The Bank of Korea's CBDC research: current status and key considerations

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Abstract

In this paper, we present the current status of the Bank of Korea's (BOK's) research on central bank digital currency (CBDC) research, and explain our perspectives on how our potential CBDC could help address future challenges posed by rapid digital transformation of the economy.

Section 1 assesses whether we need to introduce CBDC in Korea. Currently, the BOK doesn't see an urgent need to issue CBDC, since, in Korea, bank account ownership is among the highest in the world, and we already have a sophisticated fast payment system. However, taking the recent acceleration of innovation in the payment and settlement sector into consideration, we also believe that the need to introduce CBDC in Korea will increase significantly in the future, and thus, there is a strong case for being prepared.

Section 2 explains the BOK's perspective on the design principles of CBDCs to respond effectively to rapid changes in financial and economic conditions, including: i) a continuous decrease in cash use; ii) the threat of big tech's market and data dominance and iii) the growing possibility of greater interest in global stablecoins in Korea. We believe that potential CBDC should be a reliable, low-cost, universal payment method on a daily basis, but at the same time be positioned as an open and universal public currency infrastructure that will support innovation and competition in the payment industry.

Section 3 concludes with the introduction of the BOK's CBDC-related research and a brief description of the Bank's current CBDC experiment.

Keywords: CBDC, financial access, digital transformation, big tech, market dominance, stablecoins, anonymity, privacy, CBDC experiment.

JEL code: E42, E58, O33.

1. Do we need to introduce CBDC in Korea?

Financial and economic conditions

With a high level of financial accessibility and well developed digital payment systems, financial inclusion and efficiency of payment services are sufficiently advanced in

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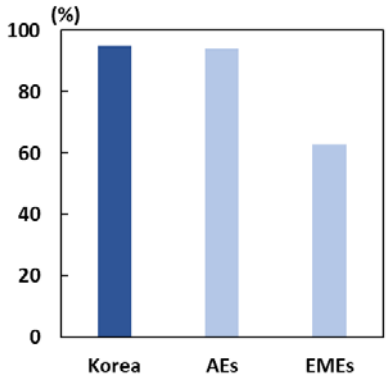
Korea.[2] The account ownership currently stands at 95%, which is one of the highest even among advanced economies. Korea also has a sophisticated fast payment system. In 2001, Korea became the first nation to launch a retail fast payment system, the "Electronic Banking System," which allows real-time transfers of funds 24/7. The transition to digitalised finance is progressing smoothly as well, with a high smartphone penetration rate (95%) and a steady increase in the number of both internet and mobile banking users.

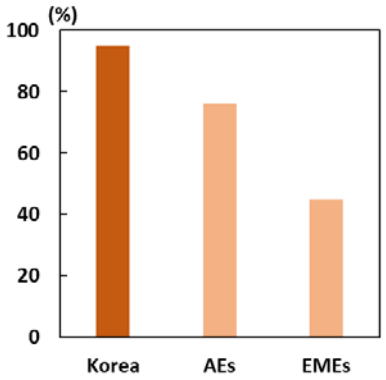
Account ownership[1)]



[1)] Ages 15 years and older

Source: Demirgüç-Kunt et al. (2017)

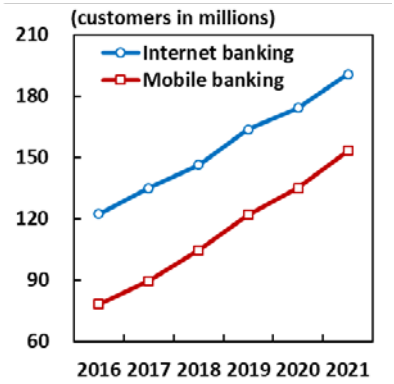
Smartphone penetration rate[1)]



[1)] Ages 18 years and older

Source: Pew Research Center (2018)

Number of registered internet and mobile banking users in Korea[1)]



[1)] Based on the number of registered accounts

Source: BOK (2021a)

Recently, financial institutions such as banks and credit card companies, and non-financial companies such as big techs have been introducing various kinds of digital payment services that are more convenient. Use of "easy payment services" and "easy transfer services"[3] has steadily increased. After Covid-19, consumers' adoption and usage of digital payment services offered by fintech platforms has been further accelerating.

