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Settlement
Systems
Report*



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Executive Summary:

An overall assessment of Japan's payment and settlement systems

Japan's payment and settlement systems have faced significant changes in recent years in light of globalization in economic activity and further progress in information technology.

On the demand side, commercial transactions have been expanding into different time zones as a result of internationalization in business activity. Lifestyles have diversified and new businesses -- including e-commerce -- have flourished. Against such background, an appetite for a variety of payment and settlement services is increasing. The services include such as those enabling efficient cash management of globally-active firms, ensuring settlement in the middle of the night and on holidays, and realizing cross-border settlement at a modest cost.

On the supply side, in light of further progress in information technology, computers' ability to process information has continued to expand, and internet and mobile devices have been widely used around the world. Against such background, technology to be applied to payment and settlement services has advanced and new devices enabling the public to access those services have continued to grow.

Despite such changes, the safety of Japan's payment and settlement systems is maintained on the whole. In addition, measures contributing to further advances in those services and moreover enhancing their efficiency are now making progress -- both on the wholesale and retail payment fronts -- while they are continuing to incorporate emerging technologies and capturing end-users' needs.

As for the wholesale payment system, the Bank of Japan is responsible for operating the BOJ-NET -- the core payment and settlement system in Japan. The BOJ-NET handles settlements smoothly on a daily basis: to be specific, the settlement via the Bank's current accounts amounts to 136 trillion yen and the face value of the JGB settlements in the book-entry system amounts to 102 trillion yen (daily average in 2015 respectively). In addition, the new BOJ-NET was fully launched in October 2015. It uses the most advanced information technology and has great flexibility in adapting to changes in financial services and various other needs. Furthermore, the BOJ-NET enhances

accessibility to cope with changes in the financial environment. In February 2016, it extended its operating hours up to 21:00. In sum, the new BOJ-NET provides powerful underpinnings for private financial institutions which contribute to enhancing the safety and efficiency of the payment and settlement systems in Japan.

On the securities settlement, stakeholders are now making efforts to reduce settlement lags in JGBs, equities and other securities. Those efforts are aimed at reducing risks associated with the settlement lags.

On the retail payment, progress has been made to realize 24/7 services which enable bank transfers from a sender to a receiver over the weekend and in the evening. Moreover, the efforts to facilitate financial electronic data interchange (EDI), which will contribute to enhancing corporate financial activity and raising the efficiency of its back-office operations, are progressing.

More recently, new financial services, dubbed "FinTech," that make the most of information technology are also flourishing. Above all, innovation in payment and settlement services is eminent: for example, payment means that are compatible with e-commerce -- which can be accessed through mobile phones regardless of the day and time -- and services enabling small-lot overseas remittances with low costs are starting to emerge. Such payment services are undertaken by a wide range of service providers including financial institutions and non-banks which excel in information technology. On top of that, a distributed ledger which constitutes a technology underpinning digital currencies receives considerable attention as it could be applicable to a variety of assets in managing ownership changes without relying on a third party.

As a central bank, the Bank is firmly committed to enhancing the safety and efficiency of the payment and settlement systems in Japan. From such a viewpoint, it conducts its oversight activity on financial market infrastructures (FMIs), based on the Principles for Financial Market Infrastructures (PFMIs), released in April 2012. In addition, the FMIs in Japan and other major economies have been comprehensively reviewed from the perspective of international standards. Those activities suggest that the payment and settlement systems in Japan continue to be stable as a whole and are fully FMI compliant.

Considering that the payment and settlement systems are vital to the foundations of economic society, all stakeholders involved with market infrastructure -- including the Bank of Japan -- need to prepare robust business continuity plans (BCPs). The Bank is intensifying its efforts to prepare for a disaster through examining its own BCP strategy and carrying out a variety of training sessions while it takes account of the experiences of the Great East Japan Earthquake and reviews its own resilience to casualties. In addition, it continues its dialogue on BCPs with private financial institutions and FMIs. Against such background, those institutions and FMIs are making their own efforts to strengthen their BCPs. Such efforts on the part of the private sector will contribute to strengthening the resilience of payment and settlement systems in Japan.

The Bank, as a central bank, provides payment and settlement services through the BOJ-NET, the core payment and settlement system among Japan's FMIs. In light of rapid changes in financial conditions, it has established the new BOJ-NET. Furthermore, it contributes to enhancing the safety and efficiency of Japan's payment and settlement systems by engaging in dialogue with relevant stakeholders and conducting oversight. Against a background of innovation in payment and settlement services, a variety of entities now engage in the provision of those services and preparations against a cyber attack have become critical. The Bank is firmly committed to playing a catalytic role in enhancing cooperation and coordination among relevant stakeholders with the aim of further advancing payment and settlement services and ensuring the safety of those systems. In the meantime, the Bank will carefully monitor developments in payment and settlement in light of the introduction of "Quantitative and Qualitative Monetary Easing with a Negative Interest Rate."

Through those measures, the Bank will make its utmost efforts as a central bank to enhance the safety and efficiency of Japan's payment and settlement systems. It will further underpin, from the viewpoint of building market infrastructure, financial market developments and sustainable growth in the economy.

I. Enhancing Payment and Settlement Systems

This chapter discusses recent developments for the enhancement of payment and settlement systems, with regard to both large-value payment systems (fund and securities settlement systems) and small-value payment systems.

Section A will focus on establishing and making effective use of the new BOJ-NET, the funds transfer system operated by the Bank of Japan. The initiatives and underlying philosophy of the Bank will first be presented in relation to the full launch of the new BOJ-Net on October 13, 2015 and the extension of its operating hours (with the closing time extended from 19:00 to 21:00) on February 15, 2016. The initiatives undertaken by private-sector financial institutions will then be discussed with regard to the full utilization of the improved functionality of the new BOJ-NET, enhancing the usability of financial services and improving the security and efficiency of payment and settlement activity.

Section B will present ongoing projects in Japan to shorten the settlement cycle of Japanese government bonds (JGBs), equities and other securities against the background of the global trend to shorten the settlement cycle of securities to reduce settlement risk.

Section C will focus on the enhancement of small-value payment services. First, recent initiatives to extend the operating hours of the Zengin System (the interbank payment system run by the Japanese Bankers Association) on a 24/7 basis will be explained. This is a scheme that will enable immediate remittance of funds to banks around the clock on weekdays, weekends and holidays. Next, with regard to the advancement of corporate financial management, the "Financial EDI (Electronic Data Interchange)" will be discussed. This is designed to automate all the processes of corporate activities, from placement or receipt of orders for goods and services to settlement of transactions.

Section D will present how a new type of financial services that use information and communications technologies, called FinTech (a coined word combining "Finance" and "Technology"), is actively utilized, particularly in areas related to small-value payment services. Moreover, the distributed ledger, the technology underpinning "digital currency," which has been drawing increasing attention recently, will be discussed as well.

A. Large-value Settlement System

1. Establishing and Making Effective Use of the New BOJ-NET

Establishment of the New BOJ-NET

The Bank operates a computer network system known as the "Bank of Japan Financial Network System (BOJ-NET)." As Japan's central bank, the Bank issues risk-free banknotes. It also accepts deposits in central bank accounts, and all the settlements ultimately take place through these accounts. The BOJ-NET is therefore the fundamental infrastructure that forms the basis of Japan's payment and settlement systems.

With the advancing globalization of economic activities and financial transactions in recent years, as well as the progress being made with information technology innovations, there has been a growing need for establishing the new BOJ-NET to serve as the fundamental infrastructure for Japan's economy. This will allow the system to flexibly respond to the networking of settlement infrastructures, globalization of financial transactions and innovations in financial services to accommodate ongoing socioeconomic needs. Against this backdrop, the Bank has been engaged in the development of the "New BOJ-NET" since 2009.

The new BOJ-NET started phase-1 operations on January 6, 2014 mainly for (i) financial market control (BOJ operations), (ii) functions related to JGB tenders, and (iii) functions related to deliveries in relation to JGB operations. The system was fully launched on October 13, 2015, starting phase-2 operations for the remaining functions, including those for settlement of funds transfer and JGBs and functions related to credit and collateral.

The features of the new BOJ-NET include the following three aspects.

First, the system is very versatile in terms of programming language and infrastructure for system linkage, and employs for its architecture the most advanced information technology that can be readily expanded in the future.

Second, the system can flexibly respond to changing financial services and needs through

the elimination and consolidation of functions and sharing of program codes.¹

Third, the system is easily accessible so as to meet the needs arising from the globalization of financial transactions and settlement infrastructure networking. The adoption of XML messages and international standard messages (ISO20022) has improved its connectivity with other settlement systems both in Japan and abroad, as well as with financial institutions. In addition, it is equipped with the technical capacity to operate for substantially longer hours.

Making Effective Use of New BOJ-NET: Extension of Operating Hours

In determining the operating hours for the new BOJ-NET, since Japan is located in a time zone that is ahead of other major financial markets, it is important to consider utilizing the functions of the new BOJ-NET as efficiently as possible in a way that would contribute to increasing the security and efficiency of settlement activity, improving financial services and subsequently enhancing Japan's economic welfare, and revitalizing Japan's financial markets.

With this in mind, in April 2010, the Bank started convening meetings for exchange of opinions on construction of the new BOJ-NET with financial institutions using the existing BOJ-NET to discuss issues that would serve as a basis for examining functions and specifications of the new BOJ-NET. In relation to the operating hours of the new BOJ-NET, it was agreed by participants to: (i) keep the system operational for long hours every business day; (ii) designate a core time during the operating hours so that all users would be prepared for the administrative processes necessary for use of the new BOJ-NET; and (iii) leave it to the discretion of each user to determine whether to use the new BOJ-NET before or after the core time.

Based on these discussions, the Bank decided to set the starting time of the new BOJ-NET at 8:30² for both funds transfer system and JGBs services (i.e., 30 minutes earlier than the

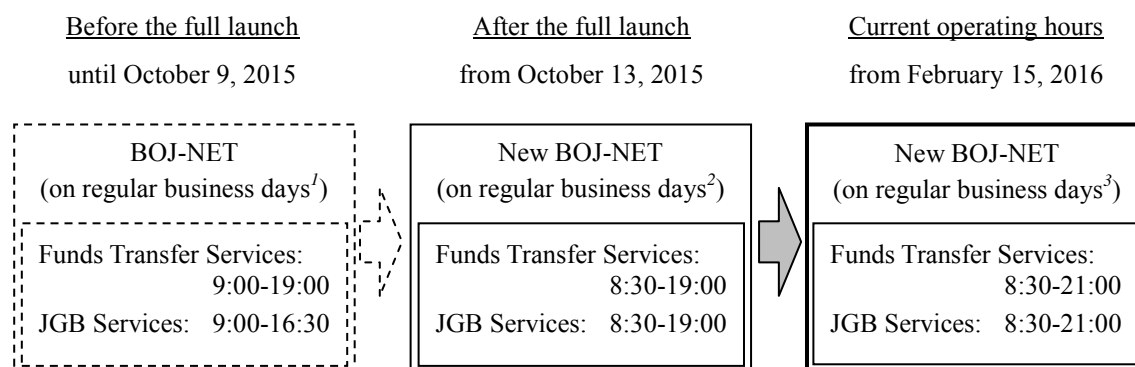
¹ The key changes in the functionality of the new BOJ-NET include: (i) expansion of the scope of settlement where the liquidity saving features can be used (for improved funding efficiency); (ii) change from office-based management to company-based management of collateral (for improved collateral use efficiency); and (iii) abolition of transfer suspension period (for smoother settlement of JGB transactions).

² 7:30 on the last business day of each month.

former BOJ-NET's starting time) and to put off the closing time for JGB services until 19:00, as with funds transfer system.

Discussions on the operating hours of the new BOJ-NET continued at the "Forum Towards Making Effective Use of the New BOJ-NET" established in August 2013. In May 2014, the Bank published its policy to further extend the operating hours of the new BOJ-NET, as shown in (Chart I-1-1). Under this policy, the closing time of the new BOJ-NET was extended to 21:00 on February 15, 2016.

Chart I-1-1 Extension of the Operating Hours of the New BOJ-NET



Notes: 1. On the last business day of each month, the operating hours are 8:30-19:00 for Funds Transfer Services and 9:00-17:30 for JGB Services.

2. On the last business day of each month, the operating hours will be 7:30-19:00 for both Funds Transfer Services and JGB Services.

3. On the last business day of each month, the operating hours will be 7:30-21:00 for both Funds Transfer Services and JGB Services.

Source: Bank of Japan.

The core time described above is from 9:00 to 17:00 for funds transfer services except for the yen settlement of FX transactions, from 9:00 to 15:00 for funds transfer services for the yen settlement of FX transactions, and from 9:00 to 16:30 for JGB services.

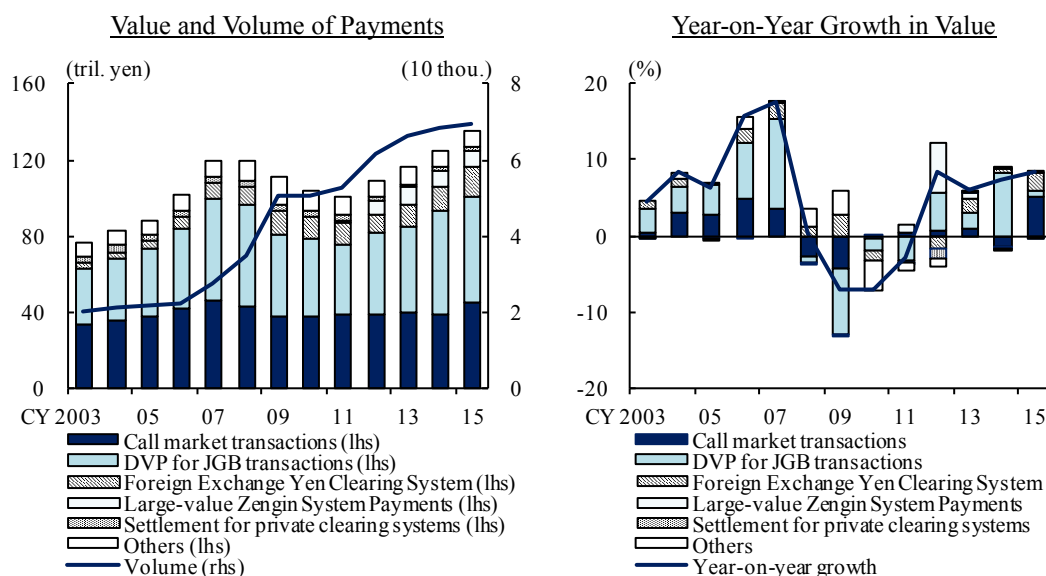
One of the advantages of the extension of the new BOJ-NET's operating hours is that, due to an increase in settlement hours overlapping with operating hours of overseas markets, the cross-border settlement of funds and securities will be performed more quickly with reduced settlement risks and increased efficiency of funds and collaterals. This is expected to improve the security and efficiency of settlement, leading to advancement of financial services and revitalization of the financial market.

