, Julio.