2 Discussions about financial inclusion in Korea are focused on the fairness of credit provision. People with low credit and no collateral cannot borrow from the institutional financial sector and so have to turn to predatory lending with high-interest rates. The Korean government has been seeking various policy measures to address these problems, such as the introduction of internet-only banks specialized in extending moderate interest rate loans and supporting fintech companies that use big data in their credit rating.

3 "Easy payment services" refer to allowing consumers to pay for goods or services based on payment card information pre-stored in a mobile app, using a fast authentication method (password, fingerprint, etc). "Easy transfer services" refer to services that remit a prepaid amount charged through a mobile device, such as an account transfer, to a recipient using a phone number or social media.

Usage of "easy payment" and "easy transfer" services in Korea[1]

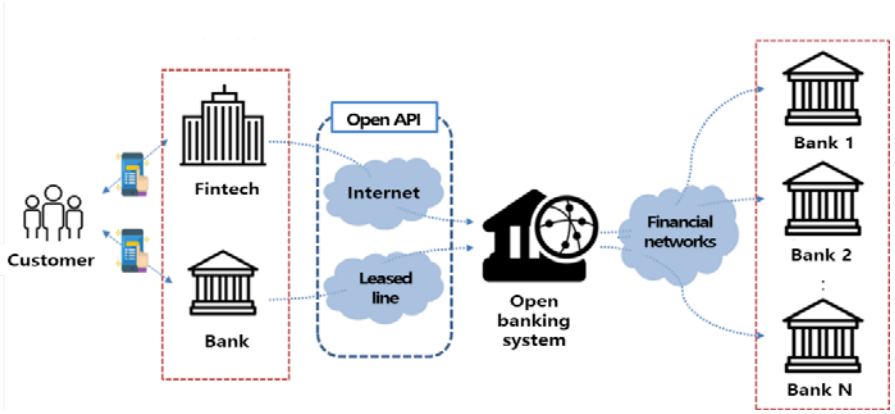
	2016	2017	2018	2019	2020
Easy payment	64.5	132.2	222.8	317.1	449.2
Easy transfer	7.1	35.5	104.6	234.6	356.6

[1)] In billions of won, based on daily average.

Source: BOK (2021b)

In addition, the Bank of Korea (BOK) and the Korean government have been supportive of fintechs and facilitated the introduction of an Open Banking System in 2019, so that new innovative entrants can operate and compete more freely within the current bank-based payment and settlement systems. As a result, in Korea there is not much concern that fintechs and stablecoins might establish their own ecosystem outside the boundary of the financial system governed by the central bank.

Structure of open banking system in Korea



Source: Bank of Korea.

In sum, BOK, like many other central banks, doesn't see an urgent need to issue central bank digital currency (CBDC). At this point, it is difficult to assess whether and when to introduce CBDC since further research and discussion are still needed, particularly with respect to the detailed design model and operation method.

The necessity of introducing CBDC

While there is no immediate need to issue CBDC in Korea, we believe that there is a strong case for us to be prepared for the potential introduction of CBDC in the future. Recently, innovation in the payment and settlement sector has been accelerating rapidly and discussions on the CBDC are in full swing in most economies including the US, Euro area, China, and Japan to name a few.[4] As such, the need to introduce

[4] See, e.g., FRS (2022), BOE (2021), ECB (2020), BOJ (2020), PBOC (2021).

CBDC in Korea is very likely to grow in the future. Therefore, the BOK is actively engaging in research and preparations so that if a decision is made in the future regarding the introduction of CBDC, it can be issued without any delay.

