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Bank of Japan

Future of Payments and the Role of Central Banks

*Speech at the Symposium for the 40th Anniversary of the
Center for Financial Industry Information Systems (FISC)*

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(English translation based on the Japanese original)

Introduction

It is my privilege to be here today at the Symposium for the 40th anniversary of the Center for Financial Industry Information Systems (FISC). Since its foundation in 1984, FISC has contributed enormously to enhancing the safety of financial information systems and to improving the efficiency of financial services in Japan. I would like to express my respect for FISC's many years of service and extend my heartfelt congratulations on the 40th anniversary.

Today, I would like to talk about the "Future of Payments and the Role of Central Banks."

First, I would like to look back on the history of currency and payment systems and try to gain historical lessons and insights into how we have improved the safety, efficiency, and convenience of payment systems while responding to environmental changes and technological innovation. I would then like to consider how the digitalization and globalization of economic activity and technological innovation, which is creating new payment methods, could affect the future of payments, and how we should respond to this.

I. Development of Payment Systems and Digital Technology

The Nature of Money: Maintaining the Confidence of Users

First, let us consider currency used for settlements. Figure 1 is a common illustration of the inconvenience of barter and the importance of currency. The so-called double coincidence of wants does not hold here, thus bartering cannot be carried out successfully. However, we can easily see that with currency which everyone trusts, exchange can be established by moving currency in the direction opposite to that of the movement of goods.

It is also important to note that in this transaction, the transfer of goods and currency takes place at the same time, and so-called DVP (Delivery Versus Payment) is achieved. Whether the seller of goods or services (or assets) can collect the sale price, or conversely, whether the buyer can receive the goods or services after having paid for them, is one of the most important aspects to consider in settlements.

Confidence is the essence of money, and for this very reason our ancestors continued to be obsessed with measures against forgery. During the Edo period in Japan, paper money was

actively issued by regional domains, called Han, as well as by merchants, and remained in circulation for about 260 years from the 17th century to the beginning of the Meiji period. Anti-counterfeiting measures were taken, such as watermarks and the inclusion of fine text within patterns, similar to the microprinting used today (Figure 2). Nowadays, paper money that is not backed by a promise of exchange for metal (fiat money) is in circulation, and in many countries, central banks issue banknotes (central bank notes) while taking the latest measures against counterfeiting. Incidentally, in Japan, banknotes are redesigned every 20 years, so 40 years ago, when FISC was established, was the year when Japan's banknotes were redesigned two cycles back from the redesign this year. The new banknotes issued this year also feature new anti-counterfeiting measures.

Needless to say, anti-counterfeiting measures alone are not sufficient enough to ensure confidence in money. As the history of money tells us, the ultimate key to ensuring confidence is maintaining a stable monetary value. Hayek approached this thinking from the opposite angle in his *Denationalisation of Money*. The idea is that if private banks are allowed to issue money freely, competition will eventually result in the survival of the money with the most stable value.

Today, with the development of digital technology having exceeded all expectations, new focal points of competition among differing forms of money have emerged as essential considerations, which can be summarized as usability by embodying new technology and efficiency while addressing safety concerns. While this is too extensive a topic on which to provide a comprehensive picture, today I would like to share some points to consider when thinking about future developments in this regard.

Before moving on, let us revisit Figure 1. I mentioned that the exchange of goods becomes possible through the use of currency as a medium, but in fact, something similar can be achieved even without using currency. In short, this is a method that involves bookkeeping. When an item is passed from person A to person B, the operation of increasing person A's "assets" and reducing person B's is carried out on the ledger, and this is repeated. While similar to exchange involving currency, this process does not require the physical movement of currency. However, there must be trust in the ledger. The payment request from person B

to person A must be conveyed accurately to the ledger clerk (messaging). As the number of participants increases, the ledgers become more fragmented and complex, creating the need for someone to manage them properly and keep them synchronized. As the number of transactions increases, a system is sometimes used where incoming and outgoing payments associated with transactions are accumulated over a certain period of time and calculated at intermediary stages, reflecting only the difference in the change in assets ("netting" of payments).

The current payment system is undergoing significant technological advances in terms of bookkeeping, and efficiency is improving. At the same time, this calls for the consideration of safety from a perspective different from what has formerly prevailed. Meanwhile, competition among payment methods that embody new technologies is also intensifying.

Development of Digital Technology and Improvements to Payment Systems

Let us now go back in time and take a look at how the development of digital technology has changed the payment system of today (Figure 3). Technological advances in message transmission and bookkeeping have greatly enhanced the efficiency of fund settlement by firms, individuals, and financial institutions. Following the launch of the Zengin Data Telecommunication System (Zengin System) in 1973 and the launch of the Bank of Japan Financial Network System (BOJ-NET) in 1988, the number of bills and checks in use and the amount of money they represent have decreased significantly over the last 40 years (Figure 4). Recently, in 2022, the Electronic Clearing House run by the Japanese Bankers Association began operating, and the exchange procedures, particularly for bills and checks between banks, were digitized (made paperless). The physical transportation and processing of messages related to fund settlement instructions, including manual labor, were significantly streamlined with the transition to online processing.

The use of digital technology has helped to reduce various risks associated with settlements. The BOJ-NET handles the settlement of current accounts at the Bank of Japan (hereafter referred to as "BOJ current accounts") and government bonds (JGBs), and in 1994, DVP settlement was introduced, linking these together and settling them simultaneously. The settlement of securities transactions on a DVP basis eliminates "principal risk," which arises when there is a time lag between two legs of settlement. In 2001, settlements of BOJ current

accounts and JGBs were consolidated into a system where each payment and receipt was settled individually and instantly (Real-Time Gross Settlement [RTGS]) from a system where many payments and receipts were accumulated until a fixed time of day and only the difference between the payments and receipts was settled (Designated-Time Net Settlement). This has reduced the systemic risk, where a failure to settle a net position spreads to other financial institutions, payment systems, and even the financial system as a whole.