The Bank will continue discussions with user financial institutions and industrial associations on more effective use of the new BOJ-NET, including future operating hours.

Trends in Settlement via BOJ-NET

Looking at the trends of fund settlement via the BOJ-NET Funds Transfer System, the value and volume of settlements in 2015 increased from the previous year, largely due to increases in "call transactions." This means that both the value and volume of settlements have been on the rise since 2012 (Chart I-1-2).

Chart I-1-2 Value and Volume of Payments Settled via the BOJ-NET Funds Transfer System¹

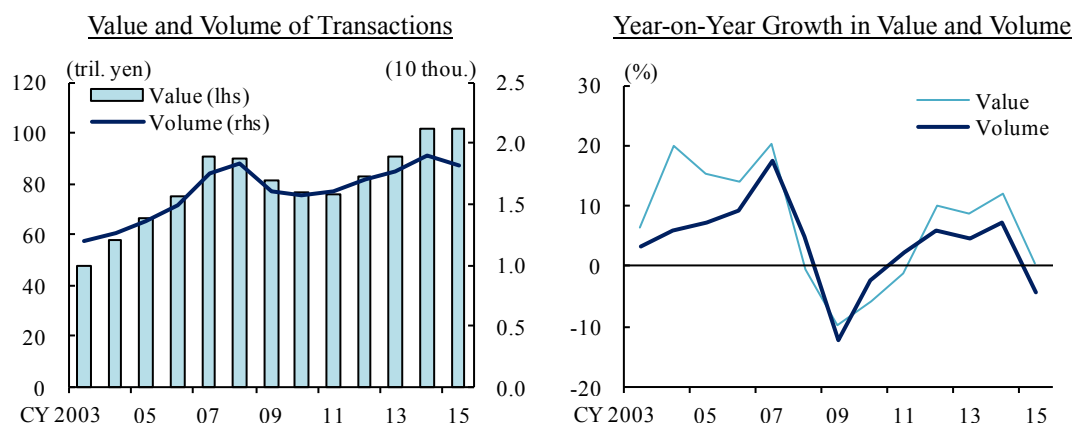


Note: 1. Average daily value and volume in a year.

Source: Bank of Japan.

The value and volume of settlements of JGBs via the BOJ-NET Funds Transfer System leveled off or declined slightly in 2015 from the previous year. Over the longer term, however, both the value and volume of settlements of JGBs remained at high levels (Chart I-1-3).

Chart I-1-3 Value and Volume of Transactions Settled via the BOJ-NET JGB Services¹



Note: 1. Average daily value and volume in a year.
Source: Bank of Japan.

2. Projects towards Making Effective Use of the New BOJ-NET

The Bank established the "Forum Towards Making Effective Use of the New BOJ-NET" (hereafter, the "Forum") in August 2013 with the intention of deepening discussions with parties for effective use of the new BOJ-NET. Since then, the Bank has continued to exchange opinions with financial institutions and industry associations at the Forum and at many other opportunities.

At the Forum, a number of ideas about measures for effective use of the New BOJ-NET and future operating hours were presented, which are summarized in its report published in March 2014.³ Even after publication of the report, discussions have continued on ways to use the BOJ-NET even more effectively.

The following are some of the ideas on the utilization of the new BOJ-NET presented at the Forum and included in the report: (i) greater use of JGBs in global financial markets; and (ii) cross-border customer transfers in Japanese yen at nighttime.

³ The report can be downloaded from the following URL:
http://www.boj.or.jp/en/announcements/release_2014/rel140314d.htm/

Greater Use of JGBs in Global Financial Markets

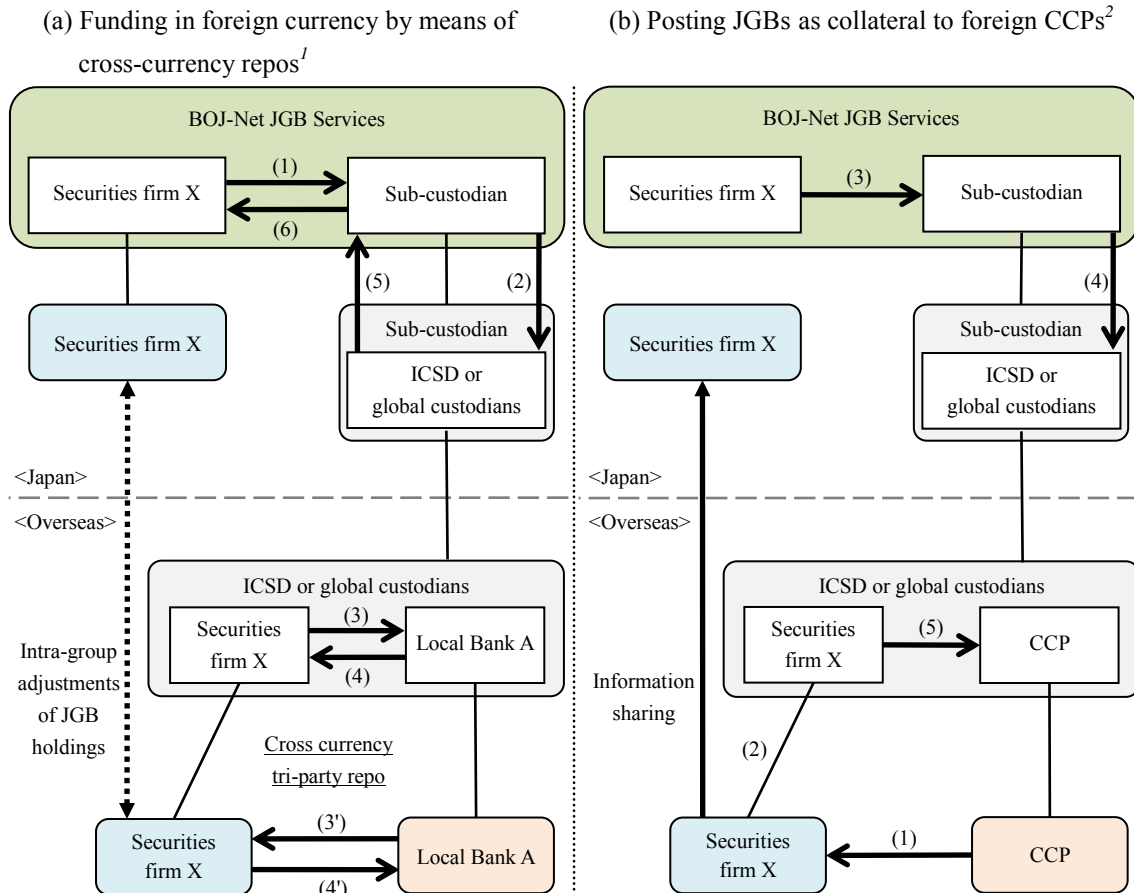
Since the financial crisis triggered by the Lehman Shock in 2008, financial institutions, particularly those operating overseas, have increasingly placed emphasis on facilities for raising liquidity in each market. At the same time, the importance of collateral in financial transactions has become more frequently noted.

In the meantime, for most Japanese financial institutions, JGBs remain key assets of high quality and liquidity, and utilization of JGBs is an important issue to be addressed for many of those institutions. In this context, suggestions were made on ways to utilize JGBs held by financial institutions as a backstop of collateral for raising liquidity overseas. Specifically, the following two schemes were presented: (i) funding in foreign currencies by posting JGBs as collateral; and (ii) utilizing JGBs as collateral in conducting global securities and derivatives transactions (Chart I-1-4).

With regard to support for raising liquidity in foreign currencies, when, for example, an European office of a Japanese financial institution is to raise liquidity in a foreign currency during daytime hours (local time) in Europe through a repo transaction, the financial institution may transfer JGBs held by its Tokyo office to the European office during night hours (local time) in Japan. Another possible scheme is to use JGBs to raise yen funds in the Tokyo repo market in combination with same-day cross-currency swap transactions, thereby effectively raising foreign currency funds.

JGBs can be used effectively as collateral for global derivatives transactions as a means of flexibly providing collateral to overseas central counterparties (CCPs) (deposit JGBs as collateral after confirming the required amount of margin) or submitting margin for derivatives transactions that have not yet been centrally cleared.

Chart I-1-4 Greater Use of JGBs in Global Financial Markets



Notes: 1. Figures in this chart refer following operational procedures: (1) transfer of JGB to a sub-custodian; (2) notification of an ICSD or a global custodian; (3) posting collateral for a repo transaction; (3') borrowing foreign currency; (4) return of collateral for a repo transaction; (4') return of foreign currency; (5) notification of a sub-custodian; and (6) transfer of JGB to a securities firm X.

2. Figures in this chart refer following operational procedures: (1) notification regarding required margin amount; (2) information sharing; (3) transfer of JGB to a sub-custodian; (4) notification of an ICSD or a global custodian; and (5) posting collateral to CCP.

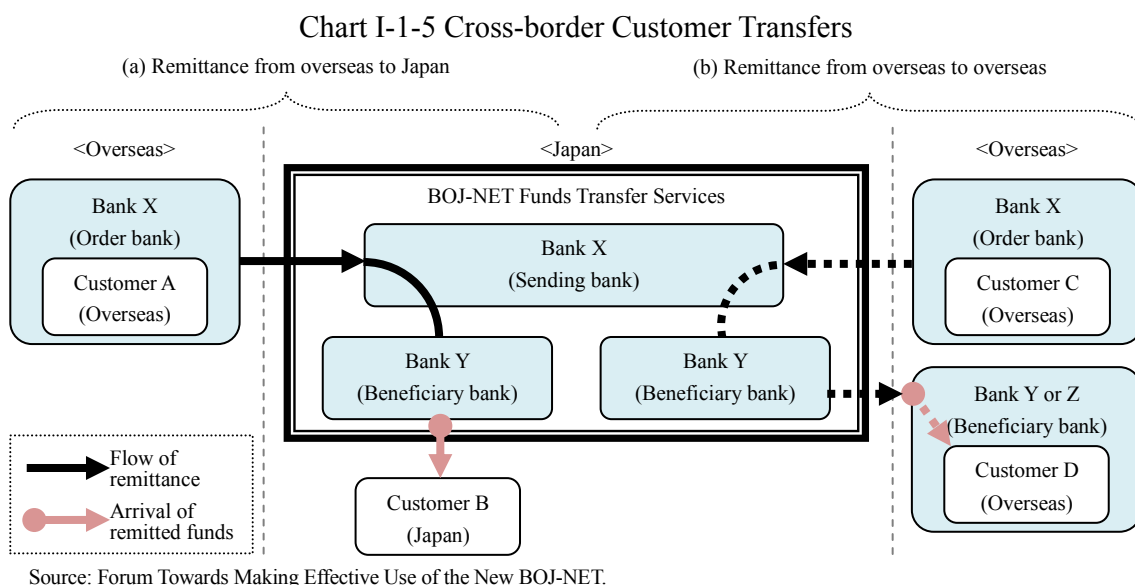
Source: Forum Towards Making Effective Use of the New BOJ-NET.

Cross-border Customer Transfers in Japanese Yen at Nighttime

As globalization of economic and corporate activities is progressing, there is an increasing need for cross-border remittance that allows for prompt receipt of money.

Two types of yen remittance via the new BOJ-NET from overseas customers can be considered: (i) remittance from overseas customers to customers in Japan; and (ii) remittance from overseas customers to other overseas customers through Japan (Chart I-1-5). In the former type of remittance, an overseas customer remits yen-denominated funds from an overseas order bank to a customer in Japan holding an account at a

beneficiary bank in Japan by way of an intermediary bank in Japan. In the latter, an overseas bank (e.g., a bank in Indonesia) remits yen-denominated funds to another overseas bank (e.g., a bank in Thailand) by way of an intermediary bank in Japan.



If these types of transactions are realized, a Japanese company operating extensively throughout Asia will be able to concentrate or distribute funds between offices of customer companies in Japan and other parts of Asia on the same day. This will enable remittance reception by receiving customers on the same day and funds delivery from remitting banks to receiving banks on the same day, which is expected to further improve the usability of settlement in yen terms.

Furthermore, shortening of the time required for cross-border remittance of funds would benefit companies using banking services by improving fund efficiency, such as by allowing better cash management of yen funds and by reducing risks.

Implementing Cross-border Linkages in Asia

Based on the framework of the ASEAN+3 (i.e., ASEAN economies, Japan, China, and Republic of Korea) Finance Ministers and Central Bank Governors' Meeting, these countries undertake initiatives to establish a regional settlement intermediary to activate cross-border securities trading in the region.

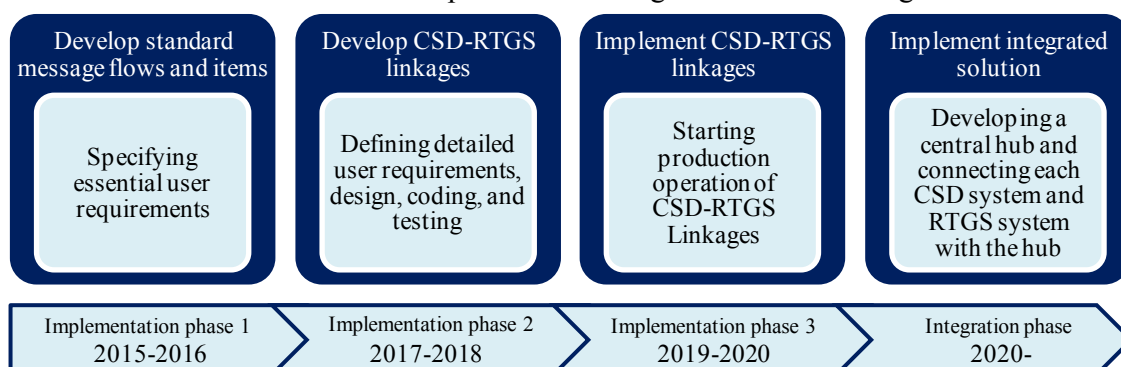
In particular, these initiatives aim to achieve delivery versus payment (DVP) for cross-border securities settlement by establishing CSD-RTGS Linkages, for cross-border linkage between a central securities depository (CSD) and a real-time gross settlement (RTGS) system operated by a central bank.

The progress to date and future plans are set out in the progress report ("Progress Report on Establishing a Regional Settlement Intermediary and Next Steps: Implementing CSD-RTGS Linkages in ASEAN+3"), published by Asian Development Bank in May 2015. The report shows the desktop study results for the Bank of Japan and the Hong Kong Monetary Authority. The desktop study collected basic view of settlement flows, message formats and contingency measures for a possible DVP linkage between the BOJ-NET JGB Services and the Hong Kong Dollar Clearing House Automated Transfer System (HKD CHATS).