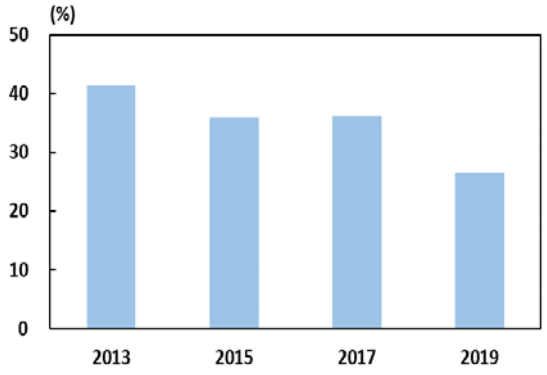
2. Key considerations in the BOK's CBDC research

In Korea, financial and economic landscape is expected to be rapidly transformed in the future due to: i) a continuous decrease in cash use, ii) growing concern about big tech's market power and data concentration and iii) potential domestic use of global stablecoins. To address the challenges posed by these shifts in the payment and settlement environment, in-depth research on the design of CBDC is called for so that it can be positioned as a universal public currency infrastructure that can support the smooth operation of the digitalised economy in the future.

The decline in the use of cash

As in many other countries, the proportion of cash use in retail transactions continues to decrease in Korea while that of credit card use remains very high (53.8%),[5] leading to high social costs in the form of transaction fees and credit risk management.

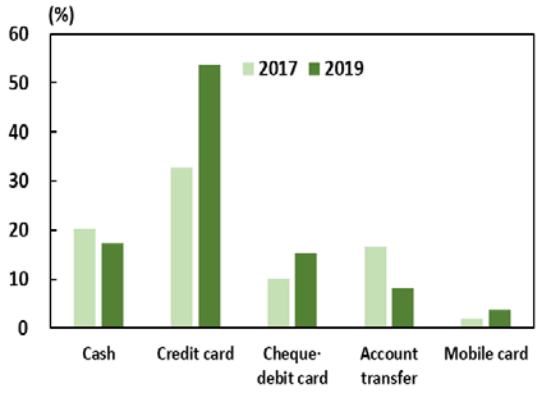
Proportions of cash use in retail transactions[1)]



[1)] Based on a number of cases, face-to-face survey results.

Source: BOK (2013, 2015, 2017, 2019).

Proportions by payment instruments[1)]



[1)] Based on the amount, face-to-face survey results.

Source: BOK (2017, 2019).

[5] The high proportion of credit card use in Korea is attributable to policies promoting credit card transactions after the 1997 Asian financial crisis. These policies sought to stimulate consumption and broaden the tax base by requiring merchants that meet certain criteria to accept credit card payment (Corporate Tax Act, Article 117) and allowing income tax refunds based on amount of credit card use.

If the decrease in cash use continues, the distribution channel will deteriorate and access to cash will weaken. As a result, those who lack access to cash alternatives will suffer the significant inconvenience. In Korea, some restaurants, cafes, and retail stores have begun to refuse to accept cash, and the numbers of ATMs and bank branches have been declining as well. In the long run, if cash is no longer regarded as a universal means of payment,[6] it may even impair the functioning of the monetary system.

Thus, we believe that, just like cash, CBDC should be positioned as a reliable, low-cost, universal payment method that can be conveniently and safely used in a digital environment by all economic entities, including individuals and businesses. Meanwhile, the issue of whether CBDC should have the same level of anonymity as cash requires further discussion and social consensus. CBDC issued by central banks must not be allowed to facilitate money laundering or tax evasion. At the same time, to ensure the protection of privacy for CBDC, albeit not on the same level as cash, the BOK has been investigating technological solutions and institutional safeguards such as privacy enhancement technology and data management governance to protect personal information.

Big tech's market dominance and concentration of personal information

The influence of big tech in Korea's financial sector has been growing.[7] While not as big as traditional players at the moment, big techs' market share has steadily been increasing in the e-commerce and retail payment services sector, and there is a growing concern about big tech abusing its dominant position in the platform business.

To tackle the potentially harmful effects induced by big tech's market power and data concentration, establishing an effective regulatory and supervisory framework should be a top priority.[8] At the same time, however, as a recent BIS report[9] suggested, we believe that CBDC could play a role by introducing a virtuous cycle of competition, innovation, and service improvement. As an open platform, CBDC would leave less room for big tech to exercise its market power over individuals and businesses by imposing excessive fees or creating barriers to entry. CBDC can also help protect privacy since central banks have no incentive to exploit personal information for profit-making and do not possess other personal data that can be combined with CBDC transaction data to identify individuals.

