



July 5, 2019

Bank of Japan

Should the Bank of Japan Issue a Digital Currency?

Speech at a Reuters Newsmaker Event in Tokyo

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(English translation based on the Japanese original)

I. Introduction

It is a great honor and pleasure for me to be able to speak to you today.

In recent years, the environment surrounding Japan's payment and settlement systems has gone through various changes. On the demand side, consumers seek more convenient payment services, such as those available during the nighttime and on holidays or low-cost international remittance services. Diversified lifestyles and the spread of e-commerce businesses have contributed to this. On the supply side, new devices -- such as smartphones and IC cards -- enabling the public to access payment services have continued to expand. In addition to traditional financial institutions, non-bank firms with strong capabilities in information technologies, or so-called FinTech firms, have started to provide cashless payments services.

As central banks have a responsibility to improve the safety and efficiency of payment and settlement systems, their future landscape in the digital age is an extremely important topic for us. In fact, whether central banks should issue digital currencies as a payment instrument substituting for cash (banknotes and coins) has become an important issue.

Digital currencies issued by central banks are called "central bank digital currencies" (CBDCs). The Bank for International Settlements (BIS) conducted an interesting survey on central bank initiatives for CBDC (Figure 1). Among the 63 respondent central banks, about 70 percent are engaged in CBDC work, most of which is in the form of research/study or experiments/proof-of-concept. Central banks that have actually been developing CBDCs and are seriously considering its issuance are in the minority; they are limited only to those of countries, such as Sweden where the circulation of banknotes is rapidly decreasing and emerging and developing countries where the infrastructure supporting banknotes has not yet fully developed. Except for these cases, many central banks see themselves as unlikely to issue CBDCs in the short or medium term.

Many central banks therefore take the position that they have no plan to issue CBDCs in the near future but will continue research into CBDCs, which is the position the Bank of Japan

also takes. But why do central banks take this seemingly contradictory position? The main aim of this speech is to explain the background to this.

First allow me to outline Japan's current status regarding retail payments -- that is, developments in person-to-person (P2P) money transfers and person-to-merchant (P2M) payments -- and then talk about the possible forms of CBDC and its expected roles. I will then discuss the implications of the research on CBDC for the future payment and settlement systems as a whole, including private digital currency.

II. Cash and Cashless Payments in Japan

Let's start by looking at survey results and statistics to discover current trends in retail payments and the degree of progress toward a cashless society in Japan.

Payment Instruments for Individuals

According to the results of a recent survey on individuals' payment instruments, the ratio of cash payments to cashless payments in private consumption expenditure is almost one to one (Figure 2). This figure displays the survey results of the share of payment instruments. In the survey, transfers between bank accounts are included as cashless payments. Thus, it should be noted that the ratio of cashless payments is at a higher level compared with that excluding transfers between bank accounts, which is often the case in other surveys. Looking at the share of payment instruments, the share of credit cards is high, at about 30 percent, and that of prepaid electronic money issued by firms such as transport and distribution firms is about 5 percent. The use of FinTech payment services, or "XYZ pay," that use mobile devices such as smartphones is still very limited, accounting for less than 1 percent.

At what pace will the share of cashless payments increase? It is difficult to project the pace but developments in the amount of cash in circulation are useful as reference information (Figure 3). The year-on-year rate of change in the amount of cash in circulation for 1 yen and 5 yen coins for 2018 declined very moderately. Meanwhile, the rate for the 100 yen coin was in the range of 0.5-1.0 percent, increasing at around the same rate as the nominal GDP growth rate for 2018. The rates for the 500 yen coin and 1,000 yen banknote were

over 2 percent. Those for 10,000 yen and 5,000 yen banknotes were even higher, being in the range of 3 to 4 percent.

This increase in the amount of high denomination banknotes in circulation, including 10,000 yen banknotes, reflects the increasing demand for cash as a store of value -- that is, savings held in the form of cash under the mattress. The lower interest rate environment has lowered opportunity cost of holding cash. On the contrary, not many people hold 1,000 yen banknotes or 500 yen coins, or even 100 yen coins, under the mattress. I think the increase in circulation of these banknotes and coins indicates the possibility of their continued use as a means of payment rather than as a store of value.

Based on these facts, cashless payments seem to be expanding in small-value payments where the change piles up, but cash still continues to be widely used as a means of payment. The year 2018 saw a growing social interest in cashless payments; however, despite the general impression gained from the media, the pace of transition from cash to cashless payments seems to have been moderate. The news that there were long queues at bank ATMs before the 10-day holiday from late April to early May 2019 indicates that cash is still an important payment instrument for many consumers.

Moderate Transition to Cashless Payments

Why the moderate transition to cashless payments in Japan? It is considered that the causes lie in both the demand and supply of cash payments.

The demand for cash payments is thought to be related to people's perception of cash: less concern about wasting money than when using cashless payment instruments; a safe environment where cash is rarely stolen and is even often returned when people lose their pocketbooks or purses; and public confidence in the high anti-counterfeit security levels of Japanese banknotes, resulting in counterfeit banknotes having a very low circulation. The prolonged low interest rate environment may also have pushed up the demand for cash.

As for the supply of cash payments, cash payment networks supported by financial institutions' bricks and mortar branches and ATMs are important (Figure 4). The denser the

networks, the more convenient cash withdrawal from the bank account and cash deposit to the account. For this reason, the greater the number of branches of financial institutions per habitable area, the higher the ratio of cash in circulation to nominal GDP tends to be. Japan's high ratio of cash in circulation to nominal GDP is considered to be due to the established convenient and inexpensive cash supply chain, as exemplified in the concentration of financial institutions' branches and ATMs within a small national territory.

These structural factors in the demand and supply of cash payments are considered to have slowed down the transition to the cashless payments. Nonetheless, if the number of new cashless payments users and merchants increases up to a certain scale, the use of cashless payments could then expand sharply. Let's take a look at the case of South Korea. In the wake of the Asian currency crisis in the late 1990s, South Korea's government promoted cashless payments as a part of economic policy package. It introduced a system of a deduction of 20 percent of annual credit card payments from taxable income, and obliged merchants to accept credit cards. These measures turned the tide, and the move toward a cashless society accelerated.