Reducing such risk often comes with efficiency loss and requires action. For example, given that RTGS requires large amounts of funds (also called liquidity) during the day for settlement, the Bank of Japan started to provide intraday overdrafts to reduce the burden of liquidity procurement for financial institutions. As a result of these efforts, the Bank has been able to provide payment services at a higher level than before, taking into account not only safety but also efficiency. However, as we will see later, when it comes to large-value transactions, systems that require payments to be made before funds are received, such as RTGS, place a significant burden on participants' liquidity management, and this is a crucial point to bear in mind when thinking about payment systems.

Turning to financial assets, the early 2000s saw a complete shift to paperless transactions that did not assume the existence of physical certificates, with JGBs and commercial paper (CP) being dematerialized in 2003, followed by general bonds (corporate bonds, municipal bonds, etc.) in 2006, investment trusts in 2007, and listed stocks in 2009. The digitization of financial assets and transactions, including the benefits brought by dematerialization, has led to greater efficiency in the operations of trading entities and intermediaries, as well as enabling risk reduction. I mentioned earlier in the example of JGBs that the introduction of DVP settlement eliminated principal risk. Furthermore, there has been a move to reduce the "replacement cost risk" (the risk of not being able to receive the funds or securities that have been agreed upon and having to pay more to replace them), which increases as the settlement period from trade agreement to settlement lengthens, by shortening the settlement period. In terms of government bond settlement, before 1996, settlement had been conducted on designated days,¹ but in 1996, the T+7 rolling settlement system was introduced, under which settlement

¹ The trading custom was to settle on the 5th, 10th, 15th, 20th, 25th, and the last business day of the month.

took place seven business days after the contract date. This was later shortened to T+3 and T+2, and finally the current T+1 in 2018. In order to shorten the settlement period, the key was to streamline administrative processes by using digital technology. It is also worth noting that, during this time, the repo market for JGBs was born and developed in order to smoothly respond to the increased funding needs for JGBs that accompanied the transition to rolling settlement. Behind the progress in streamlining operations and reducing settlement risk through the shift to paperless and computerized systems, there were also developments in digital technology, responses on the practical and systems side through collaboration among the relevant parties, and responses on the legal and institutional side to support the creation of new markets and practical operations. In order to make future payment systems safer and more efficient than they are now, I believe that it will be important to harmonize new technologies with various legal systems and practical operations.

II. Advances in Digitalization

Next, I would like to consider the impact on payment systems, particularly of recent developments in the digitalization and globalization of economic activity and in the emergence of new technologies. In doing so, I would first like to touch on the economics inherent in the digital economy, and then point out some facets to bear in mind when promoting the digitization of payment methods.

The Digital Economy

In order to understand the economics of the digital economy, gaining a grasp of the expansion of digital platforms such as GAFA (Google, Amazon, Facebook, Apple) in the United States as well as Alibaba and WeChat in China would be useful as reference (Figure 5). As you know, digital platforms allow you to purchase a wide range of products and services. Various cashless payment methods are used for settlement, including private digital money and credit cards. In some cases, such as Alipay and WeChat Pay, the company's own digital money is the main method of payment. Regarding digital platforms, it is becoming increasingly common to say that a digital economy is being formed as a place where a wide range of economic activities take place, as evident in the expansion of these platforms not only for commercial transactions but also as places to purchase various financial products. In the digital economy, the network effect grows as more consumers and businesses use the same platform since both of them find it more convenient. In addition, the larger the platform, the

more advantageous it is in terms of analyzing and utilizing information related to consumer activity, and economies of scale come into play. Meanwhile, some have pointed out that as a result of these economics, there is a tendency for specific businesses to expand, which will in turn make the digital economy more susceptible to problems associated with monopolies and oligopolies involving these businesses.

Importance of Ensuring Interoperability

Digital platforms have expanded with the remarkable proliferation of smartphones, enabling consumers to carry out economic transactions such as online booking, shopping, and online trade on their electronic devices, with greater convenience wherever and whenever they prefer. It has also become easier to make domestic and international payments and settlements associated with these transactions. For small and medium-sized retail stores, the introduction of mobile payments using QR codes has lowered the hurdle for responding to consumer needs to use cashless payments, as this has proven easier than installing card payment terminals. In this way, both consumers and stores have more options for cashless payments, and convenience is increasing. However, at the same time, there are also concerns that the proliferation of numerous cashless payment methods without interoperability is reducing the convenience for both merchants and consumers. As cashless payments have become more widespread, it is becoming increasingly important to ensure efficient interoperability between payment methods in order to avoid issues arising from fragmentation in payments. At present, stores that accept payments via cashless payment methods are paid by bank deposit. In that sense, it could be said that cashless payment methods are at this point merely a system that makes it easier to use private bank money and central bank money.