[6] Cash is a common unit of account in an economy and is the basis of the monetary system that connects bank deposits and retail payment systems. Public trust in financial products, such as bank deposits, relies on the belief and experience of ordinary people that they can always convert those products to cash on demand.

[7] The share of domestic big techs, such as Naver, Kakao, and Toss, in Korea's "easy payment" market increased from 55.7% in 2019 to 65.3% in 2020.

[8] In September 2021, Korea became the first country in the world to enact a bill prohibiting global platform companies such as Google and Apple from engaging in the anti-competitive practice of forcing exclusive payment methods (in-app payments).

[9] See BIS (2021).

For a CBDC to effectively respond to the threat of big tech, it should be designed and operated as an open public currency infrastructure. For this, participation of a broad range of stakeholders and interoperability will be important and an effective division of roles between the central bank and the private sector is required. In this sense, a *direct* CBDC model may not be a good choice since the central bank will end up being solely responsible for CBDC operation. With the *hybrid* or *intermediated* model, participating institutions, such as banks and fintechs, will have more room to creatively combine CBDC with their customer platforms and financial products to provide innovative services.

The proliferation of global stablecoins

Despite the growing global popularity of cryptocurrency trading,[10] stablecoins are not widely used in Korea. While the transaction volume of major cryptoasset exchanges in Korea has increased rapidly,[11] unlike in other countries, cryptoasset trades on Korean exchanges are settled by bank deposits rather than by stablecoins. However, considering the heightened interest in digital innovations such as non-fungible tokens (NFTs), decentralised finance (DeFi), and the metaverse, the demand for digital asset-related payment may further expand beyond cryptoasset trading in the future.[12] In particular, if big tech firms issue a global stablecoin in the near future, it is highly likely to spread rapidly into financial sector and the real economy.

In line with global discussions led by international organisations such as the G7, Financial Stability Board (FSB) and Committee on Payments and Market Infrastructures (CPMI), and among major countries including EU members, the United States and the United Kingdom,[13] discussions about a regulatory framework for stablecoins are beginning to take place in Korea as well. However, if stablecoins spread widely amid the current absence of a regulatory framework, they could not only cause problems in terms of consumer protection and financial stability but also, with deepening global economic integration, raise the risk of currency substitution similar to dollarisation in some emerging market economies. Nevertheless, in the case of Korea, it seems unlikely that global stablecoins or CBDCs issued by large foreign countries would cause currency substitution.[14]

Other issues

Some argue that a DLT-based CBDC may be more efficient at supporting new payment and settlement demands such as DeFi, the proliferation of NFTs, and the internet of things (IoT). On the other hand, some take the view that it will be possible

[10] More than $150 billion of stablecoins such as Tether (USDT) and USD Coin (USDC) have been issued worldwide and used as payment instruments for cryptoasset trading and DeFi (IMF, 2021).

[11] Daily cryptoasset transaction volume at major domestic exchanges (Upbit, Bithumb, Korbit, Coinone, and Gopax) increased two-fold from KRW 2.7 trillion in January 2021 to KRW 5.4 trillion in October 2021.

[12] Though in the early stages, Korea is seeing increased interest and investment in digital innovation, such as IoT supported by the high penetration of 5G, NFTs, and DeFi utilising distributed ledger technology (DLT), and augmented reality.

[13] See, e.g., FSB (2020), G7 (2019), CPIM-IOSCO (2021), PWG (2021).

[14] Currency substitution usually occurs in a situation where high inflation continues thanks to large fiscal deficits, impaired central bank independence, and a lack of public trust in monetary and fiscal policy.

to respond to new payment and settlement needs in the future, such as programmable payments, with current technology, for example using APIs. It must also be noted that DLT is still in the early development stage and has shown few cases of real-world application beyond cryptoasset trading.