In Japan as well, the government plans to introduce loyalty rewards for using cashless payment instruments with the scheduled consumption tax hike in October 2019. These measures may provide a boost toward the cashless society in Japan.

III. Central Bank Digital Currency and Private Digital Currency

The phenomenon of the demand for cash being surprisingly persistent and the ratio of cash in circulation to nominal GDP continuing to increase has been observed not only in Japan but in many countries.¹ Nonetheless, cashless payments will likely increase in numerous countries in the long run. Against this background, there has been a growing interest in the digitization of currencies issued by central banks, or central bank money.

¹ Morten L. Bech et al., "Payments Are A-Changin' But Cash Still Rules," *BIS Quarterly Review*, March 2018.

1. Issuance Forms of Central Bank Digital Currency

There are two main variants of CBDC. One variant is electronic central bank money, which offers access to a limited group of users such as banks, among whom it is used for funds settlement. This variant, called "wholesale CBDC," adopts new information technologies such as distributed ledger technology (DLT) in settlements using central bank deposits, or central bank liabilities which have been digitized. The other variant is electronic central bank money which is assumed to be widely accessible, including for individuals and firms. This variant is called "general purpose CBDC." From now on, I will use the term CBDC to refer to the general purpose variant.

A general purpose CBDC is a substitute for cash (banknotes and coins), and two issuing forms are possible (Figure 5). One is an "account-based" CBDC, in which individuals and firms open an account at a central bank and use it to make transfers between accounts. This scheme is fundamentally the same as transfers between accounts held at private banks. The difference lies in whether the accounts are held at the central bank or at private banks. The other form is a "token-based" CBDC, also referred to as a "value-based" CBDC, in which users deposit CBDC to their smartphone applications or IC cards and transfer value to other users when making payments. This scheme is similar to prepaid electronic money issued by transport and distribution firms and FinTech firms. The difference is whether the issuer is a private firm or the central bank.

2. Expected Roles for Central Bank Digital Currency

CBDCs are expected to play various roles (Figure 6). For instance, in terms of monetary policy, academia, in principle, argues that CBDCs should bear interest -- even negative interest rates in some cases -- as that could increase the effectiveness of monetary policy. This argument is based on the premise that the level of interest rates applied to CBDC could work as the effective lower bound of interest rates for wide-ranging financial assets. However, in order to overcome the zero lower bound of nominal interest rates, cash needs to be completely eliminated. This is because even if a central bank applies negative interest rates to CBDC, as long as cash which yields zero interest remains, there will be a shift of funds toward cash. Abolishing cash, used by many people, would only make payment infrastructures less convenient. There is no central bank that wishes to do this.

Resolving the Crowding of Cashless Payment Instruments

We often hear the opinion that the rationale for issuing CBDC is to resolve the crowding of cashless payment instruments and to unify all payment instruments. Because of the large number of cashless payment instruments currently available, consumers are often at a loss as to which one to use. In this regard, Professor Sheena Iyengar of Columbia University conducted an interesting experiment on the provision of choice. She carried out a social experiment where consumers shopping at a grocery store encountered a tasting booth for jam that offered either 6 or 24 different flavors. The results showed that more consumers stopped at the tasting booth displaying 24 flavors, but when it came to purchasing behavior, consumers who were exposed to 6 flavors were more likely to purchase the product. This implies that extensive options can attract people's interest, yet when they are too extensive they tend to reduce people's motivation to make a choice. Many might perhaps feel that this notion is reflected in current developments in cashless payments in Japan.

If central banks issue CBDCs and many consumers begin to use them, there is certainly the possibility that this would lead to a resolution of the crowding of cashless payment instruments. In fact, looking back at the history of currency globally, the issuance of banknotes has become limited to central banks as the issue of banknotes by multiple private banks in the past led to their uncontrollable increase, causing economic turmoil.

That said, it is not appropriate to identify the current retail payments market with the past where the uncontrollable increase in the issue of banknotes by multiple institutions caused turmoil. The retail payments market is now in a phase where FinTech firms and financial institutions are competing with each other in payments innovation. The Bank of Japan judges that it is important for now to promote innovation in the private sector, as it has strong information technology capabilities. If the current crowding of cashless payment instruments is maintained forever, it would reduce consumers' economic welfare, but such a situation will likely be resolved eventually in the process of competition.

Maintaining the Competitive Environment in the Retail Payments Market

On the other hand, leaving the competition up to the market may not lead to desirable outcomes in the long term; it could possibly result in "market failure." The payment and

settlement systems have "network externalities" where the wider a network is, the more benefit the participants in the network can enjoy. For this reason, if the number of users and merchants in the network exceeds a certain scale -- "a critical mass" -- the scale of the payment platform would expand greatly, leading to an oligopoly or monopoly in the retail payments market. If specific businesses gain strong control over the retail payments market, it could distort the pricing mechanism, decrease incentives for innovation, or increase systemic risk when problems arise.

At present, the Japanese retail payments market is not facing any oligopoly or monopoly. However, a decline in competition in the retail payments market is now an issue in some countries like Sweden, where cash circulation is rapidly declining and society is becoming increasingly cashless. Some argue that the issuance of CBDC would contribute to maintaining the competitive environment in the retail payments market.² It is believed that if a central bank builds cashless payment platforms, this would maintain the pressure on private sector firms to compete with each other. However, my take is that issuing CBDC is not the best option to promote competition in the retail payments market. The first possible prescription should be a government policy on competition, such as splitting up monopoly firms and strengthening regulations to resolve distortions in competition. Therefore, I believe it is not really appropriate to issue CBDC for the purpose of promoting competition in the retail payments market.

Fundamental Functions of Currency and a Two-Tiered System

To explore the rationale for issuing CBDC, we can simply get back to the fundamental roles of currency. Payment instruments that are safe, reliable, inexpensive, and available to all are essential to support economic activities. I think most people would agree that the central bank should continue to be responsible for supplying these instruments in the digital age as well. The rationale for issuing CBDC may basically rest on this.