If such DVP linkage is realized, financial institutions in the region can expand measures to raise liquidity in foreign currencies using bonds denominated in local currencies, which will in turn bring benefits to a wider scope of economic entities, including companies.

The report also sets out the implementation road map for CSD-RTGS linkages, which states: (i) interested CSDs and RTGS systems will develop bilateral linkages in 2017-2018 and aim to start operations in 2019-2020; and (ii) with the expansion of bilateral linkages within the region, an integrated solution including multilateral linkages among CSD and RTGS systems may be considered (Chart I-1-6).

Chart I-1-6 Road Map for Establishing CSD-RTGS Linkages



Source: Asian Development Bank.

B. Securities Settlement System: Reducing Settlement Risk

The settlement cycle of securities is being increasingly shortened globally in order to reduce settlement and other risks.

Major overseas countries are accelerating their efforts to shorten the settlement cycle of equities for the purpose of reducing settlement risks and enhancing the global competitiveness of their respective stock markets. Many European countries introduced the T+2 settlement of equities in October 2014. The United States plans to introduce the T+2 settlement of equities by the end of the third quarter in 2017 (Chart I-2-1).

For the settlement of government bonds, European countries are uniformly progressing toward the T+2 settlement, while the United States and the United Kingdom have already implemented the T+1 settlement for outright buy/sell transactions.

Chart I-2-1 Shortening of Settlement Cycle in US and Europe¹

		United States	United Kingdom	France	Germany	(reference) Japan
Stocks	Present	T+3	T+2	T+2	T+2	T+3
	Development on shortening	Plan a move to T+2 by Q3 2017	Moved to T+2 in October 2014		-	Plan a move to T+2 as early as possible in 2019
Government bonds	Present	T+1	T+1	T+2	T+2	T+2
	Development on shortening	-	-	Moved to T+2 in October 2014	-	Plan a move to T+1 in first half of FY 2018

Note: 1. For outright transactions.

Sources: European Central Securities Depositories Association; Industry Steering Committee; Japan Securities Dealers Association.

Shortening the Settlement Cycle of JGBs

Japan has also been undertaking proactive efforts to shorten the settlement cycle of JGBs and equities.

First, with regard to JGBs, the "Working Group on Shortening of the JGB Settlement Cycle" of the Japan Securities Dealers Association is working to shorten the settlement cycle by one day from the current T+2 settlement to the T+1 settlement for outright

transactions. In order to realize the T+1 settlement for JGBs, it is necessary to shorten the time required for administrative work, and it has been agreed to review market practices, including bringing forward the cutoff time for reconciliation of transactions, and to promote the use of electronic and straight through processing in administrative work among market participants.

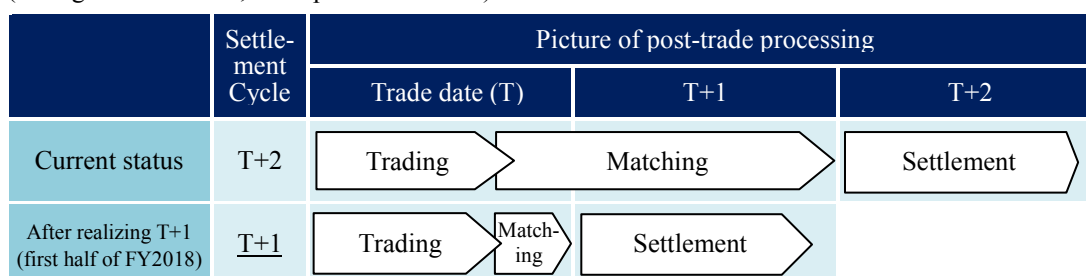
To introduce the T+1 settlement for outright JGB transactions, it is necessary to introduce the T+0 settlement (that is, settlement on the day of transaction) for GC repo transactions (the "General Collateral repo," (GC repo) that is substantially used for lending and borrowing money with JGBs as collateral, as contrasted with the "Special Collateral repo" (SC repo) used mainly for borrowing certain JGB issues) that are used to adjust any excess or deficiency of funds arising from JGB transactions. On this point, the Working Group concluded that, in order to implement the T+0 settlement, it was desirable to fundamentally review the current administrative processes and introduce a new transaction method to shorten the time required for post-trade administrative work. With regard to the GC repo, a decision has been made to introduce the subsequent collateral allocation method for GC repo transactions so that which issue of JGB should be delivered as collateral would be determined by the market infrastructure after conclusion of the repo transaction.

Currently, the Japan Securities Clearing Corporation (JSCC) is developing necessary procedures and systems to allocate JGB collateral for GC repo transactions. At the same time, participants in the repo market are also developing administrative operations and systems necessary for the subsequent collateral allocation method.

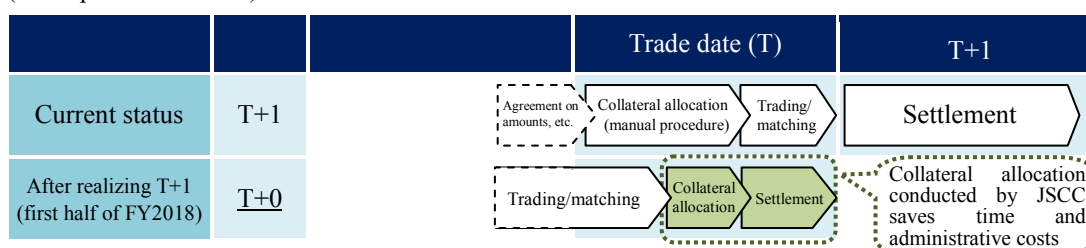
The T+1 settlement for JGBs is currently scheduled to be introduced in the first half of fiscal 2018 (Chart I-2-2).

Chart I-2-2 Shortening of JGB Settlement Cycle

(Outright transactions, SC repo transactions¹)



(GC repo transactions²)



Notes: 1. SC (Special Collateral) repo transactions are substantially conducted mainly for lending or borrowing specific issues of bonds such as JGB by posting cash as collateral.

2. GC (General Collateral) repo transactions are substantially conducted mainly for lending or borrowing funds by posting bonds such as JGB as collateral.

Source: Japan Securities Dealers Association.

In other economies, a repo transaction is generally configured as a transaction with a repurchase/resale agreement. In Japan's repo market, although some transactions are configured in the same way (new "gensaki" method) as in other countries, many transactions are still configured as borrowing/lending of securities with cash collateral ("gentan" repo method) for historical reasons. The GC repo with subsequent collateral allocation method, which is to be introduced at the time of implementation of the T+1 settlement for JGBs, will be configured with the new gensaki method, which is consistent with the global standard. At the same time, the new gensaki method is expected to be applied extensively to other repo transactions.

Expanding Use of the CCP for JGB Transactions

Since the financial crisis, the use of CCPs has been globally encouraged for the purpose of reducing settlement risks. Japan has also promoted greater use of the CCP for JGB settlements.

JSCC has developed an institutional framework that allows clearing by JSCC of repo trusts

(investment securities trusts) offered by trust banks dedicated to asset management, which are key players in the JGB market. Clearing of transactions of repo trusts at JSCC started in June 2014 with the participation of trust banks dedicated to asset management. Recently, nearly 50 percent of all transactions of JGBs involving DVP settlement have been cleared by JSCC, up from around 40 percent prior to the participation of the trust banks dedicated to asset management in JSCC.

Shortening the Settlement Cycle of Equities

As stated above, many economies are now working to shorten the settlement cycle of equities. Similarly, efforts are gaining momentum in Japan to shorten the settlement cycle of equities.

In July 2015, the "Working Group on Shortening Stock Settlement Cycle" was established, with the Japan Securities Dealers Association, JSCC and the Tokyo Stock Exchange serving as the executive office. The working group issued an interim report in December 2015 stating its intention to shorten the current T+3 settlement cycle by one day to T+2 settlement as early as possible during 2019.

Since the implementation of the T+2 settlement cycle of equities is expected to increase failed transactions to some extent, and non-resident transactions in particular, the working group has raised the following key issues to be addressed: (i) improvement of the stock lending market in order to avoid failed transactions; and (ii) review of handling of transaction failures (i.e., fail rule). The working group will review these issues from a practical point of view, and will publish its final report around June 2016.

C. Enhancement of Small-Value Payment Infrastructure

In the field of small-value payment, various efforts are being made around the world, including the "24/7 services"⁴ that would enable immediate payment of bank remittances 24

⁴ In other countries, speed and service availability are often quoted as advantages of "24/7 services." Concerning the speed, the service is generally expected to provide remittance within a few seconds or a few minutes at maximum from request for remittance to receipt of money. With regard to service availability, it is generally expected to provide bank remittance with immediate payment on a roughly 24/7 basis, including weekends and late night and

hours a day and 365 days a year. Likewise, projects for increased use of data associated with payments are in progress. In Japan, efforts are also being made to extend the operating hours of the Zengin System, a system for interbank settlements, in order to realize 24/7 immediate payment of bank remittances and to achieve the financial EDI (electronic data interchange).

1. Extension of Zengin System Operating Hours

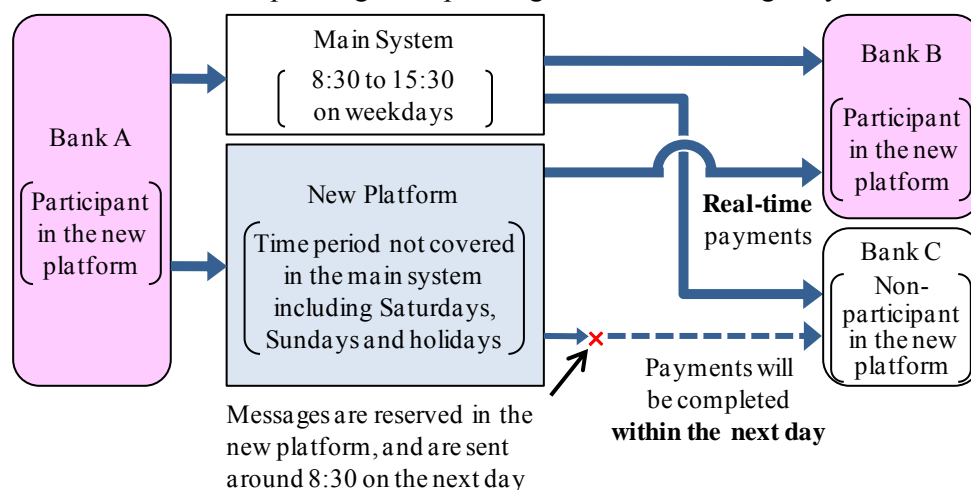
In Japan, immediate payment of remittances to domestic banks during bank operating hours has already been possible since the 1970s, ahead of all other countries in the world. However, in order to provide such services on a 24/7 basis, it has become necessary to consider extending the operating hours of the Zengin System.

Against this backdrop, the Japanese Bankers Association (JBA) and the Japanese Banks' Payment Clearing Network (Zengin-Net), which is the operator of the Zengin System, published a report titled "On the Results of Examining the Future Shape of the Zengin System" in December 2014. The report summarizes the results of reviews regarding the extension of the operating hours of the Zengin System and the utilization of the financial EDI.

Concerning the extension of the Zengin System's operating hours, the report presents a plan to build a "new platform" that will operate outside the system's current operating hours (from 8:30 to 15:30 on weekdays). The JBA and Zengin-Net are planning to build a new platform that will be combined with the current Zengin System, thereby achieving an environment that will allow for real-time payment of remittances to other banks on a 24/7 basis (Chart I-3-1).

early morning hours.

Chart I-3-1 Expanding the Operating Hours of the Zengin System

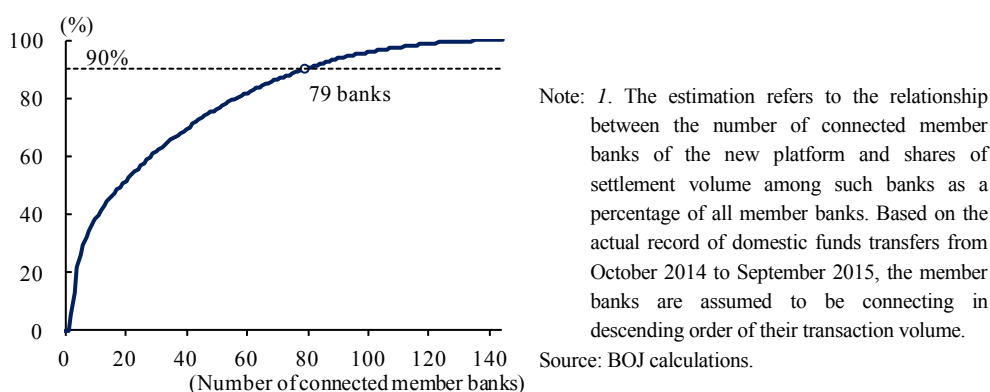


Sources: Japanese Bankers Association; Japanese Banks' Payment Clearing Network.

Of the member banks of the domestic fund-transfer system, those that have completed their preparations will start using the new platform, and each member bank will determine the time slots for connection based on its customers' needs and other issues. During the time slots in which needs from retail and corporate customers are expected to be high, all participants are expected to extend their operating hours to cover such time slots. In the meantime, the JBA and Zengin-Net will also ask banks to connect to the new platform for as long as feasible. They have announced their intention to start the new platform in 2018.

Compared with foreign countries in which 24/7 services have been realized, member banks of the Zengin system are broadly distributed, including regional banks and affiliated financial institutions. This means that more member banks need to participate in the new platform in order to broadly provide the new service. According to the Bank's estimation, 79 financial institutions need to participate in the new platform to cover 90 percent of overall payments (Chart I-3-2).

Chart I-3-2 Estimation of Relationship between Number of Member Banks of the Zengin System and Settlement Volume¹



2. Efforts for Advancement of Corporate Finance: Realization of Financial EDI

Another important initiative for advanced fund payment services is to advance corporate finance in the area of the financial EDI. Recently, discussion among stakeholders has made substantial progress.

The EDI is an electronic data interchange that incorporates information on commercial transactions such as placement or receipt of orders and invoicing associated with inter-firm transactions. In major economies overseas, efforts are being made to realize the electronic EDI, which is intended to combine data on commercial transactions with that on payments arising from commercial transactions (information such as how much is due to be paid to the bank account of the partner company), thereby allowing all the processes to be performed electronically from placement or receipt of orders to payments to progress management.