Currently, the inefficiency of the cross-border remittance networks that rely on correspondent banks has been placing an additional economic burden on EMEs and vulnerable groups such as immigrant workers. Among various ideas for improving cross-border payments that are being discussed, using CBDC, in particular, has its perks, in that a new system could be built from scratch on a clean slate. However, in order to use CBDCs in cross-border payments and settlements, we should have sufficient discussions and coordination at the global level, not only on technological aspects, such as interoperability among related systems but also on regulatory framework, including sharing of identity information among jurisdictions.

3. The BOK's CBDC experiment study

The BOK has been continuously expanding its professional workforce since 2017 and launched a dedicated CBDC unit in early 2020. It has researched on CBDC-related systems and run a proof of concept (PoC) test on the feasibility of DLT to serve as the technological foundation of CBDC.

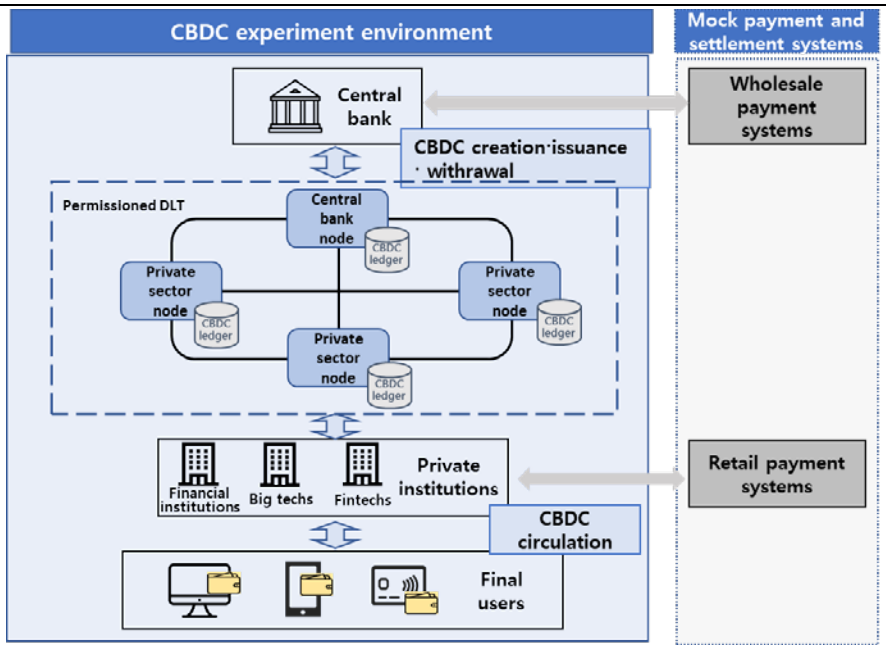
Currently, the BOK is working on a CBDC experiment, which will be conducted in two phases from August 2021 to June 2022.[15] In the experiment, virtual CBDC systems will be set up in a cloud environment, where the technological feasibility of CBDC's basic (issuance, distribution, redemption, etc) and advanced (offline payments, etc) functions will be examined.

This experiment adopts and examines: (i) hybrid architecture; and (ii) DLT-method ledger management as a basic model, following recommendations of international organisations such as the BIS and cases of central banks of major countries.[16] However, the experiment is not determinative of the CBDC design, and the BOK plans to continue researching and reviewing other alternative designs.

[15] The first stage of the experiment, completed in December 2021, reviewed the technological feasibility of basic issuance, distribution, and redemption in a distributed ledger-based CBDC experiment environment. The main goal of the second stage is to expand the central bank's CBDC distribution operations; support for cross-border remittance, digital asset purchases, offline payments, and new technologies to strengthen personal information protection will be reviewed.

[16] In a hybrid architecture, the creation, issuance, and redemption of CBDC is performed by the central bank, while distribution is carried out jointly with private financial institutions. A distributed ledger is used by a number of participating institutions (including the central bank) that confirm changes in CBDC-related information through a predefined consensus algorithm, and then distribute them to the ledgers owned by each institution to record and manage.

Korea's CBDC experiment environment architecture (example)



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