The Advent of DLT

In the field of digitalization in finance, the formation of a digital asset economy that utilizes new technologies such as distributed ledger technology (DLT), blockchains, and smart contracts is also attracting attention (Figure 6). For example, in decentralized finance (DeFi), various financial functions such as decentralized exchange and lending are inexpensively built and operated on public blockchains that do not require a specific administrator. Payment for using these services is also made using the crypto assets² and stablecoins on the

² Platforms that utilize payments with crypto assets without backing assets, such as bitcoins, are

underlying blockchain. In addition, the use of smart contracts, which automatically execute transactions when pre-specified conditions are met, has made it possible to smoothly link information related to transactions and settlements, increasing the diversity of services in the digital asset economy. Such economies are currently centered around the world of crypto assets, and compared to traditional financial and payment systems, they are noted for enabling construction at a lower cost, not requiring the disclosure of personal information, and being available 24 hours a day, 365 days a year. On the other hand, there are some concerns as well, such as the stability of prices of crypto assets used for payment, the fragility of consumer and investor protection mechanisms, and the risk that problems could proliferate through the linkage of various functions. While these concerns may be resolved as relevant laws and regulations are put in place, it is worth noting that the fact that it has become easier to automate various processes at low costs by utilizing various kinds of information on the blockchain and combining smart contracts has lowered the technological hurdles for the development of a digital asset economy.

Whether it be a digital economy or a digital asset economy using DLT, in order for a digital platform to continue developing as a place for innovation, it may be necessary to have a system that continues to secure the confidence of users by ensuring the transparency and fairness of transactions. If various services are provided with the influence of economic forces working to expand the scale of such an economy, I am sure that the responsibility to ensure the safety and robustness of service provision will increase in proportion to scale as well as the economic and social impact.

Understanding the Significance of and Issues surrounding DLT

Let me discuss DLT a little further. This technology initially attracted attention because it includes a mechanism that allows the legitimacy of transactions to be verified by a wide range of participants without relying on a central administrator. In addition, because the ledger information is distributed and there is no centralized server that can be the target of an attack, it is extremely difficult to destroy or tamper with the data, which is thought to be one of the factors behind the expectation for applications to various financial transactions and operations.

inherently different in context from that covered today. As will be discussed, such payment methods are currently not in active use outside of crypto asset transactions, in part due to the extreme price volatility of bitcoins and similar crypto assets.

Recently, the possibility of being able to quickly and inexpensively build a system for sharing ledgers among multiple parties and, as mentioned earlier, the opportunities of using smart contracts, have also been recognized as attractive.

On the other hand, issues exist as well. For example, questions have been raised about the following: whether it is possible to process large numbers of transactions quickly, whether there are any uncertainties about the finality of settlements, how legal and operational risks of smart contracts should be managed, and how appropriate governance of system operations should be ensured in the absence of a central administrator. Some talk about smart contracts as if they were a "magic wand," but there are limitations to their use in business where it is not possible to determine in advance how to respond to unexpected events in the contract -- business that is similar to what economists call "incomplete contracts." These points should be borne in mind as well.

Despite these issues, DLT and blockchains have the potential to play an active role in fields where it is difficult to appoint a central administrator and where there is not much demand for speed in processing large volumes of transactions.³ For example, they could be applied to large-value cross-border payments. Compared to small-value payments, the number of large-value payments is small. Also, in cross-border payments, it is difficult to have a single central administrator. Currently, in the field of large-value cross-border payments, settlements are carried out using a network of banks across multiple countries, with payment information and funds being passed on in a long transaction chain. As a result, issues such as high costs and low speeds have been pointed out. The reason for this long transaction chain is that it was difficult to build and operate a central management-type payment system in a world where currencies and regulations differ from country to country. Recently, we have started to see initiatives to address this issue using new technologies, including DLT. This is the international experiment called Project Agorá, which the Bank of Japan is also participating in. I would like to return to Project Agorá later.

³ Alternatively, these technologies could be used to link registration entries with registration procedures and their settlement for assets that are not so frequently transacted, such as real estate and automobiles.

Importance of Ensuring Resilience of Services

Being a user of the digital economy means being provided with the convenience of easy access to various goods and services. At the same time, because it might come with a connection to the entire world through digital networks, the possibility of being affected by system failures due to cyberattacks or natural disasters is also thought to increase. In international discussions,⁴ the need to improve the robustness of financial market infrastructures (FMIs) against cyberattacks is also a major issue being considered. As the digital economy expands further and plays an increasingly important role in people's lives and as an infrastructure for financial markets, it will be necessary to respond to various risks, including cyberattacks, at an even higher level.

Importance of International Standardization

Earlier, I pointed out the importance of interoperability in cashless payments. This also applies to cross-border payments. International standards for information transmission and security, which can be regarded as a means of language unification across different ledgers and entities, play an important role. For example, in cross-border transactions, international standardization of the handling of relevant information in different countries' payment systems makes it possible to exchange information smoothly and securely between payment systems and the financial institutions that participate in them. The International Organization for Standardization (ISO) Technical Committee on Financial Services (ISO/TC68) is working to develop international standards for information exchange methods and security measures. In terms of security, for example, this committee is developing new international standards for online identity verification using smartphones and security technology for blockchains and DLT. The Bank of Japan serves as the secretariat of the national standards body for TC68, which is working to incorporate Japan's perspective into international standards, while also supporting the smooth domestic application of excellent technologies from around the world.

III. Perspectives on the Future of Payment Systems

Benefits and Challenges of Conventional Payment Systems

To consider the future of payment systems, let me offer a perspective on the division of labor

⁴ For example, the Committee on Payments and Market Infrastructures (CPMI), an international standard-setting body for payment systems, has listed the operational resilience of FMIs as one of its main areas of focus for the 2024-25 period, with cyber resilience listed as a main component.

in a world where non-bank payments also form part of the two-tier structure of central bank deposits and private bank deposits. Considering the benefits and challenges of conventional payment systems serves as a good starting point. A key role in the current payment system is played by banks' deposit currencies. Deposit currencies are equipped with a credit creation function. Banks can create deposit currencies through lending, which function as a means of payment. This makes it easier for banks to flexibly respond to the liquidity needs (temporary funding needs that arise, for example, when the timing of the payout precedes that of the incoming payment) of customers that are required for large-value payments. In the case of electronic money and stablecoins, as it is necessary to prepare payment funds in advance (prefunding), the burden becomes greater for large-value payments. Payment systems that use deposit currencies are particularly effective for large-value payments. On the other hand, in the field of small-value payments, the burden of prefunding is not as great as for large-value payments and there is a tendency toward placing more importance on user experience, such as the ease of the procedure for users. In this respect, there is an opportunity for non-bank payment services to expand their use in the field of small-value payments.