CBDC functions not only as a means of payment but also as a store of value. In normal times, people may not be aware of the difference between central bank money and private

² Walter Engert, Ben S. C. Fung, and Scott Hendry, "Is a Cashless Society Problematic?," *Bank of Canada Staff Discussion Paper 2018-12*, October 2018.

money (i.e., money issued by the private sector); however, this is not the case in times of financial crisis or natural disaster. When people are anxious, the precautionary demand for central bank money free of credit risk tends to increase. When the Great East Japan Earthquake hit Japan, there was a significant increase in cash withdrawal in disaster areas.³ Also, when the Lehman Brothers bankruptcy led to a financial crisis in Iceland, demand for cash soared so high that the Central Bank of Iceland's inventory of banknotes was nearly exhausted.⁴ These facts show that it is reasonable to say that a framework should be in place to supply highly credible central bank money that is suitable for the digital age.

Nevertheless, issuing CBDC in normal times with the purpose of preparing for crisis could pose a new challenge. For example, if CBDC starts to substitute for bank deposits, it could squeeze banks' credit intermediation and affect the real economy. There is also the view that CBDC, which functions as a safe haven in times of stress, would rather amplify the stress. Since all it takes is a few clicks on a computer or smartphone, a shift from bank deposits to CBDC would occur in a much more drastic way in the digital age than with traditional bank runs, and thus could exacerbate a financial crisis. This is called a "digital bank run."

As we look deeper into these issues, we end up facing the issue of how we should treat the "two-tiered system," established in most modern states. Under the two-tiered system, a central bank exclusively supplies the public with central bank money consisting of cash and central bank deposits, and private banks provide deposits through credit creation based on the central bank money. The two-tiered system has various advantages regarding information processing and resource allocation. While the credibility of currency is ensured by central bank money, financial resources are efficiently allocated through private-led initiatives. Private sector innovations are greatly utilized in the area of payment services. For example, new cashless payment instruments offered by FinTech firms provide better user interface using smartphones and make payment using deposits very handy.

³ Bank of Japan Payment and Settlement Systems Department, "Higashi Nihon Daishinsai chokugo no kin'yū kessai-men no dōkō: dēta ni motozuku jijitsu seiri," *Bank of Japan Research Papers*, March 2013.

⁴ Central Bank of Iceland, "Rafkróna?," *Central Bank Digital Currency Interim Report*, September 2018.

No matter how safe and reliable CBDC is as a payment instrument, the benefits derived from the two-tiered system would be lost if private money were to be replaced by CBDC on a considerable scale. When considering the design of payment and settlement systems, it is necessary to examine ways to improve the overall functions and credibility of the systems. In doing so, central bank money and private money should not be considered independently. We need to take into account the interrelations between the two. Next, I will discuss how the functions of private digital currencies can be improved to achieve a level close to the expected functions of CBDC in terms of creditworthiness, general acceptability, and settlement finality (Figure 7).

3. Improving the Functions of Private Digital Currency

Creditworthiness of Private Digital Currency

As I have mentioned earlier, in the digital age, it is important to prepare ourselves for crises with safe assets, and CBDC is an important possibility. However, it is also important to design a framework that improves the creditworthiness of private money, regardless of the issuance of CBDC. If the credit risk of private money could be minimized and the credit gap between private money and central bank money could be narrowed, the issue of a shift from bank deposits to CBDC could, in theory, be alleviated.

In Japan, among the various types of private money, a framework of protection provided by deposit insurance for bank deposits was put firmly in place after the crisis of the late 1990s. As for electronic money issued by transport and distribution firms and FinTech firms, consumer protection is provided by securing assets. For example, firms issuing electronic money which is convertible to cash are required by law to secure funds equivalent to or more than the amount received from users, by making a security deposit or by other means.

As for developments overseas, in China, BigTech firms, including Alipay and WeChat Pay, that provide payment services are required to deposit funds equivalent to the amount received from their users in accounts at the People's Bank of China. This could be seen as an example of a scheme where BigTech firms issue private digital currencies based on the credibility of a central bank. In terms of functionality, it is very much the same as narrow

banking, where the central bank requires full reserves, and is almost equivalent to CBDC in terms of creditworthiness.

To ensure the stability of the retail payment system as a whole, it is essential to design a framework that secures the creditworthiness of private digital currencies. The social impact would increase as the scale of the cashless payment platforms operated by the private sector grows. With regard to payment instruments and services, the authorities would therefore need to put an adequate risk-based regulatory framework in place. As for firms operating payment platforms, they would be required to take responsible action, including adoption of sophisticated risk management procedures and stringent responses to regulatory requirements.

General Acceptability of Money

Even if the creditworthiness of private digital currencies improves, it does not mean that they will be widely accepted as money. For instance, merchants participating in different payment platforms operated by FinTech firms do not necessarily overlap. This means that electronic money issued by a FinTech firm cannot be used in transactions with merchants participating in payment platforms operated by different FinTech firms. Moreover, users cannot conduct P2P money transfers across different payment platforms. Thus, electronic money issued by FinTech firms is at present considerably inferior to cash in terms of general acceptability.

Overseas, there are cases where interoperability among payment service providers is ensured. For example, in Hong Kong, major banks and nonbank payment service providers (store value facilities) such as Alipay and WeChat Pay have joined the Faster Payment System -- a real-time funds transfer system which operates on a 24/7 basis -- launched by the Hong Kong Monetary Authority in 2018. This has enabled users of these service providers to conduct P2P money transfers. Users can even transfer funds to bank accounts using electronic money issued by these nonbank payment service providers. To the extent that interoperability is ensured, the general acceptability of electronic money issued by the private sector will likely increase.

With regard to interoperability among private digital currencies, whether a central bank should allow new nonbank payment service providers, such as FinTech firms, to open current accounts at the central bank may be an issue for discussion. If the interoperability of private money is enhanced through safe and efficient settlement using central bank current accounts, private digital currencies could resemble CBDC in terms of general acceptability. However, central banks need to examine the notion of allowing nonbanks to access current accounts comprehensively from various aspects, including the potential impact on financial systems in addition to interoperability. Needless to say, nonbanks seeking access to payment and settlement systems via central bank current accounts would be required to meet strict standards in many areas, such as financial soundness, information security, and risk management. Overseas, nonbank payment service providers are now allowed to open current accounts at central banks in countries such as the United Kingdom and Australia. This is also currently under consideration in Switzerland and Singapore.