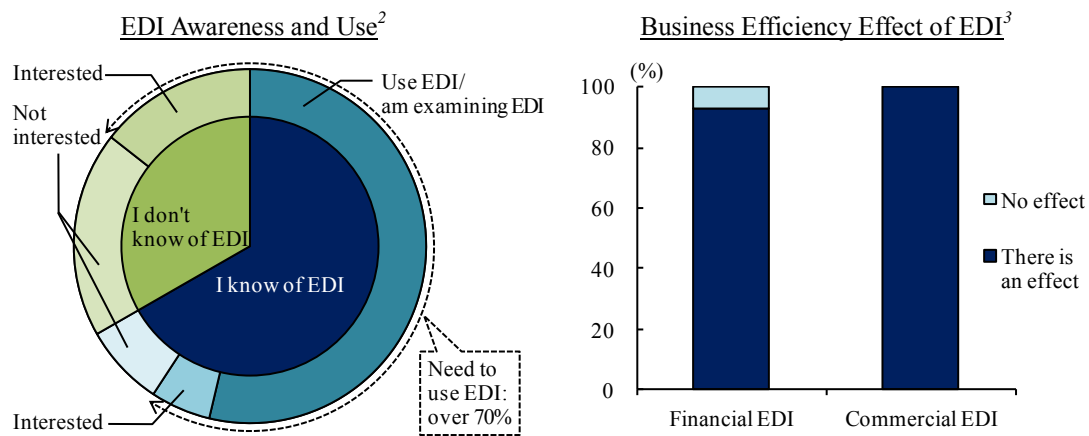
In order to realize the financial EDI, it is necessary for banks and firms to develop a system for electronically exchanging transaction-related data. If the linking of the commercial information with the payment information is made possible by developing the financial EDI, there will likely be advantages. First, firms will be able to substantially cut the administrative costs of collecting receivables. Second, banks will be able to uncover potential customer demand with the use of commercial information associated with

payments and to provide funding and other forms of support to their customers.

Need for Financial EDI

In order to understand firms' need for the financial EDI, the JBA carried out a questionnaire survey towards the end of 2014 (Chart I-3-3). The survey shows that, while some firms are cautious about bearing costs including system investment for the financial EDI, over 70% of respondents need the financial EDI. Firms that have already utilized the financial EDI answered that the financial EDI is actually effective in streamlining operations. Based on the survey results, the JBA concluded that the financial EDI's cost effectiveness must be assessed to make effective use of the scheme.

Chart I-3-3 Results of the Questionnaire Survey¹



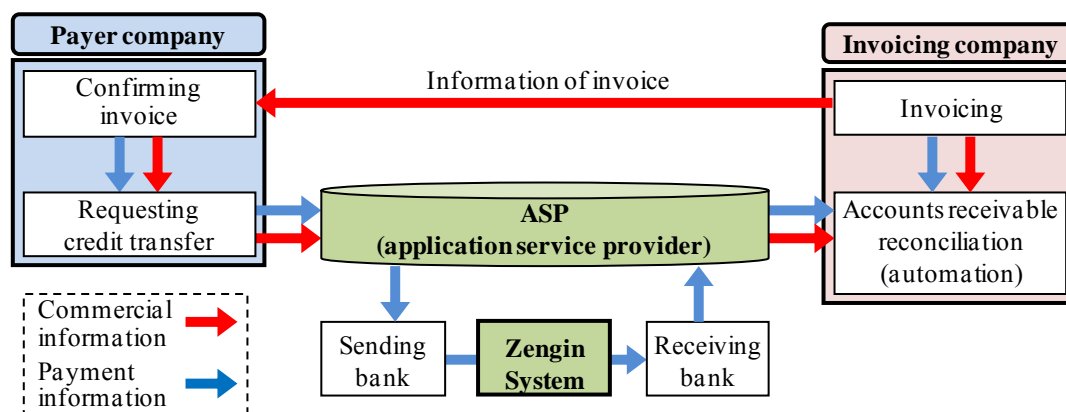
Notes: 1. 59 industry groups and 201 companies are counted in the survey.
 2. For financial EDI and commercial EDI.
 3. Based on responses by companies actually using financial EDI or commercial EDI.
 Sources: Japanese Bankers Association; Japanese Banks' Payment Clearing Network.

Effects of Efficient Administrative Work

Based on such results, the industrial and financial circles carried out joint demonstration experiments twice -- in November 2014 and February 2015 -- to verify the extent to which administrative work would be streamlined with the realization of the financial EDI. These experiments were conducted in the following manner: (i) when the payer company requests transfer by the bank, the payment information was combined with the commercial information for transmission to the invoicing company; (ii) the commercial information was

separated from the combined information for temporary storage at the relay system (which is called an "Application Service Provider" (ASP)); and (iii) upon completion of the payment, the two sets of information were combined again for transmission to the invoicing company (Chart I-3-4).

Chart I-3-4 Image of Joint Experiments



Sources: Japanese Bankers Association; Japanese Banks' Payment Clearing Network.

According to this method, (i) an XML message was used between companies and the ASP to meet the need of the companies to send detailed commercial information together with payment information; and (ii) the existing Zengin format (a fixed length data format, with a 20-digit space for supplementary information) was used between the ASP and banks to reduce development cost for the banks. The results of the joint experiments indicate that the process for matching sales receivables and rebates can be automated. That contributes to streamlining administrative work on the part of companies. Furthermore, the results showed that the ASP was functioning as intended.

Taking into consideration these results of the joint experiments, the working group on advancement of settlement operations of the Financial System Council published a report in December 2015. The group called for the development of a new system for the financial EDI involving all of the member financial institutions of the Zengin System by around 2018 and proposing complete transition of domestic remittance instruction between companies to XML message-based instruction by 2020.

Issues in Promoting Financial EDI

Based on the questionnaire survey of the JBA and joint experiments, the financial EDI was found to have certain positive effects of streamlining administrative work. On the other hand, there are several challenges to the realization of the financial EDI.

First, the advantages of the financial EDI should be more clearly identified for companies as well as banks. To be sure, in the joint experiments, the effects of streamlining administrative work were prominent; on the other hand, the advantages for banks have not yet been clearly demonstrated. That may make it difficult for banks to take a step toward adopting the financial EDI that requires investment. In this regard, efforts are being made in initiatives to identify the advantages for banks in areas such as trade finance and PO finance.⁵ The results of those efforts will be crucial to set the stage for promoting financial EDI.

Second, there is the issue of sharing the cost of system development. In the joint experiments, the ASP was used as common infrastructure. The development of a host-centralized system like this would involve substantial system investment, and the way in which such costs would be allocated to the parties concerned could be an important issue. In this regard, discussions on cost sharing will be conducted more smoothly if the benefits associated with the realization of the financial EDI are made clearer among stakeholders.

Third, there is the issue of how to standardize the format included in the financial EDI. Currently, the message format used for intercompany transactions differs by industry sector. In order to maximize the benefits of the financial EDI, it must be discussed, as a key issue, to what extent such formats can be standardized and unified in the future.

D. Innovation in Settlement and "FinTech"

Major economies overseas are proactively developing infrastructure for 24/7 services that would allow for real-time payment of small-value remittance on weekends and during night hours.

⁵ Loan based on information on customers' purchase or receipt of orders.

In addition, there are also moves, including a new form of financial services called "FinTech," which incorporate new information and telecommunications technologies into financial services, and a new payment medium called "digital currency." These moves are characterized by the involvement of nonbanks such as IT companies and start-up companies engaged proactively in various services, in addition to traditional financial institutions.

1. FinTech and Financial Services

"FinTech" is a word created by combining "Finance" and "Technology," and it has been increasingly drawing attention in recent years.

The term "FinTech" is not necessarily clearly defined, and may have slightly different meanings depending on the context in which it is used. In general, it refers to new types of financial services involving information and telecommunications technologies and other new technologies, or the act of proactively providing such financial services.

There are many types of FinTech services, some of which are listed below.

- A new form of small-value settlement service linked to the internet shopping, so-called "e-commerce," and mobile terminals
- A low-cost overseas remittance service based on algorithms
- A funding intermediary service for matching the fund procurer and fund manager on the internet, such as "crowdfunding"
- Investment decision support services and risk management services that use artificial intelligence and big data processing

Particularly noteworthy among these services are those related to small-value settlement. The reasons are that: (i) the widespread use of the internet has fostered new types of commerce -- including e-commerce -- globally, increasing the need for payment services compatible with such services; (ii) the processing of enormous amounts of various types of information accompanying payment information is expected to provide a new source of added value; and (iii) the rapid spread of cellular phones and mobile terminals in emerging

and developing countries and elsewhere has increased the need for settlement services using these devices. Regarding the last point, FinTech is drawing attention in terms of "financial inclusion," promoting public access to financial services in emerging and developing countries in which access to financial services has not necessarily been available to all the citizens.

These new FinTech services are provided by a wide range of companies, including not only traditional financial institutions but also information-related companies, start-up companies and companies with ample data. There appear to be many forms of interaction, including competition and cooperation, between new entrants and traditional financial institutions.

Looking at services for small-value remittance, new services are being introduced that are designed to improve the efficiency or lower costs of bank remittance. More concretely, when money is sent from one individual to another via a bank, the payee notifies the payer of his/her bank account number, and the payer then instructs the bank to make the payment based on such information. In many cases, these services incur remittance fees, and the payment is not necessarily made immediately. Recently, in the new form of settlement services, the service provider offers customers with an account for payment called a "digital wallet" so that the payer can almost immediately transfer funds (claim against the service provider) from his/her digital wallet to that of the payee without remittance fees. With these settlement services, it is possible for the buyer to use e-commerce services on weekends or during late night hours without disclosing his/her credit card information, and for the seller to dispatch the goods promptly upon confirmation of receipt of the payment. Other services include mobile POS, which enables payment by credit/debit card by connecting devices to mobile devices, in place of the traditional POS terminals installed in shops.

New services are also being seen in the field of international remittance. Some of the payment service providers reduce cross-border transfer of funds as much as possible by matching remittance instructions from customers to the extent possible by means of an algorithm, rather than executing international remittances one at a time. By replacing some international remittances with domestic ones, such providers are able to offer low-cost international remittance services.

These new services constitute merely a portion of FinTech services at present. The common characteristics of these services are that service providers come from a range of areas, including not only traditional financial institutions but also information-related companies and start-up companies.

If such moves create new added value, improving the usability of financial services or making existing services of financial institutions more efficient and advanced, they are regarded as a welcome development. From the standpoint of a central bank, however, there are several points to be noted. First, a number of new economic entities have entered the FinTech business, and, unlike financial institutions, many of them are not subject to capital adequacy or liquidity regulations. The potential impact that the payment and settlement systems might suffer in case these entities face bankruptcy or liquidity crunches must be kept in mind. Also, many new payment services use mobile terminals and the internet, and it is necessary to determine whether or not these services are sufficiently protected from cyber attacks and other threats.

2. Digital Currency and Distributed Ledger

This section discusses recent trends concerning so-called "digital currency." It also touches on recent initiatives that attempt to apply a "distributed ledger" -- a technology underpinning digital currency -- to a wide area of services.

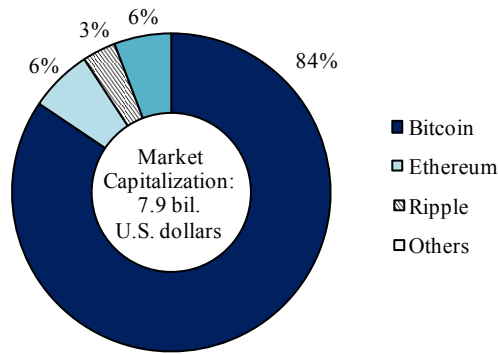
Current State and Characteristics of Digital Currency

Digital currency can be described in general terms as a medium issued in an electronic form and used for payment and settlement. It is transferred without any specific entity managing the ledger. Among digital currencies, those that are not backed by specific assets and that are not issued by a central bank are sometimes called "virtual currency." In this sense, prepaid cards issued by a specific entity as its own obligation are outside the scope of the definition of digital currencies.

Digital currencies that meet the definition above and are well known include "Bitcoin" and "Ethereum." The aggregate market value of digital currencies stood at about 7.9 billion

U.S. dollars (figures below are all as of February 29, 2016). The aggregate market value of Bitcoin was about 6.7 billion U.S. dollars, and accounted for over 80 percent of the total value (Chart I-4-1). In comparison with the size of economy, the outstanding amount is far from being large in many economies, and digital currencies are by no means among major payment methods at present.

Chart I-4-1 Market Capitalization of Major Digital Currencies¹



Note: 1. As of February 29, 2016.
Source: coinmarketcap.com.

The exchange rate of Bitcoin against the U.S. dollar reached nearly 1,200 dollars in the second half of 2013 before a downward trend set in. It is showing an uptrend at present. Its exchange rate against sovereign currencies has changed fairly substantially (Chart I-4-2).

Chart I-4-2 Bitcoin Prices¹



Note: 1. Prices on the Bitcoin exchange "Bitstamp." The latest data is as of February 29, 2016.
Source: bitcoincharts.com.

In comparison with other payment and settlement means, the key characteristic of a digital currency is that it is not debt of a specific entity. To be precise, banknotes or central bank current deposits are debts of a central bank, and deposits at a private bank are debts of that

bank. In contrast, digital currencies like Bitcoin are not issued as debts of an entity. In this sense, they may be more like "commodities" such as precious metals and primary products. However, while commodities are considered to have intrinsic value, the value of digital currencies is characterized as solely dependent on the trust that they may be exchanged with goods or sovereign currencies.⁶

Another characteristic of digital currencies is that they are transferred with technology known as a distributed ledger, without going through a third-party entity. For banknotes and coins, the value is transferred by means of delivery of physical paper or metal without going through a third-party entity. For central bank current deposits, private bank deposits or traditional electronic money, the value is transferred via infrastructure such as a ledger managed by a specific entity including banks or service providers. In contrast, for digital currencies, the value is transferred in the form of electronic data but not via a ledger managed by a specific third party.

It is also pointed out that, for many digital currencies, there is no specific operator such as a bank. Instead, nonbanks are providing various services.

Distributed Ledger

In addition to the digital currency, the use of the distributed ledger -- which is the technology underpinning the digital currency -- is globally drawing attention in that the value can be transferred through a mechanism of verification by plural entities, rather than management of a ledger by a specific entity. Specifically, in other countries, studies are underway for application in: (i) ownership and transfer of a wide range of financial assets, including equities and bonds; and (ii) real estate registration.

Major financial institutions both in Japan and abroad are showing a strong interest in the distributed ledger technology, and several banks have started joint research and experiments to explore its applicability. Some stock exchanges and securities clearing houses overseas

⁶ In its report published in December 2015, the working group on advancement of settlement operations of the Financial System Council called for introduction of a registration system for exchanges, adding them to the list of parties subject to regulations on money laundering and terrorism financing. It also called for regulations on exchanges to protect users that exchange digital and sovereign currencies by imposing segregation management and financial requirements.

have been examining the possibility of application to the administration of unlisted stocks and bonds.