Next, in the area of cross-border payments, bank payment services are, in many cases, said to be more costly and require a longer time compared with non-bank payment services. As I mentioned earlier, banks are convenient for large-value payments because they have a credit creation function, but because the provision of a credit creation function requires strict risk management, banking regulation and supervision is also stringent. As a result, the burden of multinational business expansion becomes greater. On the other hand, non-bank payment service providers do not have a credit creation function, making it difficult for them to gain an advantage in the field of large-value payments. However, compared to banks, multinational business expansion is relatively easier for them, because they are not subject to the same stringent regulation and supervision as banks. As a result, it becomes easier to carry out cross-border payments using their own networks, mainly for small-value payments, quickly and at low cost. However, if they were to expand their services to include large-value payments in the future, the demands on and responsibilities of non-bank payment service providers would increase, such as the need to prepare funds in each country's currency in advance and to secure alternative measures in the event of a system failure.

Structure and Required Characteristics of Currency and Payment Systems

Taking a step further, let us reconsider the payment system from the perspective of central bank money and private money. There are many things we do not know about the future, but looking back in history, it seems that there are certain characteristics that are always required of money and payment systems. The most important of these, as mentioned at the outset, is to gain the confidence of users and ensure general acceptability through achieving a stable monetary value. The Bank of Japan Act⁵ stipulates that banknotes issued by the Bank of Japan can be used for payment without limits (valid for the payment of debts and must be accepted when offered), which also supports this point from a legal perspective.

On the other hand, while there is no system in place to ensure the same level of institutional confidence in bank deposits and electronic money as there is in central bank money, there are certain institutional frameworks to ensure that they are used with peace of mind, under which, for example, bank deposits are protected by deposit insurance up to a certain amount, they are subject to regulation and supervision, and some of them can be exchanged for cash upon request. Under such a system, the economic appeal of interest being paid on bank deposits and the various points that can be earned with electronic money, as well as the convenience of being able to use them at any time via smartphones and other devices, are thought to be encouraging their use. However, whether it be bank deposits or electronic money, private money issued by private entities is a means of payment that is premised on the existence of central bank money, such as cash or central bank current accounts. For example, bank deposits are essentially money that promises to be paid back in cash. This is not simply an abstract concept. Many people probably think that paying in cash would be the last resort if bank transfers or electronic money were to become unusable due to some kind of problem. Thus, current bank deposits and electronic money do not exist on their own, but are payment methods that are premised on the availability of central bank money, such as cash and central bank deposits.

With this in mind, it is important that private money and central bank money circulate in a well-balanced manner according to their respective characteristics. It seems that the roles in

⁵ Article 46 (2) of the Bank of Japan Act stipulates that the banknotes issued by the Bank of Japan are legal tender and hence used for payment without limits.

the payment systems have also been divided according to the characteristics of central bank money and private money. For example, payment systems that use central bank money, which places importance on reliability and trust, tend to be built using technologies that have a proven track record, and are constructed after sufficient operational checks have been carried out to ensure that they can respond to exceptional situations such as system failures, while also taking efficiency into consideration and ensuring safety and robustness. Even among payment systems that use private money, the requirements for the robustness of the system and the level of alternative functions can differ between systems that are used as infrastructure for economic activity and systems that have a relatively low social impact.

As digitalization progresses, thinking about the future of currency and payment systems involves considering the division of roles between the central bank and private entities, including which areas of payment services should be developed as infrastructures (non-competitive areas) and which areas should be improved through competition by private businesses (competitive areas), as well as areas that fall somewhere in between.

Initiatives by the Bank of Japan

The Bank of Japan is also exploring the future of payments through various initiatives. Our basic thinking is that it is important to ensure that there are generally acceptable payment instruments, whether it be for large-value or small-value payments, for the sound development of the Japanese economy. From this perspective, we are taking various initiatives as a payment service provider, an overseer of private settlement systems, and a catalyst for discussions among relevant parties, with the aim of enhancing Japan's payment and settlement systems as a whole. Among these initiatives, I would like to touch on Project Agorá and the consideration of a central bank digital currency (CBDC) below.

Project Agorá is an experimental project aimed at improving cross-border payments, primarily increasing their speed and lowering their costs, by utilizing new technologies such as DLT and smart contracts. The project is led by the Bank for International Settlements (BIS) and brings together central banks and private financial institutions from seven jurisdictions. Specifically, based on the concept of a unified ledger proposed by the BIS in 2023, the project will consider ways to achieve smooth cross-border payments while maintaining the two-tier

structure of the monetary system by placing central bank deposits and commercial bank deposits on the same ledger. Recently, managing assets on a DLT platform has been referred to as "tokenization," and deposits managed on a DLT platform are called "tokenized deposits." Project Agorá will experiment with "tokenizing" deposits at central banks as well as private banks in various countries and managing them on a common platform. I mentioned earlier that there were difficulties in establishing and operating a single central management system for cross-border payments because currencies and regulations differ from country to country. Project Agorá has the potential to overcome this problem by utilizing DLT. This is because, in theory, by using DLT, it is possible to build a common international platform while each country manages the data related to its own country, without centralizing data management in the system of any single country. The Bank of Japan believes that, when building a common international platform like Agorá, it is important to aim for a decentralized data management system that takes into account monetary sovereignty, and an open, transparent, and secure system that allows for the participation of many countries. The Bank has summarized its basic approach to building a common international platform, including these points, and has disseminated it both domestically and internationally in publications such as the 2024 issue of the *Payment and Settlement Systems Report*.