Settlement Finality

Now, I would like to touch upon the issue of "settlement finality." Finality means that settlement of an obligation is irrevocable. Central bank money is not only credit risk free, but also provides immediate finality. Banknotes can be used to settle obligations 24 hours a day, 365 days a year with finality.

In Japan, the launch of the Zengin More Time System in October 2018 has enabled users to send funds on a real-time basis 24 hours a day, 365 days a year for transfers of less than 100 million yen per transaction (hereinafter referred to as "retail transfers"). It should be noted, however, that transactions between financial institutions, accompanying these retail transfers between users, are settled on a deferred net settlement (DNS) basis. Under a DNS system, payment instructions received from financial institutions are pooled until a designated time, and then the gross values of incoming and outgoing funds are netted out. Only the net amount is settled. While the efficient use of liquidity provided by DNS is an advantage, it accumulates unsettled positions up to the designated time, which means that settlement is not final until this net position is settled. In this way, DNS harbors a systemic risk; if even one of the participating financial institutions fails to meet its obligations, it could potentially start a chain reaction affecting all other institutions.

If the number of retail transfers via deposit accounts at financial institutions increases with the progress toward a cashless society, it could bring an increase in intraday unsettled positions, thereby accumulating risks in payment and settlement systems as a whole. To address this concern, one option is to reduce dependence on settlement via deposit accounts at financial institutions by issuing a CBDC which provides immediate settlement finality. However, there are also other options; settlement methods of retail transfers between financial institutions could be changed from DNS to real-time gross settlements (RTGS). RTGS offers a simple way of settling funds where the central bank immediately executes payment instructions received from financial institutions. Under an RTGS system, as each payment is settled with finality in real time one after another, systemic risk can, to a large extent, be contained. To settle RTGS transactions 24 hours a day, 365 days a year, the central bank's system also needs to operate throughout the day.

Meanwhile, new RTGS platforms, which enable retail transfers 24 hours a day, 365 days a year, have already been launched in places such as Australia, Hong Kong, and Europe. In these platforms, settlement finality is ensured, as with CBDC. I think that it is important for each jurisdiction to consider the most desirable way to settle retail transfers through cost-benefit analysis, while taking into account developments in payments and settlements in each country.

IV. Concluding Remarks

Today, I have had the pleasure of sharing with you my understanding on retail payments in the digital age, focusing on the relationship between central bank money and private money.

Now, I would like to give you my own answer to the question I posed at the beginning: "Why are many central banks, including the Bank of Japan, committed to researching and studying into CBDCs even though they have no plan to issue them in the near future?" I have two reasons. First, since technological innovation evolves rapidly, the retail payments market structure could suddenly change dramatically, pushing us toward a cashless society. In some cases, the need for CBDC issuance may suddenly increase. To be able to adapt to such a situation, central banks need to deepen their understanding on the latest

developments in information technologies and their applicability to CBDC. Second, as I have discussed in the latter half of my speech, through research into CBDC -- or through the CBDC lens -- central banks examine more fundamental questions such as: "What are the required functions of money?"; "What ways do we have of improving the complementary relationship between central bank money and private money?"; or "What ways do we have of enhancing the functionality of private digital currency?" This process can offer clues for ways in which payment and settlement systems as a whole can be improved.

The Bank will continue to examine CBDC with these two aspects in mind. In this respect, allow me to introduce two of our recent initiatives. On the technological front, the Bank is continuing research into distributed ledger technology -- DLT. Project Stella, a joint research project with the European Central Bank is part of these initiatives.⁵ This project has resulted in three reports so far, exploring, for example, the applicability of DLT to payments using central bank deposits -- that is, wholesale CBDC.

On the legal front, the Bank's Institute for Monetary and Economic Studies set up a study group on legal issues regarding CBDC in November 2018. It identifies potential legal issues that would arise if the Bank were to issue CBDC in response to rapid developments in technology and their possible interpretations. The report will be released in due course.

The Bank will continue to work to improve the efficiency and safety of payment and settlement systems. It will examine, from various perspectives, the desirable nature of these systems, including the issue of CBDC. And this brings me to the end of my speech.

Thank you very much for your attention.