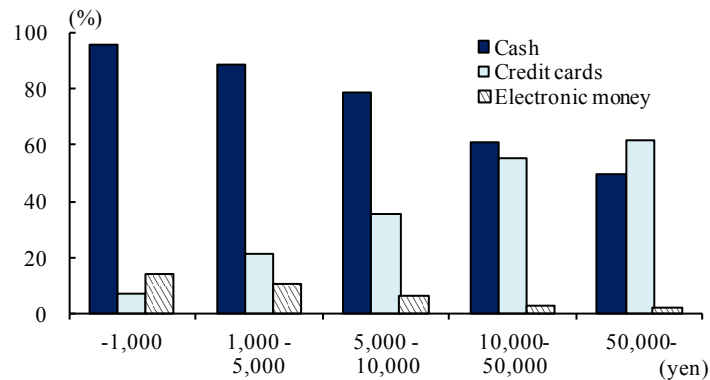
As described above, the recent development of FinTech, the birth of digital currencies and the utilization of the distributed ledger can help enhance economic welfare and revitalize economic activities through efficient payment, improved services and promotion of competition. On the other hand, in order to ensure stability of payment and settlement systems, it should be noted that the entry of service providers from a range of sectors and the use of the internet have generated new risks and changes in risk profile. Considering these points, the Bank of Japan, as a central bank, will continue to closely monitor what impact FinTech and other new technologies will have on payment and settlement systems as well as financial systems and central bank operations.

Addendum 1. Trends in Major Methods for Small-Value Payment with a Focus on Electronic Money

In Japan, methods used for small-value payments for face-to-face transactions such as daily shopping include cash, credit cards, and electronic money such as prepaid cards.

For a payment of up to 50,000 yen, cash remains the most common payment method (Chart A1-1). Credit cards, on the other hand, are used as often as cash for payments of 10,000 yen or more, and are the most common payment method for a payment of 50,000 yen or more. For households, it appears that cash is used for smaller payments and credit cards for larger payments.

Chart A1-1 Retail Payments Used by Payment Size^{1,2}



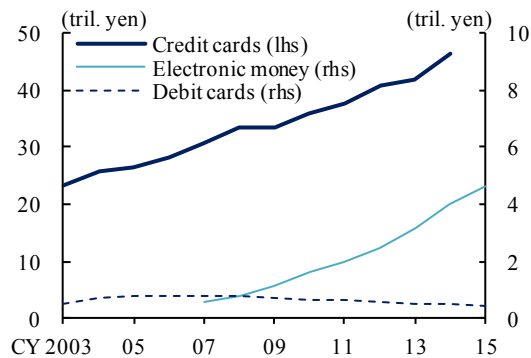
Notes: 1. In a survey conducted in 2015, the respondents were asked to choose up to two payment instruments they use for ordinary expenses (such as shopping). The denominators for obtaining the percentages of the use of payment instruments exclude non-respondents.

2. "Electronic money" includes debit cards in the Public Opinion Survey on Household Financial Assets and Liabilities.

Source: Central Council for Financial Services Information, "Public Opinion Survey on Household Financial Assets and Liabilities."

Taking a look at means of small-value payments other than cash, credit cards are still predominantly used in Japan over other payment means. In 2014, payments by credit card amounted to nearly 50 trillion yen, far larger than 4 trillion yen for electronic money, including prepaid cards, and 500 billion yen for debit cards⁷ (Chart A1-2).

Chart A1-2 Annual Transaction Value for Major Retail Payment Instruments^{1,2,3}



Notes: 1. For "Credit cards," there is a statistical discontinuity between the data from before 2012 and that from after 2013 due to changes in data calculation method.

2. The figures for "debit cards" are for the J-Debit debit card scheme.

3. The figure for "electronic money" for 2007 was annualized using data from April to December.

Sources: Japan Consumer Credit Association; Japan Debit Card Promotion Association; Bank of Japan.

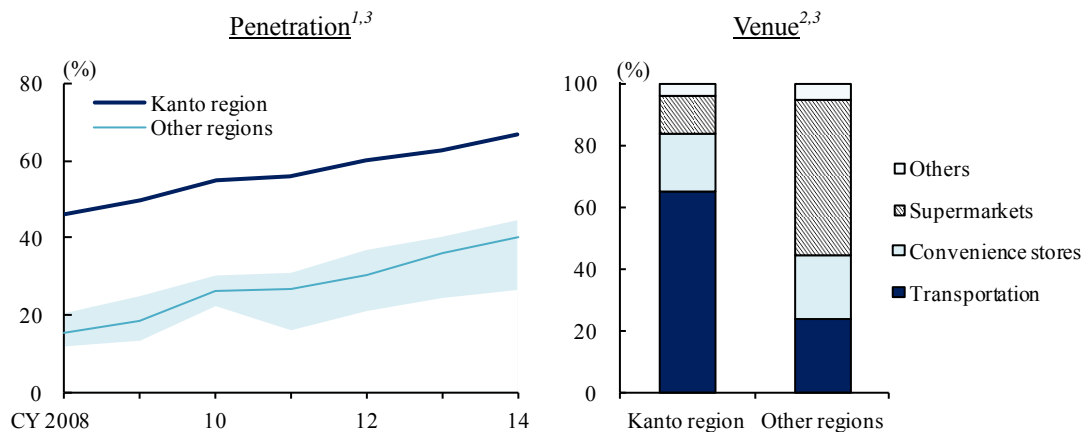
The use of electronic money appears to be steadily increasing. By region, the penetration ratio for electronic money remains the highest in Kanto, but figures are also steadily rising

⁷ Payments by J-Debit. In addition to J-Debit, brand debit cards offered by international card companies are also used in Japan. The number of banks offering international-brand debit cards has been increasing in recent years.

in other regions including Tokai and Kinki (left graph on Chart A1-3). In 2014, the penetration ratio in Chugoku exceeded those in Tokai and Kinki.

Outside Kanto, electronic money has the following characteristics: (i) it is most often used at supermarkets; and (ii) accordingly, it is not used frequently for payments of 1,000 yen or less, but it is used for payments between 5,000 yen and 10,000 yen relatively frequently (right graph of Chart A1-3 and Chart A1-4). Electronic money thus tends to be used for daily shopping at large retail stores outside Kanto. In contrast, in metropolitan areas, it is mainly used for payment of small-value public transport fares.

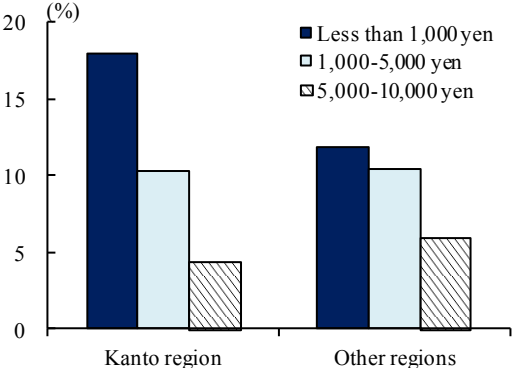
Chart A1-3 Use of Electronic Money by Region (Penetration, Venue)



- Notes: 1. The percentage of households holding electronic money in two-or-more person households. The shaded area for "Other regions" shows the percentage for regions with the smallest and largest percentages.
2. In a survey conducted in 2014, the respondents were asked to choose the venue at which they use electronic money most frequently.
3. In the Survey of Household Economy, "Electronic money" refers to value issued in exchange for cash that is stored in media such as chip cards or magnetic stripe cards. Use of these media as commuter passes is not counted as use of electronic money.

Source: Ministry of Internal Affairs and Communications, "Survey of Household Economy."

Chart A1-4 Utilization of Electronic Money by Region (Frequency by Amount)^{1,2}



Notes: 1. Rate of respondents who choose electronic money in the survey as a payment instrument for ordinary expenditures such as shopping. Respondents are allowed to choose up to two instruments. Non-respondents are not counted in denominators of the rates. As of 2015.

2. Electronic money includes debit cards in the Public Opinion Survey on Household Financial Assets and Liabilities.

Source: Central Council for Financial Services Information, "Public Opinion Survey on Household Financial Assets and Liabilities."

II. Efforts for Improvement of Safety and Efficiency of Payment and Settlement Systems

In this chapter, implementation of oversight by the Bank of Japan will be discussed, together with compliance of various FMIs with the PFMI. The chapter will then focus on compliance with the PFMI with regard to the BOJ-NET Funds Transfer System and JGB Book-Entry Transfer System. It concludes that those systems are compliant with all the applicable PFMI. Concerning private-sector FMIs, they are, on the whole, in compliance with the PFMI; more recently, information disclosure has been pursued by private-sector FMIs both qualitatively and quantitatively.

A. Oversight by the Bank of Japan

1. Basic Policy for Oversight

The Bank has announced that it would apply the PFMI to its assessment of security and efficiency of private-sector FMIs pursuant to the "The Bank of Japan Policy on Oversight of Financial Market Infrastructures" (hereafter, the "Policy"), published in March 2013. In the Policy, the following seven risks are considered to be of key importance: systemic risk, legal risk, credit risk, liquidity risk, business risk, custody and investment risk, and operational risk. The Bank will identify, analyze and assess the risks and risk management procedures of the FMIs in consideration of the specific characteristics of each FMI, and will encourage them to improve their business practices as required.

The Bank will also assess compliance with the PFMI for the BOJ-NET Funds Transfer System and JGB Book-Entry Transfer System operated by the Bank in as rigorous a manner as it uses when it assesses private-sector FMIs. In this section, the current situation will first be explained with regard to compliance with the PFMI of the FMIs run by the Bank, and then efforts of private-sector FMIs to ensure compliance with the PFMI will be presented.

2. Compliance Situation of BOJ-NET Funds Transfer System and JGB Book-Entry Transfer System Run by the Bank

In July 2015, the Bank published disclosure materials on the "BOJ-NET Funds Transfer System" and the "JGB Book-entry Transfer System." These systems are run by the Bank, pursuant to the PFMI and "Principles for financial market infrastructures: Disclosure framework and Assessment methodology." The disclosure materials stated that the BOJ-NET Funds Transfer System and the JGB Book-Entry Transfer System were both assessed as being compliant with all the applicable PFMI (see Chart II-1-1 for the applicable PFMI). The key points of the assessment are summarized below.

Chart II-1-1 Applicable PFMI

Principles		Funds Transfer	JGB Transfer	Principles		Funds Transfer	JGB Transfer
General organisation	1 Legal basis	✓	✓	Default management	13 Participant-default rules and procedures	✓	✓
	2 Governance	✓	✓		14 Segregation and portability	-	-
	3 Framework for the comprehensive management of risks	✓	✓	General business and operational risk management	15 General business risk	-	-
Credit and liquidity risk management	4 Credit risk	✓	✓		16 Custody and investment risks	✓	✓
	5 Collateral	✓	✓		17 Operational risk	✓	✓
	6 Margin	-	-	Access	18 Access and participation requirements	✓	✓
	7 Liquidity risk	✓	✓		19 Tiered participation arrangements	✓	✓
20 FMI links					-	✓	
Settlement	8 Settlement finality	✓	✓	Efficiency	21 Efficiency and effectiveness	✓	✓
	9 Money settlements	✓	✓		22 Communication procedures and standards	✓	✓
	10 Physical deliveries	-	-			Transparency	23 Disclosure of rules, key procedures and market data
CSD and exchange-of-value settlement systems	11 CSD	-	✓	24 Disclosure of market data by trade repositories	-		-
	12 Exchange-of-value settlement systems	✓	✓				

Source: Bank of Japan.

First, concerning the management of credit and liquidity risks, the Bank, as an operator, is not subject to settlement risk as a party in settlement transactions between financial institutions that have current deposit accounts with the Bank or between participants in the JGB Book-Entry Transfer System (hereinafter collectively referred to as "users"). To be

sure, as the Bank provides daytime overdraft facilities to selected users in order to facilitate smooth operation of the BOJ-NET Funds Transfer System and JGB Book-Entry Transfer System by means of the real-time gross settlement (RTGS), it bears credit risk to that extent. However, the Bank properly manages such risk, not only through on-site examination and off-site monitoring but also through requiring qualified assets as collateral and managing the credit for each user so that the collateral submitted will remain adequate. Concerning the risks to users, the Bank has introduced the RTGS to the BOJ-NET Funds Transfer System and JGB Book-Entry Transfer System. In addition, in consideration of the liquidity risk for users, the Bank provides liquidity-saving features and simultaneous processing of collateralization. With the former, payment instructions that cannot immediately be settled due to fund shortages are accepted anyway, and then a plurality of payment instructions that can together cover the fund shortages are searched for simultaneous processing on the RTGS. The latter comes into effect when the user of the current deposit overdraft facilities purchases JGBs with DVP. The user delivers the JGBs to the Bank as collateral for the overdraft, is provided with daytime overdraft, and applies the overdraft to the payment for the purchase of JGBs.

Second, concerning the business continuity arrangements, Principle 17 on operational risk calls for business continuity arrangements that ensure timely resumption of operations (within two hours after disruption of such operations). With both the BOJ-NET Funds Transfer System and the JGB Book-Entry Transfer System, the Bank estimates that operations at the backup center will be resumed within two hours. In order to ensure such prompt resumption of operations, the data at the main center is reflected at the backup center in almost real time. In addition, necessary procedures are already in place so that once operations are switched to the backup center in Osaka, the officers at the Osaka branch will take primary responsibility for the operations. Furthermore, in order to ensure the effectiveness of these procedures, exercises on the switchover to the backup center are conducted each year, with users among the participants.

Third, concerning the legal risk, both the BOJ-NET Funds Transfer System and the JGB Book-Entry Transfer System are considered to be in compliance with Principle 1 on a legal basis in terms of settlement finality. This is an important aspect for both systems, and dematerialization of securities and tiered structure, which are important aspects of

Book-Entry Transfer Systems. This is because the relevant laws and regulations, the Bank of Japan Act, and contracts with users provide sufficient legal basis. Concerning Principle 8 on settlement finality, the Bank uses the RTGS for settlement of transactions between users for both systems to ensure immediate intraday finality.

Fourth, concerning Principle 2 on governance, the overall governance and risk management arrangements of the BOJ-NET Funds Transfer System and Book-Entry Transfer System are in compliance with the principle through governance by the Bank. Concerning Principle 3 on the framework for the comprehensive management of risks, the Articles of Incorporation adopted by the Policy Board of the Bank and relevant laws and regulations, including the Act on Book-Entry of Company Bonds, Shares, etc., provide the overall basic policy for business operations and risk management. The Policy Board then determines key matters in relation to operations and procedures, and executives and relevant departments identify, control and manage risks that can arise in the course of their respective duties.