With regard to CBDC, in October 2020, the Bank released "The Bank of Japan's Approach to Central Bank Digital Currency," and under this approach, the Bank has been working in collaboration with domestic and overseas stakeholders to conduct experiments and explore institutional arrangements for a retail CBDC that is expected to be used by a wide range of entities, including individuals and firms. Currently, the Bank is proceeding with the pilot program,⁶ which revolves around two pillars: the "development of a system for the pilot program and experimentation" conducted by the Bank to verify the technical feasibility, and the "CBDC Forum," which is a venue for learning from the technology and expertise of private-sector businesses that are effective for verifying the technical and operational aspects. At present, there are no plans to issue a CBDC, but we believe it is important to continue to deepen discussions with all those involved about the future positioning of central bank money in the retail payments sector, including the impact of the ongoing digitalization in various

⁶ Details on progress made on the pilot program are regularly updated on the Bank of Japan website. <https://www.boj.or.jp/en/paym/digital/index.htm>

areas in Japan and overseas on the structure of currency and payment systems, and the role that CBDC could play in ensuring the safety and efficiency of currency and payment systems.

Concluding Remarks

When considering the future of payments, it is necessary to predict and analyze changes in the economic and social environment and the resulting payment needs and risks from a wide range of perspectives. The payment systems of a country are constructed in response to such factors as the needs and risk preferences of the people who make up that society and are influenced by the economic development of that country. They are therefore path dependent. In this sense, when upgrading payment and settlement systems, it is important to consider mechanisms that reflect social needs and risk preferences, and to promote measures that are conscious of the need to harmonize new technologies with existing institutional arrangements and practices. In this respect, in countries such as developing countries that have followed a path of delayed development of payment and settlement systems, there are cases where new technologies are used to upgrade these systems in a single step, as in the English term "leapfrog." In the case of Japan, it is important to effectively adapt new technologies while leveraging traditional payment systems to create an enhanced currency and payment system as a whole. The Bank of Japan also intends to continue making various efforts toward this end.

Finally, I would like to express my respect once again for the efforts of FISC, which has contributed to the development of Japan's payment and settlement systems over the past 40 years since its establishment. Let me conclude my speech by expressing my hope that FISC will continue to play its part alongside its member firms in creating more robust and convenient future payment and settlement systems.

Thank you very much for your attention.

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■ **Advances in Digitalization**

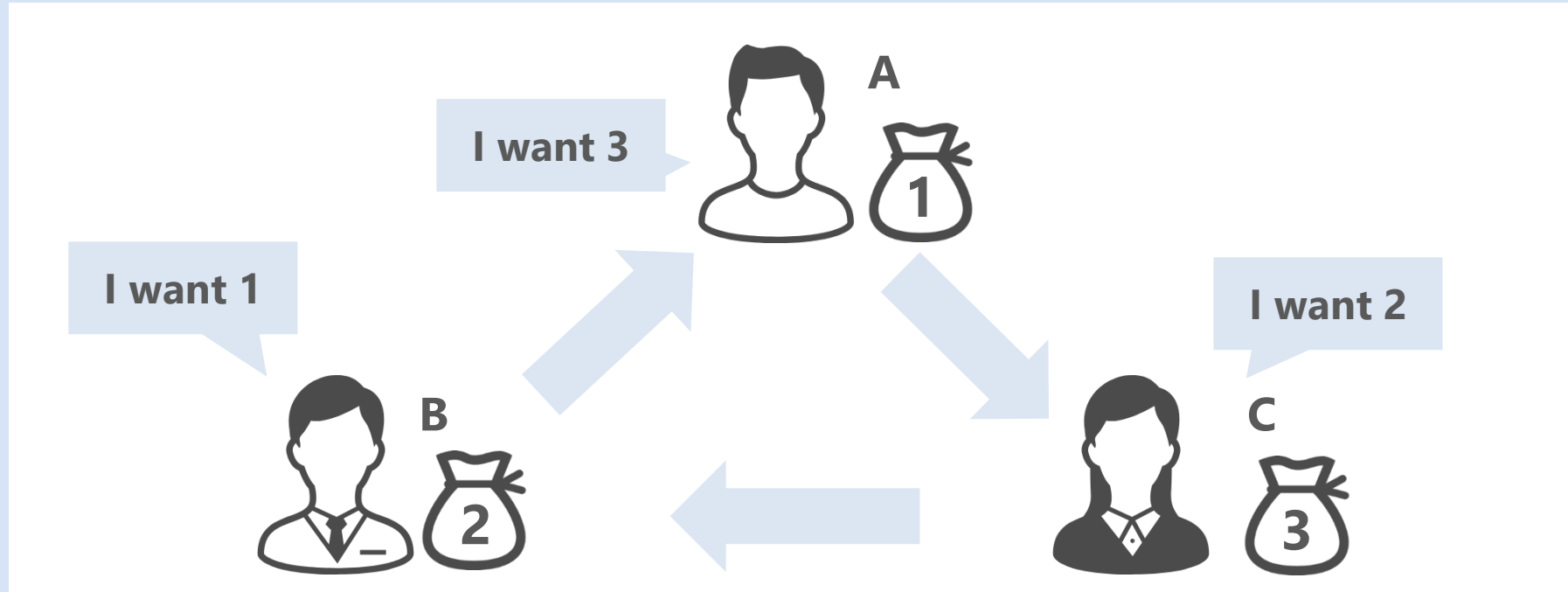
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■ **Perspectives on the Future of Payment Systems**