⁵ <http://www.boj.or.jp/en/paym/fintech/index.htm/>

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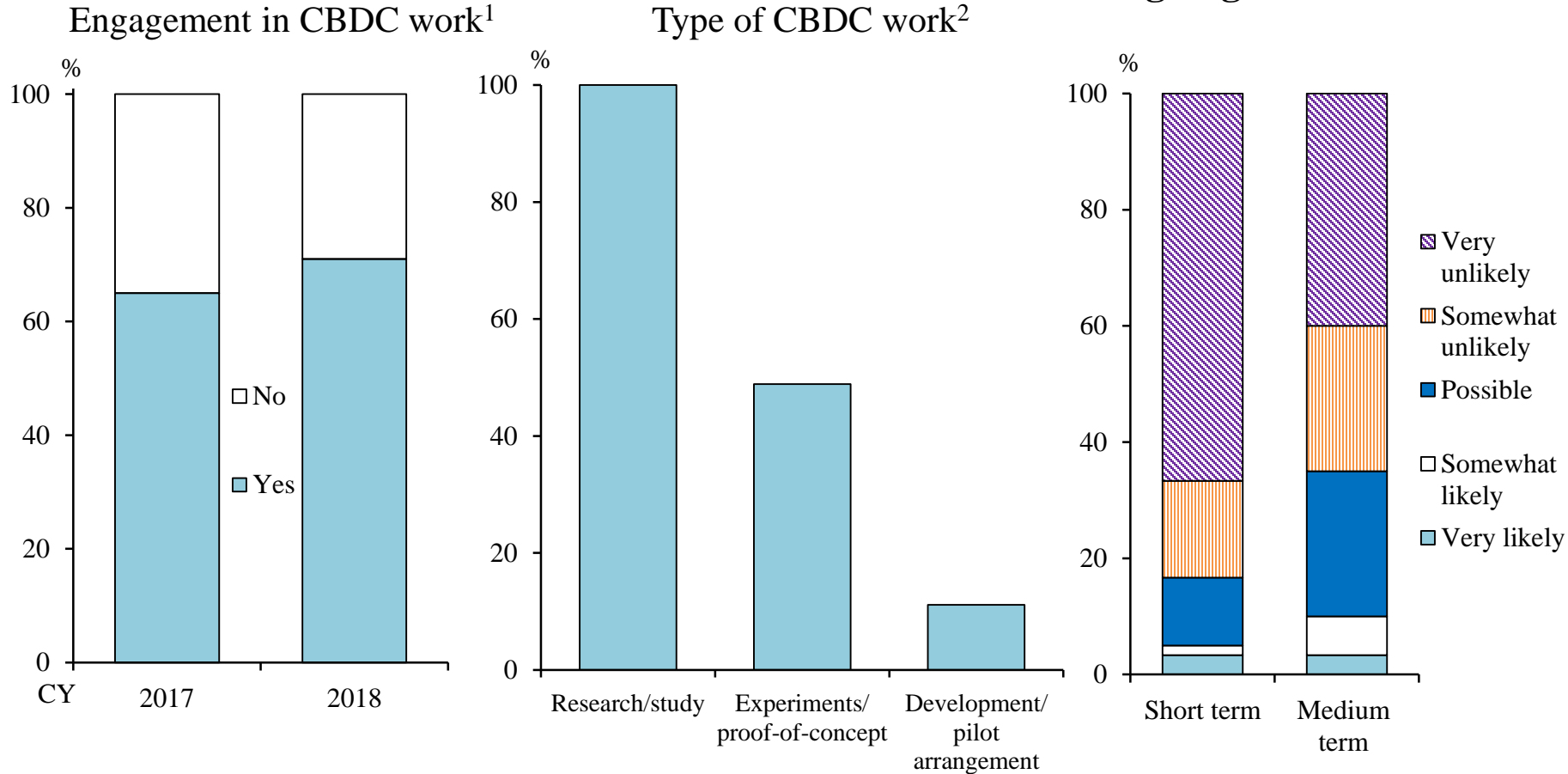
Masayoshi Amamiya

Deputy Governor of the Bank of Japan



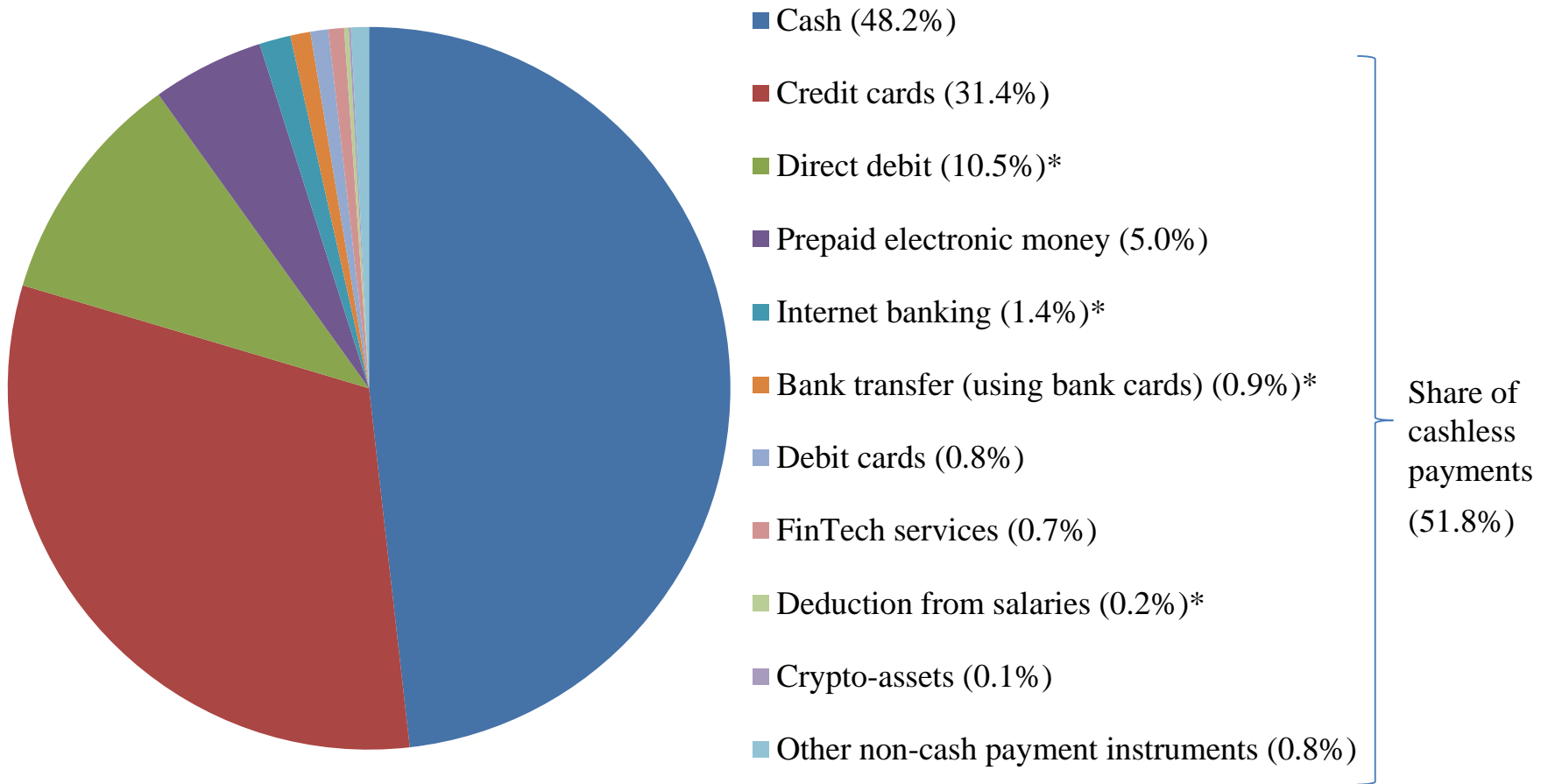
Initiatives for CBDC

Likelihood of issuing a CBDC going forward³



Notes: 1. Share among the 63 respondent central banks. The sum of general purpose CBDCs and wholesale CBDCs.
 2. Share among the respondent central banks that answered that they were engaged in CBDC work in 2018 survey (multiple answers were allowed).
 The sum of general purpose CBDCs and wholesale CBDCs.
 3. Share among the 63 respondent central banks. Figures are for general purpose CBDCs. "Short term" denotes 1-3 years and "Medium term" denotes 4-6 years.