Finally, concerning Principle 23 on transparency, the Bank discloses information about the BOJ-NET Funds Transfer System and JGB Book-Entry Transfer System, including the rights and obligations of the Bank and users, detailed arrangements for use of the systems, and costs for use of the BOJ-NET.

Based on these observations, it can be assessed that the BOJ-NET Funds Transfer System and JGB Book-Entry Transfer System are compliant with all the PFMI applicable to the central bank. The Bank will regularly update such disclosure materials.

3. Compliance by Private-Sector FMIs and Their Initiatives

The Bank carries out oversight activity on private-sector FMIs, selecting systemically important FMIs from among payment systems, securities settlement systems, CCPs and trade repositories, based on the Policy and in reference to the disclosure materials. It can be assessed that, overall, these private-sector FMIs are in conformity with the PFMI.

Each FMI is making efforts to comply with the PFMI, which can be summarized as follows (see Addendum 2 for specific initiatives undertaken by private-sector FMIs).

First, the governance (Principle 2) and framework for the comprehensive management of risks (Principle 3) are being upgraded. Some FMIs have already established basic policies for managing risks comprehensively, have segregated the risk control division from the operations division, and have developed procedures for the risk management committee to report directly to the management. Some of them have even appointed a chief risk officer (CRO).

Second, concerning Principle 7 on liquidity risk and Principle 13 on participant-default rules and procedures, some FMIs have been undertaking initiatives to improve effectiveness in securing liquidity in the event of a participant default.

Third, efforts are also being made to strengthen management of credit risk. They relate to Principle 4 on credit risk, Principle 5 on collateral, Principle 6 on margin, and Principle 13 on participant-default rules and procedures, and some FMIs are enhancing stress tests on adequacy of financial resources in the event of a participant default under various risk scenarios.

Last, concerning Principle 17 on operational risk, business continuity arrangements are in the process of being developed. Namely, all the FMIs have established a backup site in addition to the main site, as well as procedures for resumption of operations within two hours after disruption of operations and for completion of payment and settlement by the end of the day, as required by the PFMIs. In addition, various efforts are also underway to review contingency plans in cases of system failure or to add various scenarios to the stress test.

Taking into consideration the various initiatives by private-sector FMIs, the Bank will continue its oversight activity with a view to ensuring greater effectiveness of risk management pursued by the FMIs. Specifically, the Bank will ensure that business operations are carried out steadily in compliance with the new risk management framework. Furthermore, the Bank will continue to verify training and systems upgrading situations in response to business expansion and changes in the external environment and conformity with the global initiatives of CPMI-IOSCO for enhancement of risk management, and will provide encouragement as required.

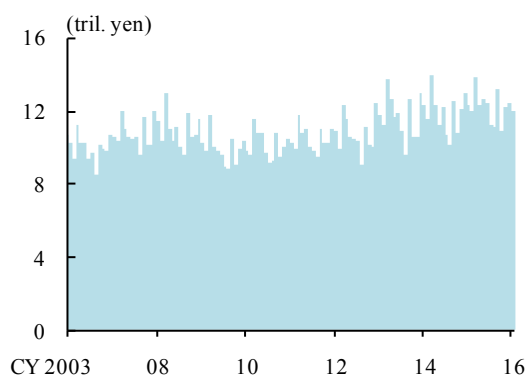
Addendum 2. Current State of Initiatives of Private-Sector FMIs

1. Japanese Bank's Payment Clearing Network (Zengin-Net)

Zengin-Net operates the Domestic Fund Transfer System (DFTS), an interbank clearing system for exchanging credit transfer requests between financial institutions and centrally executing such transfer requests. In 2015, the Zengin Data Telecommunication System (Zengin System), which is the core processing system of the DFTS, processed, on average, about 12 trillion yen per business day (Chart A2-1). Among these transfers, large-value domestic transfers of 100 million yen or more per transaction accounted for about 70 percent of the total, or 9 trillion yen, in 2015, while small-value domestic transfers of less than 100 million yen per transaction accounted for about 30 percent, or 3 trillion yen, in the same year. The large-value transfers are processed on an RTGS basis and small-value transfers on a deferred net settlement basis via the Bank current deposit accounts.

The current Zengin System, which was upgraded in 2011, has been stably operating, consistently processing about 12 trillion yen per business day. In terms of advancing funds settlement and enhancing the convenience of daily life, a review is currently underway to extend the system's operating hours (see Chapter 1 Section C for details).

Chart A2-1 Value of Transactions Processed by the Zengin System¹

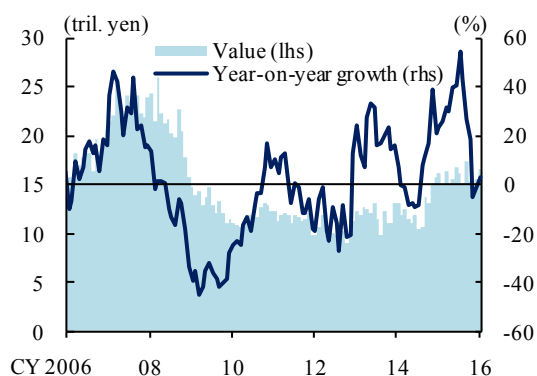


Note: 1. Average daily value in a month. The latest data is as of January 2016.
Source: Bank of Japan, "Payment and Settlement Statistics."

2. Foreign Exchange Yen Clearing System (FXYCS)

The Foreign Exchange Yen Clearing System (FXYCS) is a mechanism for clearing yen funds accompanying trading on the foreign exchange market or yen-denominated remittance from overseas. It is managed by the JBA, and the administrative work is carried out through clearing on the BOJ-NET. FXYCS exchanged about 16 trillion yen per business day in 2015 (Chart A2-2). The CLS is also used for foreign exchange clearing in Japan. Thanks to the PVP function provided by CLS for reduction in settlement risk, CLS processed about 54 trillion yen per business day in 2015.

Chart A2-2 Value of Transactions Processed by FXYCS¹

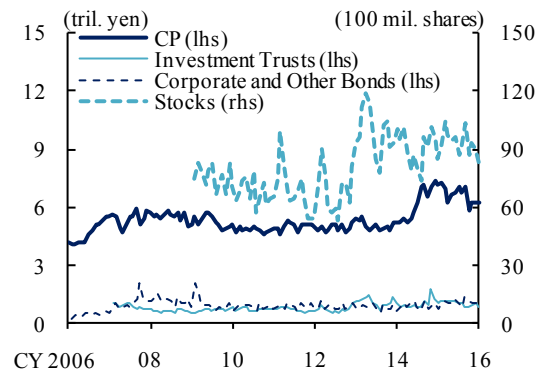


Note: 1. Average daily value in a month. The latest data is as of January 2016.
Source: Bank of Japan.

3. Japan Securities Depository Center (JASDEC)

JASDEC is a central securities depository that operates a book-entry transfer system for settling stocks, CPs, corporate and other bonds, investment trusts, and other securities. It also provides pre-settlement matching services on agreement details and settlement instructions electronically for JGB and other securities transactions executed between institutional investors and securities companies. Recently, the settlement value of stocks and CPs remained at a relatively high level in historical terms (Chart A2-3).

Chart A2-3 Amount of Settlements Processed by JASDEC^{1,2,3}



Notes: 1. Average daily amount in a month. Based on value for "CP," "Corporate and Other Bonds," and "Investment Trusts," and on number of shares for "Stocks." The latest data is as of January 2016.

2. The data for the month that each transfer system launched are excluded.

3. Figures for "CP" and "Corporate and Other Bonds" show the total amounts of underwriting, redemption, redemption by purchase and transfers. Figures for "Stocks" and "Investment Trusts" show the total amounts of issuance, redemption, and transfers.

Source: Japan Securities Depository Center, "Statistical data."

Since fiscal 2014, JASDEC has been carrying out organizational changes to enhance governance, nominating the CRO, establishing the Integrated Risk Management Council, setting up the Risk Committee, of which executives other than those from operations divisions comprise a majority, and establishing the Nomination Committee. In the systems upgrade carried out in January 2014, JASDEC worked together with the JASDEC DVP Clearing Corporation (JDCC) to set up a system that enables DVP settlement of stock lending transactions, reducing the settlement risk of such transactions.

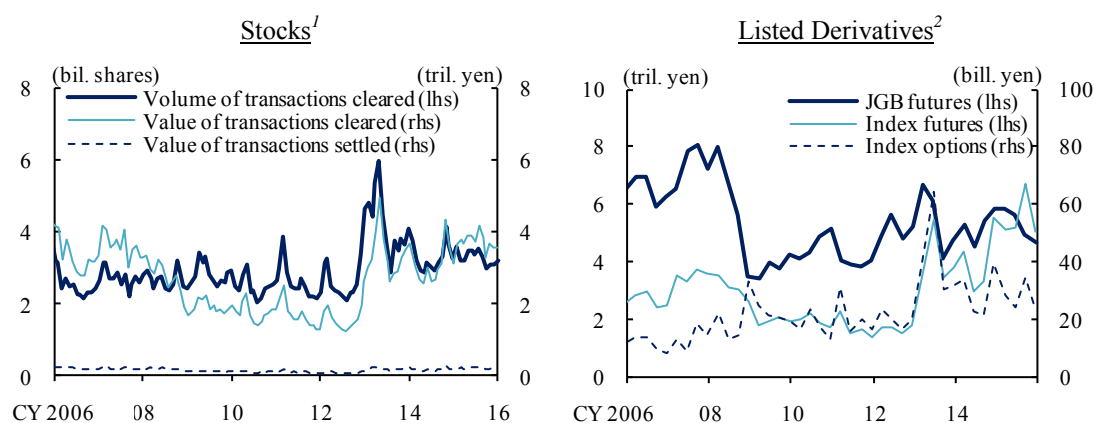
4. Japan Securities Clearing Corporation (JSCC)

Having taken over the clearing function for derivatives listed on the Osaka Stock Exchange in July 2013 and merged with Japan Government Bond Clearing Corporation in October 2013, JSCC now provides clearing services for stock transactions on stock exchanges, listed derivatives transactions, JGB OTC transactions and OTC derivatives transactions (interest-rate swaps and CDSs). JSCC has worked to establish a framework to allow financial institutions overseas to readily use JSCC's services. In April 2015, JSCC was recognized as a Third Country CCP by the European Securities and Markets Authority. In September 2015, JSCC was designated as a Prescribed CCP in relation to OTC derivatives regulations in Australia. In October 2015, JSCC received an Order of Exemption from

Registration from the U.S. Commodity Futures Trading Commission as a Derivatives Clearing Organization. At the same time, JSCC has pursued efforts to enhance the governance of organization-wide risk management, including the nomination of the CRO in 2014.

The value and volume of stock transactions cleared by JSCC substantially increased in 2013 and remained stable thereafter (left graph on Chart A2-4). With regard to derivatives transactions, the value and volume of stock index futures transactions have been on the rise for the past couple of years, but those of JGB futures and others have effectively leveled off (right graph on Chart A2-4). In terms of risk management, JSCC has been working to improve the robustness of financial resources, reviewing the calculation method for initial margin and introducing a clearing fund for stocks in January 2016.

Chart A2-4 Transaction Value and Volume of Stocks and Listed Derivatives
Processed by JSCC



Notes: 1. Average daily value in a month. The latest data is as of January 2016.

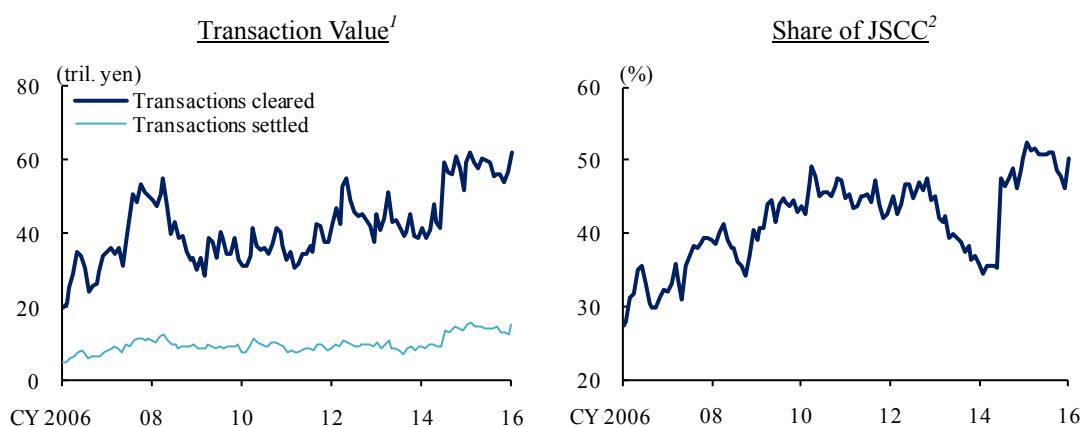
2. Average daily value in a quarter. Figures for "JGB futures" show the amount for 10-year JGB futures. Figures for "Index futures" show the total amount for Nikkei 225 futures, as well as Nikkei 225 mini and TOPIX futures. Figures for "Index options" show the amount for Nikkei 225 options. Transactions processed by the Osaka Securities Exchange, whose clearing functionality for exchange-traded derivatives was integrated into JSCC, are counted.

Sources: Japan Exchange Group; Japan Securities Clearing Corporation, "Statistical Data"; Bank of Japan, "Payment and Settlement Statistics."

The value of JGB OTC transactions cleared by JSCC increased to an average of 58 trillion yen per business day in 2015 (left graph on Chart A2-5), partly because trust banks dedicated to asset management became clearing members in June 2014 (see Chapter 1 Section B for details). As a result, the percentage of DVP settlement for JGBs cleared by JSCC reached nearly 50 percent (right graph on Chart A2-5). In terms of risk management,

JSCC implemented in 2014 measures to enhance its risk management, such as a review of schemes for securing liquidity and loss compensation, and for introducing clearing funds. JSCC has recently been working to develop procedures and systems for the introduction of a subsequent collateral allocation method for GC repo transactions for shortening the settlement cycle of JGB transactions (see Chapter 1 Section B for details).

Chart A2-5 Value of JGB OTC Transactions Processed by JSCC



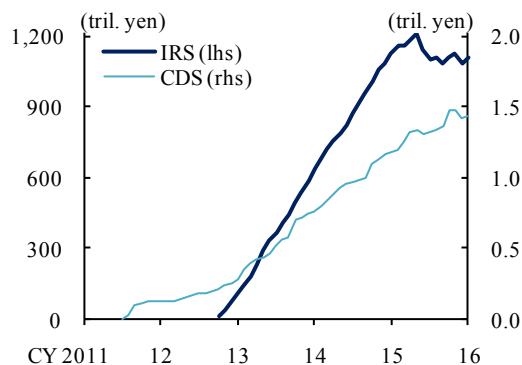
Notes: 1. Average daily value in a month. The latest data is as of January 2016.