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The Nature of Money: Maintaining the Confidence of Users

(Figure 1) The necessity of money



Exchange of currency resolves this situation



The Nature of Money: Maintaining the Confidence of Users

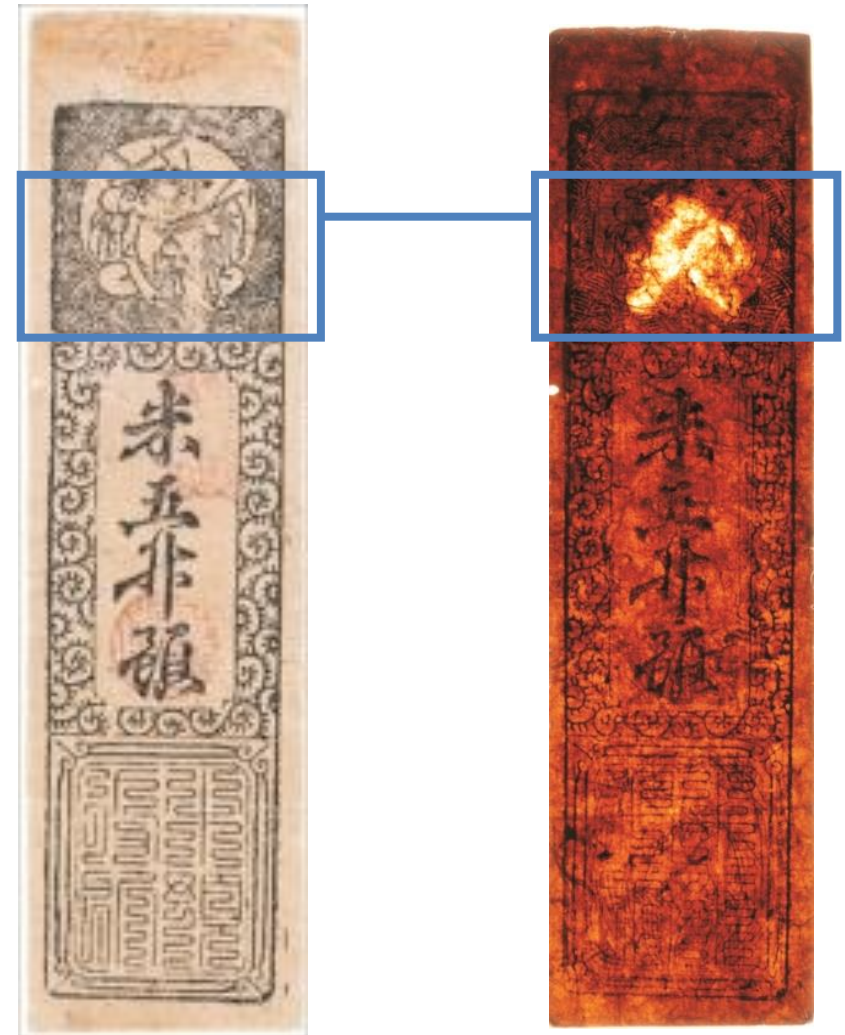
(Figure 2) Anti-counterfeiting measures in the Edo period

Fine text within patterns



Chikugo-yanagawa Han bill

Watermarks



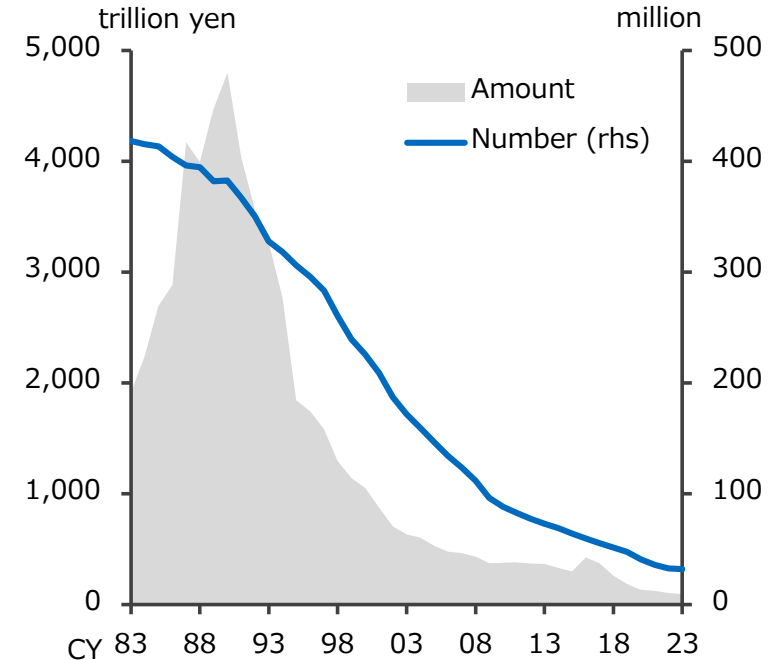
Nagato-chofu Han bill

Development of Digital Technology and Improvements to Payment Systems

(Figure 3) History of the development of payment systems

1970-	Launch of Zengin System
1980-	Launch of BOJ-NET
1990-	Introduction of DVP for JGB settlements Introduction of T+7 rolling settlement system for JGBs JGB settlement cycle shortened to T+3
2000-	Introduction of RTGS system to the BOJ-NET Dematerialization of JGBs and CP Dematerialization of general bonds Dematerialization of investment trusts Dematerialization of listed stocks
2010-	JGB settlement cycle shortened to T+2 JGB settlement cycle shortened to T+1 Implementation of More Time System (realizing Zengin System operations on a 24/7 basis)
2020-	Establishment of “Electronic Clearing House”