Figure 2 Share of Payment Instruments in Private Consumption Expenditure

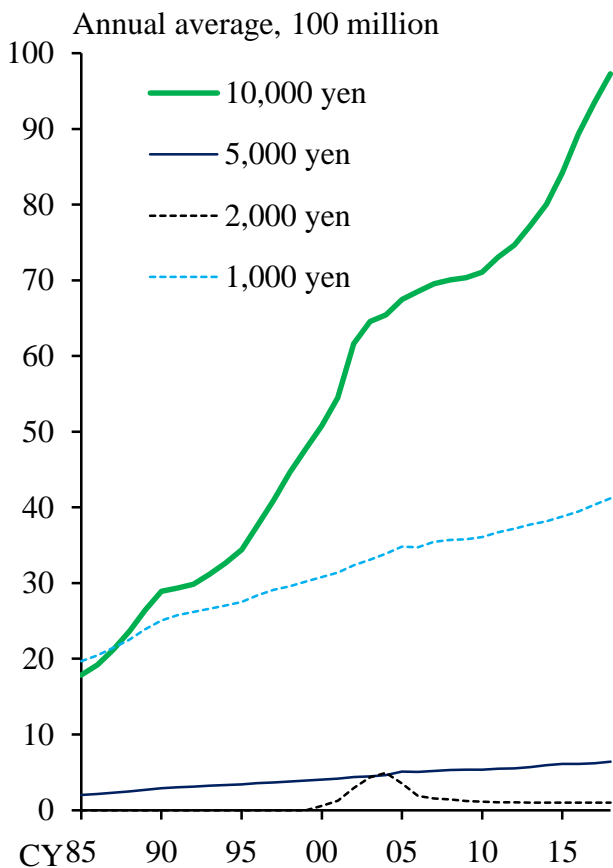


Share of transfers between bank accounts (sum of instruments with asterisks[*]): 13%

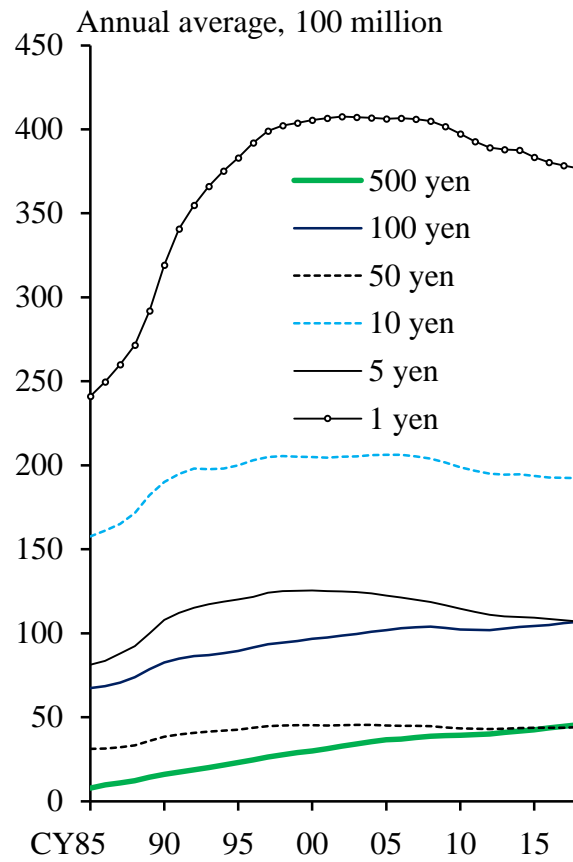
Note: In the figure "prepaid electronic money" refers to services such as Suica, PASMO, Rakuten Edy, nanaco, and WAON. "FinTech services" refers to payment services -- other than prepaid electronic money -- that is provided by FinTech firms; the services include iD, QUICPay, Alipay, WeChat Pay, Apple Pay, Google Pay, Rakuten Pay, LINE Pay, and Origami Pay. The survey was conducted online with a nationwide sample of 3,000 individuals who are between the ages of 20 and 69.

Source: The Nippon Institute for Research Advancement (NIRA), *Survey on Cashless Payments in Japan*, September 2018 (available only in Japanese).