2. Figures show the share of JGB transactions settled by JSCC in relation to DVP-Settled JGB transactions via BOJ-NET. The latest data is as of January 2016.

Sources: Japan Securities Clearing Corporation, "Statistical data"; Bank of Japan, "Payment and Settlement Statistics."

Concerning the clearing of OTC derivatives, the outstanding value of interest-rate swaps transactions cleared by JSCC rose substantially in 2013 and 2014, and thereafter remained stable at around 1,100 trillion yen. The outstanding value of CDS transactions cleared by JSCC amounted to 1.4 trillion yen as of the end of 2015 (Chart A2-6). In the meantime, since 2014, JSCC has expanded the scope of its clearing products, including foreign currency-denominated interest rate swaps, and introduced measures for improving usability, such as cross margin.

Chart A2-6 Open Interest of Assumption of Obligations for OTC Derivatives by JSCC¹

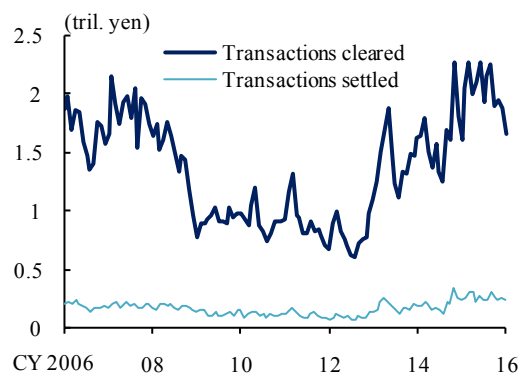


Note: 1. The latest data is as of January 2016.
Source: Japan Securities Clearing Corporation.

5. JASDEC DVP Clearing Corporation (JDCC)

JDCC, a wholly owned subsidiary of JASDEC, provides clearing services for stocks and other securities that are traded off-exchange between financial institutions. In fiscal 2015, the average daily value of transactions cleared by JDCC was 2.0 trillion yen and that of funds settlement was a record 260 billion yen (Chart A2-7).

Chart A2-7 Value of Transactions Processed by JDCC¹



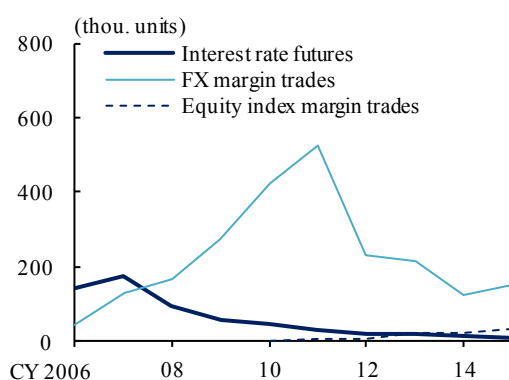
Note: 1. Average daily value in a month. The latest data is as of January 2016.
Source: Japan Securities Depository Center, "Statistical data."

From January 2014, JDCC started clearing stock lending transactions and introduced the DVP settlement in cooperation with JASDEC, reducing the settlement risk of these transactions. In relation to risk management, in an effort to comply with the PFMI, JDCC is considering revising the system to secure liquidity in case of a participant default (on a consolidated basis), and it is planning to implement the revision by the end of fiscal 2016.

6. Tokyo Financial Exchange (TFX)

The Tokyo Financial Exchange (TFX) lists financial derivatives, such as interest rate futures, FX margin trades, and equity index margin trades, and it provides clearing services for these products. Trading volumes for interest rate futures and FX margin contracts have remained almost flat, while the volumes for equity index margin trades have been gradually increasing since their listing in November 2010 (Chart A2-8).

Chart A2-8 Trading Volume on TFX¹



Note: 1. Average daily value in a year.

Source: Tokyo Financial Exchange, "Monthly Statistics."

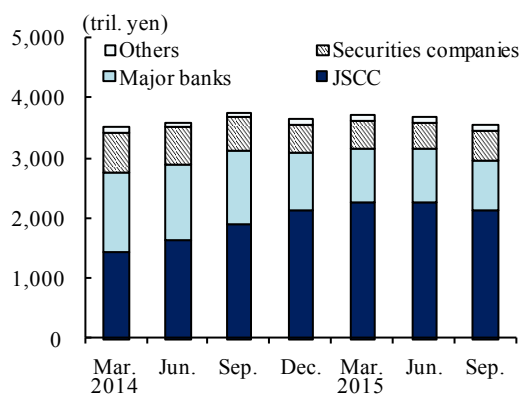
In April 2015, TFX was recognized as a Third Country CCP by the European Securities and Markets Authority. In relation to risk management, TFX has been working to improve governance by nominating the CRO in 2014 and to enhance the robustness of financial resources by introducing a clearing fund and revising the loss compensation scheme for cases of participant default in July 2015.

7. DTCC Data Repository Japan (DDRJ)

DTCC Data Repository Japan (DDRJ) is the only trade repository in Japan designated by the Financial Services Agency (FSA). In Japan, it is mandatory for financial institutions to report to the FSA data on the OTC derivatives transactions they have executed, and DDRJ is responsible for sending to the FSA data on OTC derivatives transactions submitted by such financial institutions. For other transactions, financial institutions report directly to the FSA, or via a CCP if such transactions are cleared by the CCP. The aggregated

transaction data indicate that clearing of OTC derivatives transactions via CCPs has been advancing steadily (Chart A2-9).

Chart A2-9 Outstanding Value of OTC Derivatives^{1,2}



Notes: 1. Based on notional amount outstanding. A transaction reported by both reporting entities is counted twice.

2. "Major banks" include affiliated financial institutions such as Norinchukin Bank, Shinkin Central Bank and Shokochukin Bank."

Source: Financial Services Agency, "Figures aggregating the OTC derivative transactions."

III. Initiatives for Strengthening Business Continuity Arrangements

The financial market participants -- including the Bank of Japan -- and payment and settlement systems constitute important social infrastructure. They are required to have in place adequate business continuity arrangements to address a wide range of events posing risks of operational disruption. Such events may include natural disasters (e.g., earthquakes, typhoons, and floods), technical disasters (e.g., system failures), man-made disasters (e.g., terrorist attacks), and infectious diseases such as the pandemic influenza. Recently, new types of man-made disasters, such as "cyber attacks," are drawing attention.

Based on the lessons learned from the Great East Japan Earthquake of 2011 and tightened standards for business continuity arrangements of FMIs stipulated in the PFMI released in 2012, FMIs in Japan, including the Bank, have been considering and steadily taking steps for enhancement of business continuity arrangements. Principle 17 on operational risk in the PFMI requires that the FMIs should have a business continuity plan that addresses events posing a significant risk of disrupting operations. It further states that the plan should be designed to ensure that critical information technology systems can resume operations within two hours following disruptive events, and to enable the FMI to complete settlement by the end of the day of the disruption, even in case of extreme circumstances.

This chapter describes specific initiatives for study and implementation of measures for further enhancement of the business continuity arrangements of FMIs (i.e., the Bank of Japan, financial institutions, financial markets, and private-sector payment and settlement systems).

A. Initiatives of the Bank to Strengthen Business Continuity Arrangements

If operations of the Bank are ever disrupted by disasters, Japan's payment and settlement systems, financial systems and ultimately the economy and lives of the citizenry will severely suffer. The Bank is required to continue operations even at times of disaster

under the Basic Act on Disaster Control Measures and other relevant laws and regulations,⁸ and, in preparation for possible threats to business continuity,⁹ it has in place arrangements in accordance with the extent of damage to key offices, executives and officers. The Bank has thus developed business continuity arrangements that will enable it to secure management resources to continue key operations in case risks come to surface.

Recently, based on the lessons learned from the Great East Japan Earthquake and revisions to estimates of damage that might be caused by possible earthquakes, Tokyo inland earthquakes or a Nankai megathrust earthquake,¹⁰ the Bank has been checking and re-examining the business continuity arrangements it has developed in order of priority, further strengthening the operational resilience of the head office and branch offices.¹¹ Specifically, the Bank has worked on the following four areas. The first is the enhancement of the ability to carry out the functions to be continued in emergencies and improving the efficiency of operational workflow. The second is to review the Bank's framework of assigned staff for continuing its operations in emergencies. The third is to review facilities and equipment for business continuity. The fourth is to share know-how and skills for development of business continuity arrangements.

Further, in order to improve the effectiveness of its business continuity arrangements, the Bank carries out practical exercises assuming various disaster and damage scenarios. Specifically, the Bank carries out exercises for establishing and conducting the Disaster Management Team, in which scenarios are not announced before the day of the exercise. The Bank also carries out business continuity exercises at the alternative site to continue critical operations, and exercises for execution of Headquarters functions at the Osaka

⁸ The Bank is positioned as a "designated public corporation" or as having a "crucial economic function" under the Basic Act on Disaster Control Measures and other relevant laws and regulations related to emergency situations, and is required to develop and implement a business plan, to establish procedures for emergency staffing and to periodically hold exercises. The Bank lists the following functions as those to be carried out in emergency situations: (i) issuance of banknotes and carrying out currency and monetary control; (ii) measures to ensure smooth settlement of funds, thereby contributing to the maintenance of stability of financial systems; (iii) requests to financial institutions to take certain financial measures; (iv) publicity campaigns on various measures taken; and (v) liaison and coordination with central banks overseas.

⁹ The Bank has developed business continuity arrangements for various scenarios, including natural disasters, terrorist attacks, and system failures.

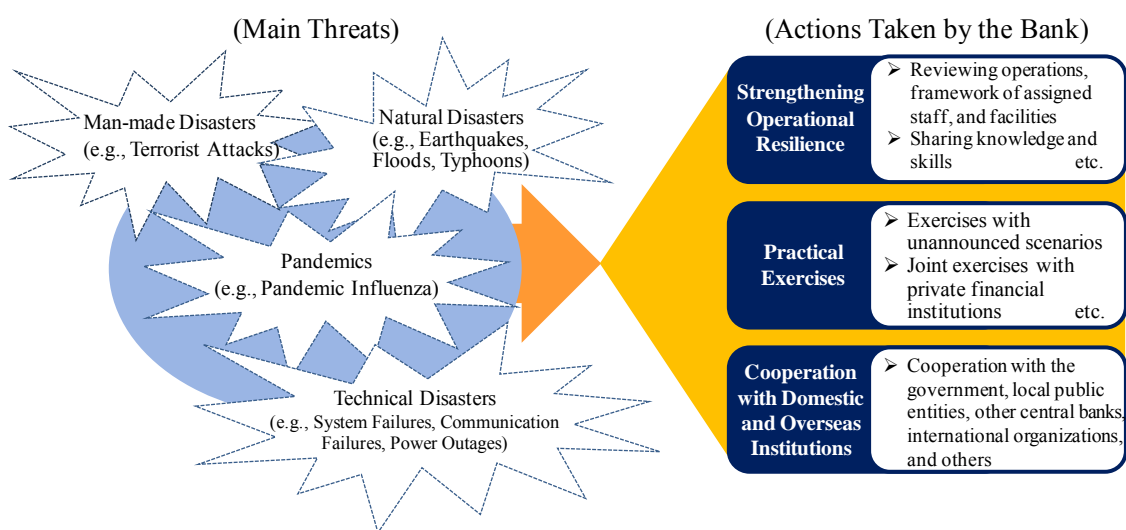
¹⁰ The Act on Special Measures against Tokyo Inland Earthquake and Act on Special Measures for Promotion of Nankai Trough Earthquake Disaster Management were enacted in 2013. The Act on Special Measures for Pandemic Influenza and New Infectious Diseases Preparedness and Response was also enacted in 2013, and the Bank, as a designated public corporation, is developing its business continuity arrangements in line with these acts.

¹¹ "The Bank of Japan's strategic priorities for fiscal 2014-2018" have strengthened business continuity arrangement among key issues to be addressed in terms of organizational management.

Branch assuming that the Tokyo office is severely damaged. Furthermore, the Bank carries out exercises for switchover to the backup system in case of the BOJ-NET system failure, and those for connecting the backup system with users' computers, in which a wide range of financial institutions and private-sector systems have participated.

In addition, the Bank is promoting coordination with the governments and local public entities through participation in disaster management councils and exercises. The Bank is also exchanging information and opinions with other central banks and international organizations on the business continuity of financial and settlement systems and central banks through international conferences and bilateral meetings. The information and knowledge thus obtained through these channels are utilized to develop the business continuity arrangements of the Bank and to support the development of the business continuity arrangements of financial institutions, financial markets, and private-sector payment and settlement systems.

Chart III-1-1 The Bank's Action to Strengthen Business Continuity Arrangements



B. Initiatives of Financial Institutions to Strengthen Business Continuity Arrangements

From August to September 2014, the Bank carried out a questionnaire survey of financial institutions on the state of the development of their business continuity arrangements, and it published the results in January 2015.¹²

All the financial institutions surveyed answered that they had "completed" the establishment of business continuity management frameworks, and about 85 percent of them answered that they were regularly reviewing the frameworks that they established, demonstrating overall progress in the development of business continuity arrangements. Over 90 percent of the respondents cited earthquakes and infectious diseases as disaster scenarios, and over 80 percent said they assumed virtually complete disability of the main computer center and main office. Furthermore, more financial institutions said that they assumed cyber terrorism or more serious scenarios such as simultaneous complete disability of the main and backup offices. All the respondents said that they identified critical operations to be restored with priority at the time of disaster, and nearly 90 percent of them said they set up target times for the resumption of critical operations. Nearly 70 percent of them said they set target times for the resumption of key business activities at 4 hours or less.

Over 40 percent of the financial institutions said they established cooperation arrangements with other financial institutions for supply of relief goods, temporary dispatch of staff, cash withdrawal and other functions, showing an increase in arrangements with financial institutions across different business categories.

Despite such progress in the development of the business continuity plan, about 65 percent of the respondents said they felt that the effectiveness of their business continuity plans was partially inadequate, and about 40 to 50 percent of them considered, as key issues, securing and developing management resources including business continuity personnel and locations of operations. Specifically, although identification of business continuity personnel is widely carried out, only over 30 percent of the respondents have checked if such staff can actually come to the office. Some respondents said that, while a backup

¹² See "Questionnaire Survey on Business Continuity Management (September 2014)" (May 2015) for details.

office had been secured, no person was expressly designated for authorizing a switch to the backup office, that the criteria for switching was yet to be developed or that the backup office was not large enough to house all the staff minimally required to conduct critical operations. About 20 to 30 percent of respondents said their in-house power generation facilities would not last long enough, or that fuel and cooling water was not stockpiled adequately. In addition, some have not checked the consistency of the manuals for execution of critical operations on a company-wide basis, or they have yet to develop some such manuals. Further, there are others that have not gained an understanding of the details of the business continuity plans of external parties to which parts of key business activities are contracted out, or have not checked consistency of their plans with those of the contractors. Finally, the survey found that although the number of financial institutions carrying out regular exercises on fund settlement or cash supplies had been on the rise, only 20 to 30 percent of the respondents carried out exercises by operations departments on switchovers to a backup center, or those for emergency staff to gather at branches or backup offices.