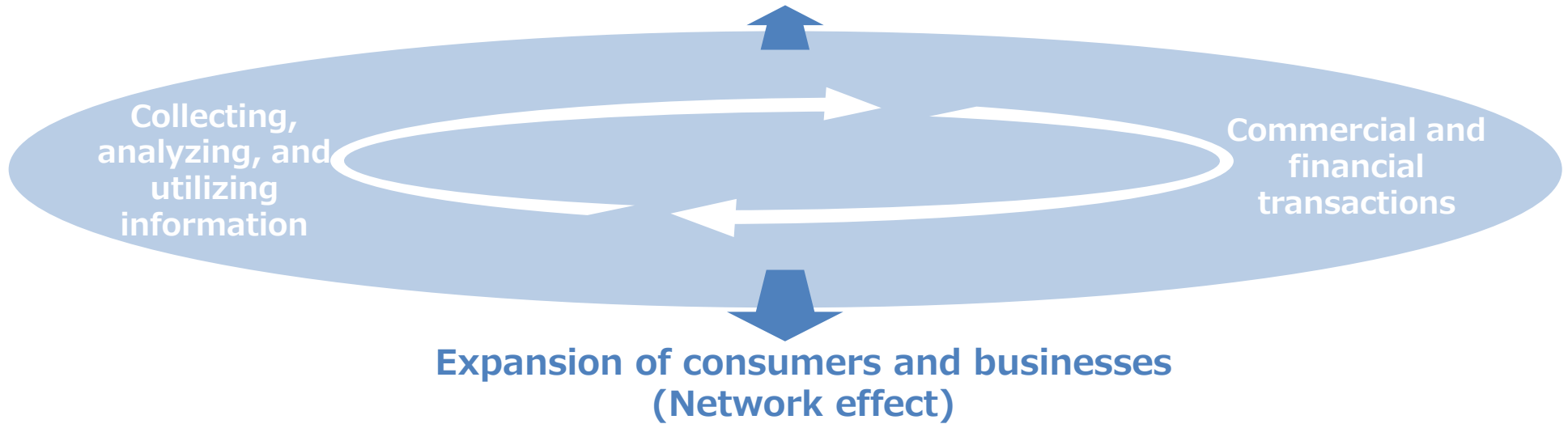
(Figure 4) Volume of bills/checks in circulation



(Source) Japanese Bankers Association

The Digital Economy

(Figure 5) Expansion of the digital economy



Benefits

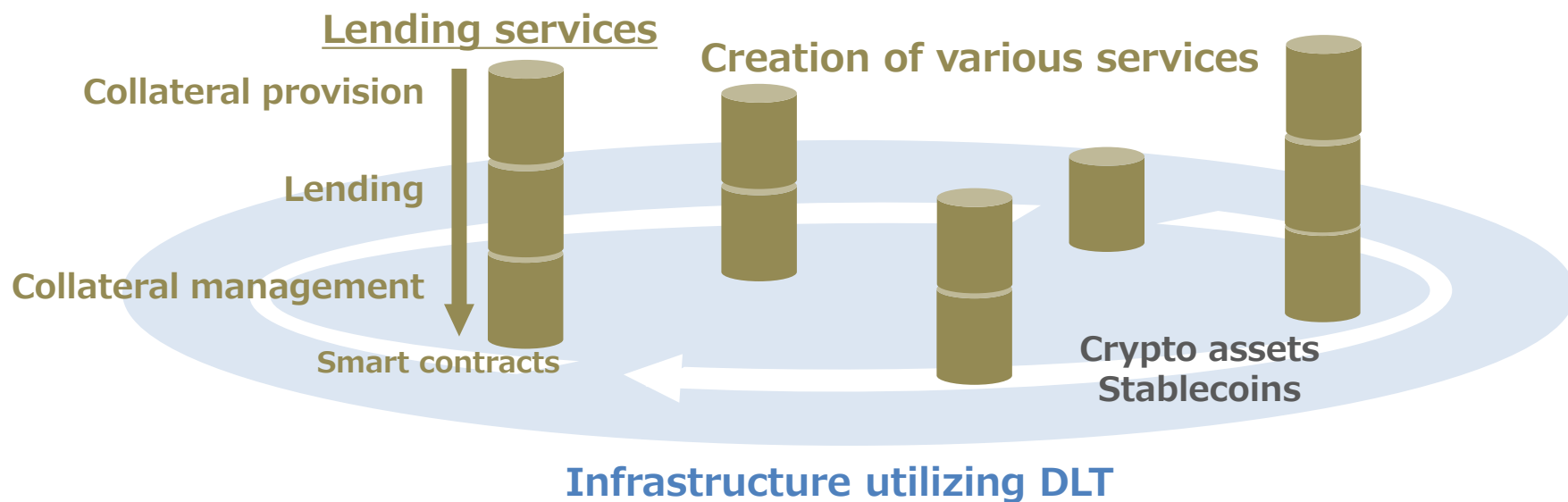
- Expansion of access to various goods and services
- Expansion of cashless payment options

Risks

- Possibility of monopolies and oligopolies
- Social costs of fragmentation in payments

The Advent of DLT

(Figure 6) Formation of a digital asset economy utilizing DLT



Benefits

- Potential for creating new services
- Potential for reducing usage costs
- Potential for improving accessibility

Risks

- Fragility of consumer and investor protection mechanisms
- Possible spillover of effects in the event of program malfunctions