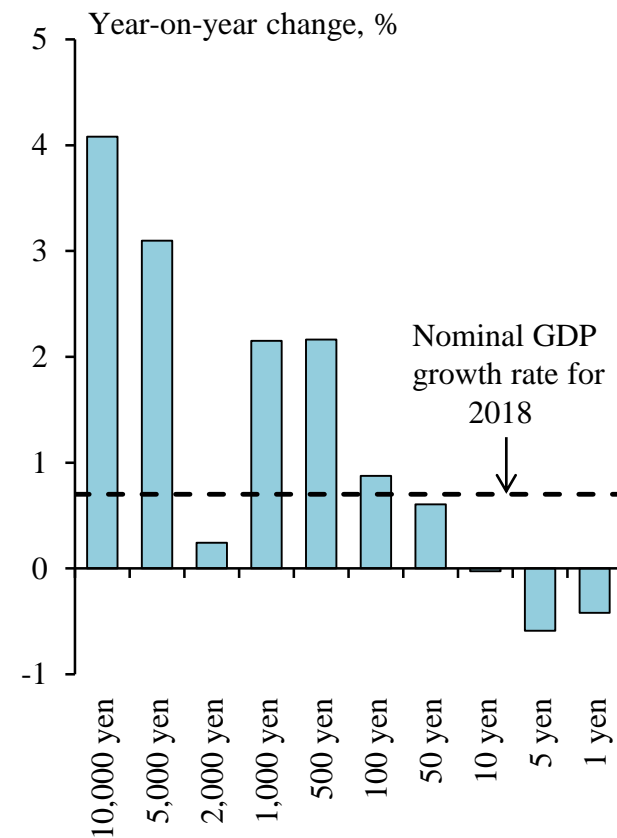
Amount of banknotes in circulation



Amount of coins in circulation



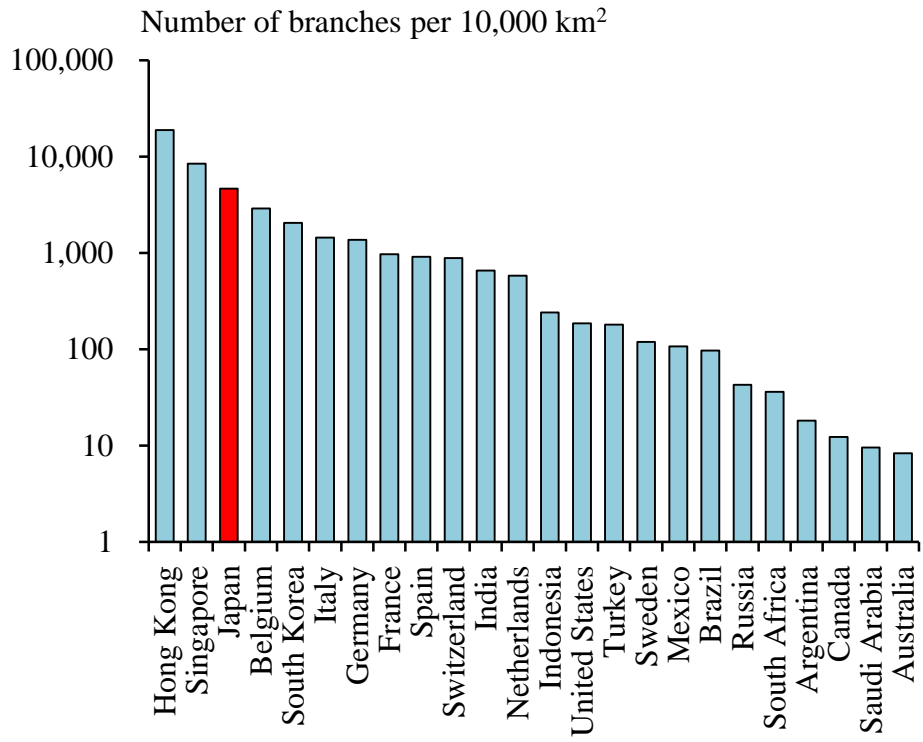
Change in the amount of banknotes/coins in circulation for 2018



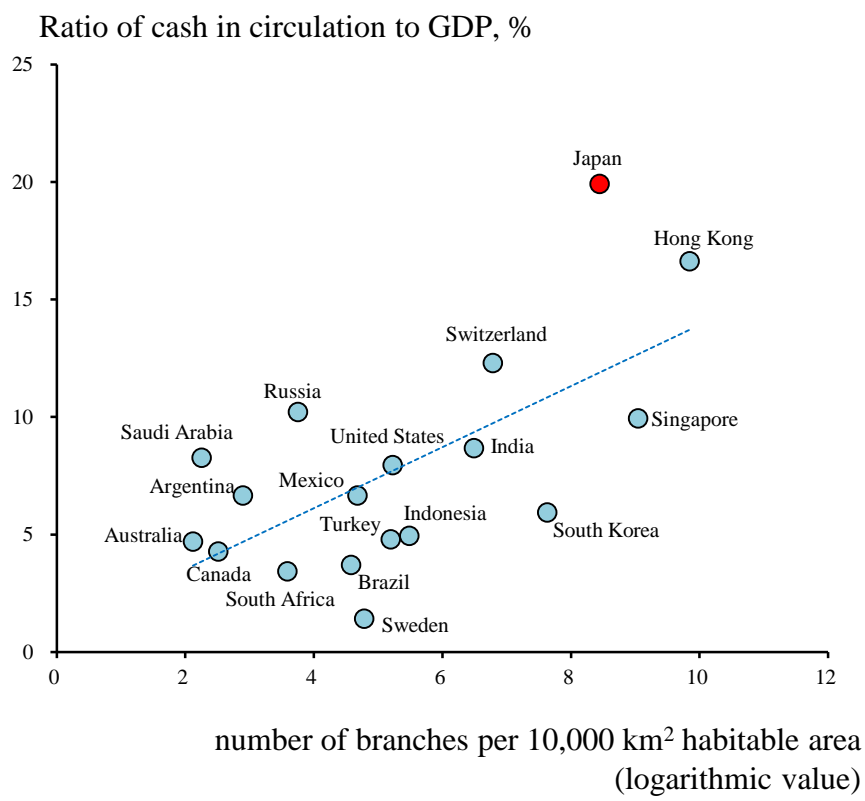
Source: Bank of Japan.

Figure 4 International Comparison of the Number of Financial Institutions' Branches and Cash in Circulation

International comparison of the number of financial institutions' branches per habitable area



Correlation between the ratio of cash in circulation to GDP and the number of branches per habitable area



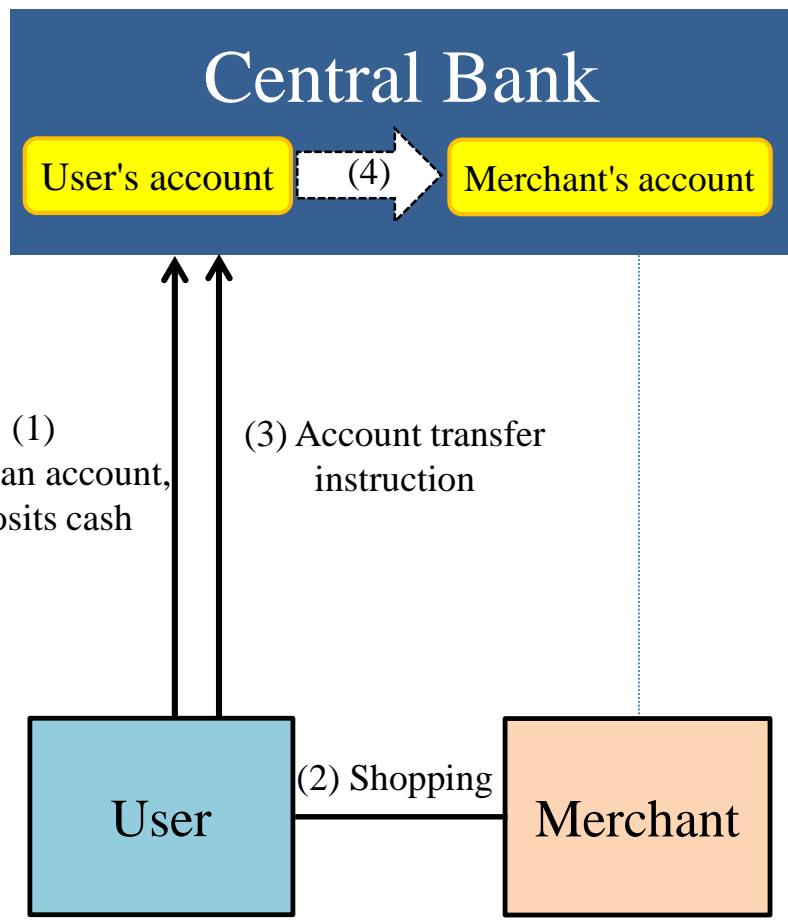
Note: The figure shows the latest possible international comparison as of the end of 2016 (the figure for Japan is as of the end of fiscal 2016). The habitable area is calculated by deducting the forest areas from the total area.

Sources: BIS, *Statistics on Payments and Financial Market Infrastructures*; World Bank; IMF, etc.

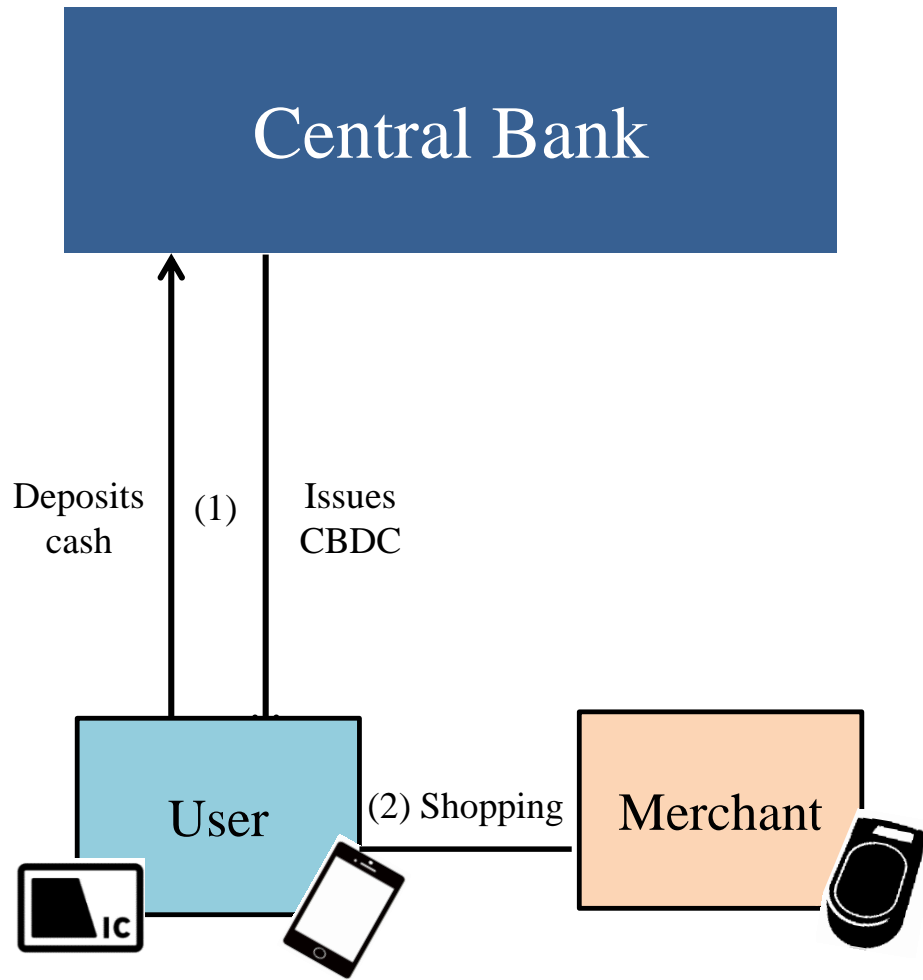
Figure 5

Issuance Forms of CBDC

Account-based CBDC



Token-based CBDC



- (1) A user opens an account and deposits cash at a central bank.
- (2) The user shops at a merchant.
- (3) The user sends an account transfer instruction to the central bank.
- (4) The central bank transfers CBDC to the merchant's account.

- (1) A central bank issues CBDC to a user in exchange for cash. CBDC is stored on the user's smartphone application or IC card.
- (2) When the user shops at a merchant, CBDC is transferred to the merchant's terminal, etc.

■ Effectiveness on monetary policy

- The level of interest rates applied to CBDC could work as the effective lower bound of interest rates for wide-ranging financial assets?

■ Resolving the crowding of cashless payment instruments

- Will issuing CBDC promote the unification of all cashless payment instruments?
- The crowding of cashless payment instruments will likely be resolved in the process of competition.

■ Maintaining the competitive environment in the retail payments market

- Will issuing CBDC maintain the pressure on private sector firms to compete with each other?
- The role of a government policy on competition.

■ Fundamental functions of currency and a two-tiered system

- Central banks should continue to supply payment instruments that are safe, reliable, inexpensive, and available to all in the digital age as well.
- Under the two-tiered system, overall functions of payment and settlement systems should be examined, while taking into account the interrelations between central bank money and private money.

■ Creditworthiness of private digital currency

- It is important to minimize the credit risk of private digital currencies and narrow the credit gap between private money and central bank money for the stability of financial system and payment and settlement systems.

■ General acceptability of money

- Ensuring interoperability among payment service providers can increase the general acceptability of private digital currencies.
- Overseas, there are cases where nonbank payment service providers and banks participate in the same payment and settlement platforms.

■ Settlement finality

- Settlement finality is ensured in RTGS platforms that enable retail transfers on a 24/7 basis as with CBDC.
- Overseas, such RTGS platforms have already been launched in some places.