Facets to Bear in Mind When Promoting the Digitization of Payment Methods

	Expectations	Challenges
Importance of ensuring interoperability	Expansion of cashless payment options	Fragmentation in payments
Understanding the significance of and issues surrounding DLT	Building a system for sharing ledgers among multiple parties Possibility of using smart contracts	Governance of system operations Risks of smart contracts
Importance of ensuring resilience of services	Expansion of access to various goods and services	Risks such as cyberattacks
Importance of international standardization	Smoother and more efficient cross-border payments	—

Benefits and Challenges of Conventional Payment Systems

■ Benefits

- Deposit currencies play a key role in the conventional payment system
- A notable characteristic of deposit currencies is their credit creation function, which makes it easier for banks to flexibly respond to large-value payments

■ Challenges

- In cross-border payments, bank payment services, in many cases, are costly and require a long time

Structure and Required Characteristics of Currency and Payment Systems

■ Ensuring the confidence of users

- Stability of the value of money
- General acceptability of payment instruments

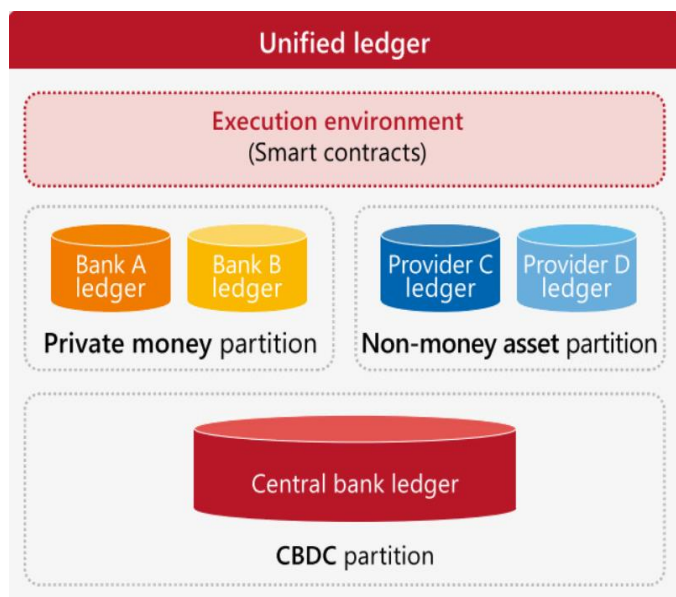
■ Division of roles between private money and central bank money

- Requirements for the robustness of the system and the level of alternative functions in accordance with social impact
- Competitive vs. non-competitive areas of payment services in a digital society

Initiatives by the Bank of Japan

■ Project Agorá

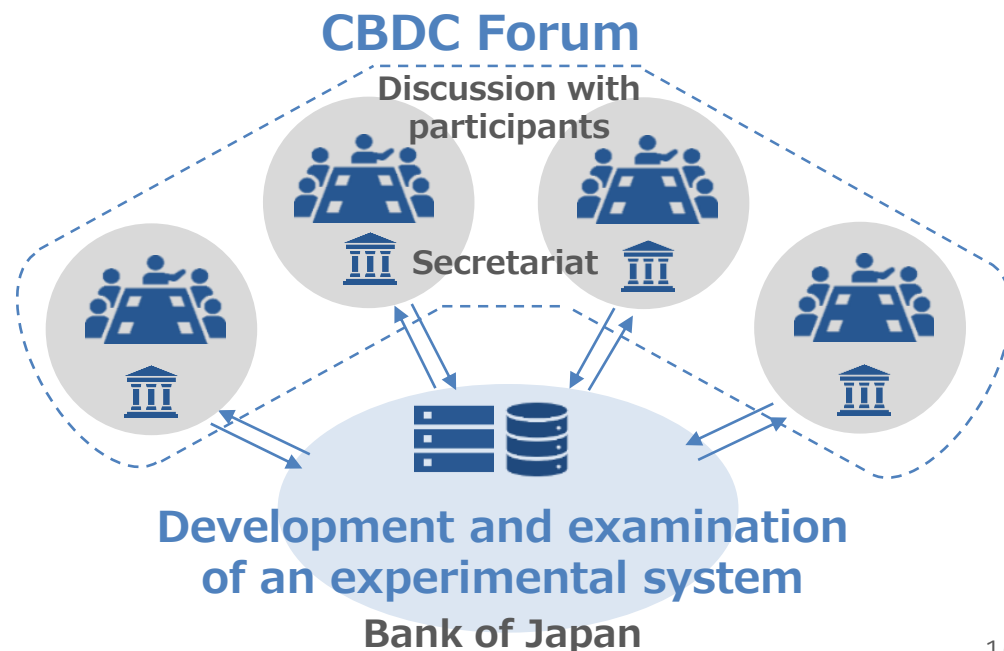
- An experimental project led by the BIS, aimed at improving cross-border payments
- Based on the concept of a “unified ledger,” the project will consider ways to achieve smooth cross-border payments while maintaining the two-tier structure of the currency system by placing central bank deposits and private bank deposits on the same ledger.



(Source) Annual Economic Report (BIS, 2023)

■ CBDC

- Since April 2023, the Bank has been proceeding with a pilot program
- The pilot program revolves around two pillars: “development and examination of an experimental system” with the aim of conducting technical evaluation and the “CBDC Forum” to leverage the skills and insights of private businesses.



Summary

■ Key points for considering the future of payments

➤ Understanding the nature of money:

Building a mechanism to sustainably ensure user confidence

➤ Understanding path dependence:

Harmonizing new technologies with existing institutional arrangements and practices

➤ Understanding the division of roles between the central bank and public sectors:

Payment systems as infrastructures in a digital society