The business continuity arrangements of financial institutions differ from one another depending on environment and position in terms of possible disasters and anticipated levels of counter-measures. In addition, there can be many approaches to such arrangements. Accordingly, financial institutions are expected to formulate counter-measures that are appropriate for their circumstances, and to improve the effectiveness of their business continuity plans steadily by referring to these survey results and the arrangements of other institutions.

C. Initiatives of Financial Markets and Private-Sector Settlement Systems to Strengthen Business Continuity Arrangements

For initiatives by individual financial institutions concerning the business continuity plans discussed in the previous section, it is also important to link individual efforts in an industry-wide manner. From this viewpoint, it is essential to strengthen the cross-market business continuity plan (market-level BCP) so that the core market functions that provide the basis of economic activities are maintained or can be resumed as quickly as possible in

case of emergency.

The market-level BCP is intended to establish procedures for information sharing and communications and the consultation on changes to market practices at the time of disaster among market participants of the money market, securities market, and foreign exchange market. Since 2010, among the efforts to establish the procedures, joint exercises for market-level BCP have been held for those markets. Such exercises have been established as cross-market exercises, attended by over 500 market participants and settlement infrastructure operators in total. In the seventh exercise held in November 2015, the Bank carried out a funds supplying operation against pooled collateral with immediate start, in response to requests from market participants. This exercise was conducted to further enhance the business continuity arrangements of financial institutions at the time of disaster by checking various administrative processes in relation to funds supplying operations that might be carried out at the time of disaster.

For the financial industry as a whole, the JBA carried out a cross-sectoral (street-wide) exercise in 2010 assuming pandemic influenza. Since 2012, it has held annual exercises assuming a large-scale earthquake, in which the Financial Services Agency and the Bank have been taking part.

For further enhancement of cross-market business continuity arrangements, the following points have been raised as lessons learned from the Great East Japan Earthquake, and measures to deal with these issues have steadily been developed.

First, it is important to enhance communication tools and networks for information sharing and reporting, including building redundant infrastructure. In this regard, there are initiatives in which the operators of the three markets mutually issue IDs and passwords to access their respective BCP websites, thus sharing information with the other markets.

Second, it is required to share common ideas about the outline of administrative work for business continuity. Specifically, it is necessary to reach a consensus about the timeframe for response, during which the relevant parties will make feasible adjustments internally, upload information on the BCP websites, and start consultation with each other. These ideas will then be incorporated into the business continuity plans of the respective market

participants. Dialogues on such coordination are gradually in progress.

Third, it is critical to establish and enhance backup staff and backup offices. The Great East Japan Earthquake implied the possibility that it could become difficult to continue operations in the Tokyo metropolitan area, and an increasing number of entities are moving to establish and enhance backup arrangements outside the Tokyo area, most notably in Kansai. Some are even building a permanent dual operational system at the main facilities in the Tokyo metropolitan area and at backup facilities in another area for critical market operations, assigning personnel at the backup facilities on a permanent basis.

Fourth, in order to ensure the effectiveness of market-level BCP, it is important to maintain and improve staff skills through regular exercises and to analyze the results to help improve and update the business continuity plan. Such efforts are also seen in many organizations.

In the meantime, the private-sector settlement systems have also been studying and implementing further means of enhancement for the business continuity arrangements in consideration of the lessons learned from the Great East Japan Earthquake and government initiatives thereafter, as well as the stricter requirements on business continuity arrangements as stipulated in the PFMI. Specifically, they have been working on enhancement of staffing and backup offices, cooperation with settlement system participants, and conducting regular exercises.

As discussed above, efforts undertaken by the financial market and private-sector settlement systems have shown steady progress. However, enhancement of business continuity ability requires incessant review and improvement. The Bank provides proactive support for the market-level BCP and initiatives by private-sector settlement systems, and as a central bank, it will continue to proactively contribute to the maintenance of the functions of the financial markets and infrastructure. Utilizing the results of the surveys and initiatives of various parties shown in the previous sections, the Bank will -- through oversight, on-site examination and off-site monitoring, as well as on other occasions -- deepen discussions on business continuity arrangements with private-sector settlement systems and financial institutions to help improve the stability of such financial and settlement systems.

IV. Assessment of Current State of and Mid- to Long-term Vision for Japan's Payment and Settlement Systems

Payment and settlement underpin all economic activities. Likewise, the payment and settlement systems constitute important infrastructure that forms the basis of economic society. In order to achieve stable and sustainable economic growth, highly stable payment and settlement systems that ensure secure and efficient payment and settlement of various transactions are essential.

Further development of globalization of economies and diversification of economic activities in recent years have changed and diversified the needs for payment and settlement services. Moreover, innovations in information and communications have widened the range of technologies that can be applied to payment and settlement services. Against such backdrop, economic entities that provide payment and settlement infrastructure are required to make efforts to respond to environmental changes and improve the security and efficiency of payment and settlement services. These initiatives will contribute to the development of markets and the sustained growth of the economy through interactions between payment and settlement services and various businesses.

The Bank of Japan, as a central bank, provides the market infrastructure that forms the underpinning of Japan's economy, including issuance of bank notes and operation of BOJ-NET, a fundamental payment and settlement system for funds and JGB transactions. The Bank is working closely with other entities that provide payment and settlement systems both in Japan and overseas, entities such as financial institutions that are involved with such systems, central banks overseas, and government agencies. In addition, the Bank is responsible for the oversight of private-sector payment and settlement systems. Through these activities, the Bank, as a central bank, works on initiatives to improve the security and efficiency of Japan's payment and settlement systems.

Recently, with rapidly progressing innovations in information technology and increasingly diversified and sophisticated payment and settlement services, a wide variety of economic entities -- including information-related companies, electronic money issuers and retailers -- have come to provide payment and settlement services, in addition to traditional financial

institutions and operators of private-sector payment and settlement systems. In such a changing environment, it is necessary to encourage cooperation and coordination with a wide range of economic entities and monitor trends in order to improve the security and efficiency of Japan's payment and settlement services.

With these issues in mind, this chapter will first discuss an assessment of the current state of Japan's payment and settlement systems, and then explain a mid- to long-term vision with respect to these systems.

Assessment of Current State of Japan's Payment and Settlement Systems

Japan's payment and settlement systems guarantee one of the highest levels of security in the world. Considering recent environmental changes, a wide range of entities are working to improve the security and efficiency of payment and settlement services, both for large-value and small-value transactions.

In the area of large-value settlement, the BOJ-NET serves as a cornerstone of Japan's economic infrastructure. In fact, the average amounts of transactions it handled per business day in 2015 reached about 136 trillion yen for funds transfer, and about 102 trillion yen for JGBs transfer. The Bank has also established the new BOJ-NET, which was fully launched in October 2015, to respond to changes such as globalization of the economy and innovation in information technology. With the most advanced information processing technologies, the new BOJ-NET system is designed to be flexibly expandable in response to changes in user needs, and it provides improved accessibility. Its operating hours were extended till 21:00 starting February 2016.

In addition, based on the "The Bank of Japan Policy on Oversight of Financial Market Infrastructures" published in March 2013 and also in consideration of the PFMI released in 2012 by CPMI and IOSCO, the Bank assesses the security and efficiency of Japan's payment and settlement systems. As part of such assessment, in July 2015, the Bank concluded that the BOJ-NET Funds Transfer System and JGB Book-Entry Transfer System were both in compliance with all the applicable PFMI. The Bank also oversees payment and settlement systems run by private-sector entities, and it has concluded that all the

systems that are subject to oversight by the Bank are, on the whole, compliant with the PFMIs.

With regard to securities settlement, steady efforts have been made to shorten the settlement cycle with a view to reducing settlement risk. At present, the settlement cycle of JGBs will be shortened to the T+1 settlement and that of stocks to the T+2 settlement.

With regard to small-value payment, JBA and Zengin-Net are developing a new platform that enables fund transfers between end-users on a 24/7 basis. Some firms are working toward advancement of corporate finance with financial electronic data interchange (EDI). In the meantime, taking advantage of innovation in information technology, a wide range of economic entities -- including financial institutions and nonbanks -- have started providing payment services.

Changing Environment Surrounding Payment and Settlement Systems

Looking at changes in the environment surrounding payment and settlement systems, on the demand side, cross-border transactions are increasing amid the accelerating globalization of economic activities. Among firms engaging in global businesses, there is a growing demand for global cash management in order to achieve efficient fund management in Japan and overseas. In the meantime, people's lifestyle has become increasingly diversified, and new forms of business have been developed, including e-commerce, which enables online transactions at any time, during night hours or on weekends. Accordingly, demand for payment services that are compatible with these new types of business is increasing.

On the supply side, further advancement of technological innovations in information, communications and related fields has dramatically improved the processing capability of computers, widening the range of technologies that can be applied to payment services, such as cryptographic technologies and distributed ledgers. The internet and mobile devices have also spread rapidly in Japan and overseas, and an increasing number of people have now gained access to payment services through these mediums.

Against this backdrop, a wide range of economic entities -- including financial institutions,

information-related companies, venture companies and retailers -- are actively seeking to provide new payment services incorporating information and technological innovations in response to diversifying customer needs. Innovation in the field of payment services is drawing attention in light of recent development in FinTech services.

Given the trend towards enhancement of payment services, the industrial structure providing payment infrastructures is changing, with a wide range of companies entering the payment service market. In addition to traditional financial institutions, these include retailers and nonbanks that have advantages in information and communications technologies, networks or data. Some see new business opportunities in the processing of huge quantities of data accompanying payments, and provision of innovative payment services sometimes has spawned new businesses.

In the meantime, it has been widely recognized that payment infrastructures are important for the development of financial markets and revitalization of the economy. More economies appear to enhance their infrastructures for large-value and small-value payment and settlement on a nation-wide basis. For example, many countries, including the United Kingdom, Singapore, European countries and Australia, have realized or plan to realize real-time remittance service on a 24/7 basis, during night hours or on weekends. In some key developed countries, the central banks are proactively taking initiatives to enhance the payment and settlement systems of their countries, and in many emerging economies large-value settlement systems are being built for the purpose of promoting their markets' competitiveness.

Mid- to Long-Term Vision for Japan's Payment and Settlement Systems

Taking account of these environmental changes both in Japan and overseas, the Bank will take proactive steps in order to further enhance the security and efficiency of Japan's payment and settlement systems.

First, the Bank will continue to take measures to ensure and improve the security of Japan's payment and settlement systems.

For this purpose, it is important to identify and assess risks associated with payment and

settlement systems, and furthermore, to take adequate measures as appropriate. These processes will contribute to gaining public confidence in payment and settlement systems and financial infrastructure. In particular, new threats have come to surface in recent years, including hacking and cyber-attacks due to the widespread use of information and communications mediums. Innovations by financial institutions to provide financial services on the internet have also added to the threat to cyber security. As a measure to cope with these new types of threats, it is urgently necessary to take more advanced cyber-security measures. At the same time, it is also vital to enhance the business continuity ability so as to be able to cope with various types of disasters.

The Bank is determined to ensure that operations of FMIs remain compliant with the PFMIs in coordination with central banks and authorities overseas, international standard setters, and Japanese government agencies. It is also determined to ensure the security of Japan's payment and settlement systems as a whole through stable operations of the BOJ-NET and oversight activities on various FMIs.

Second, as a central bank, the Bank will continue to make proactive efforts to improve the efficiency of Japan's payment and settlement systems, which can contribute to Japan's economic welfare and sustained economic growth.

In terms of promptness and timeliness of payment services, easy-to-access payment services that are available at any time -- during night or day, on weekdays or weekends -- will be beneficial to households and companies. Further, such payment services may generate the additional benefit of helping to reinvigorate economic activities. From these viewpoints, the Bank is closely watching the efforts by the JBA and Zengin-Net to construct the new platform.

If prompt finalization of payments helps shorten the time from transaction to settlement, it will reduce settlement risk. In this regard, those involved in the transactions of JGBs and stocks are working to further shorten the settlement cycle, thereby reducing settlement risk. The Bank will continue to support such efforts through dialogues with the parties concerned.

Banks may wish to provide prompt payment and settlement services for cross-border

transactions. If, however, the balance of interbank transactions that have not been cleared increases, it may result in accumulation of risks, which could constrain provision of services to support globalization of corporate activities. The extension of the operating hours of the BOJ-NET to 21:00, which started February 2016, created an overlap of operating hours that constitute daytime in all Asian markets and morning time until about noon in European markets. This is expected to provide strong support, in terms of core infrastructure, for banks' moves to provide immediate same-day remittance services to companies operating globally. At the meetings of the "Forum Towards Making Effective Use of the New BOJ-NET," some expressed opinions that further extension of the operating hours of the BOJ-NET should be considered. The Bank will continue and deepen discussions with interested parties to determine what to do with the operating hours of the BOJ-NET in the future.

In terms of functionality of payment and settlement services, there are increasing needs to use information and data accompanying payments to create new added value or to reduce costs, with due attention to information security. For example, there are initiatives to utilize remittance information through the financial EDI in order to achieve straight-through processing, thereby contributing to the enhancement of global competitiveness. The Bank is paying attention to such initiatives. Advancement of collateral management services is also drawing attention.

Turning to the interoperability and connectivity of payment and settlement systems, improving accessibility to such payment and settlement systems and enhancing linkage among them to improve interoperability may also contribute to improving economic welfare, while due attention is paid to security issues. In particular, the payment and settlement system is considered to have "network externality" (i.e., the wider the network is, the more benefit the participants of the network can enjoy). Accordingly, the interoperability of multiple payment and settlement systems is beneficial to the participants. At the same time, linkage of these systems may lead to more efficient administrative work and lower costs for the participants through introduction of straight-through processing.

In this respect, Japan, as a member of ASEAN+3, is expected to promote studies to realize the roadmap for construction of the CSD-RTGS link in Asia. Concerning the

improvement in accessibility to settlement services, some members at the "Forum Towards Making Effective Use of the New BOJ-NET" have requested that the Bank should study the possibility of BOJ-NET terminal installation at overseas locations. Taking these requests into consideration, the Bank will deepen discussions on the connectivity and accessibility of the BOJ-NET with interested parties. In the meantime, against a backdrop of the rapid spread of the internet and mobile devices, the initiatives of private financial institutions to utilize such equipment for provision of various innovative payment and settlement services are also important.

Conclusion

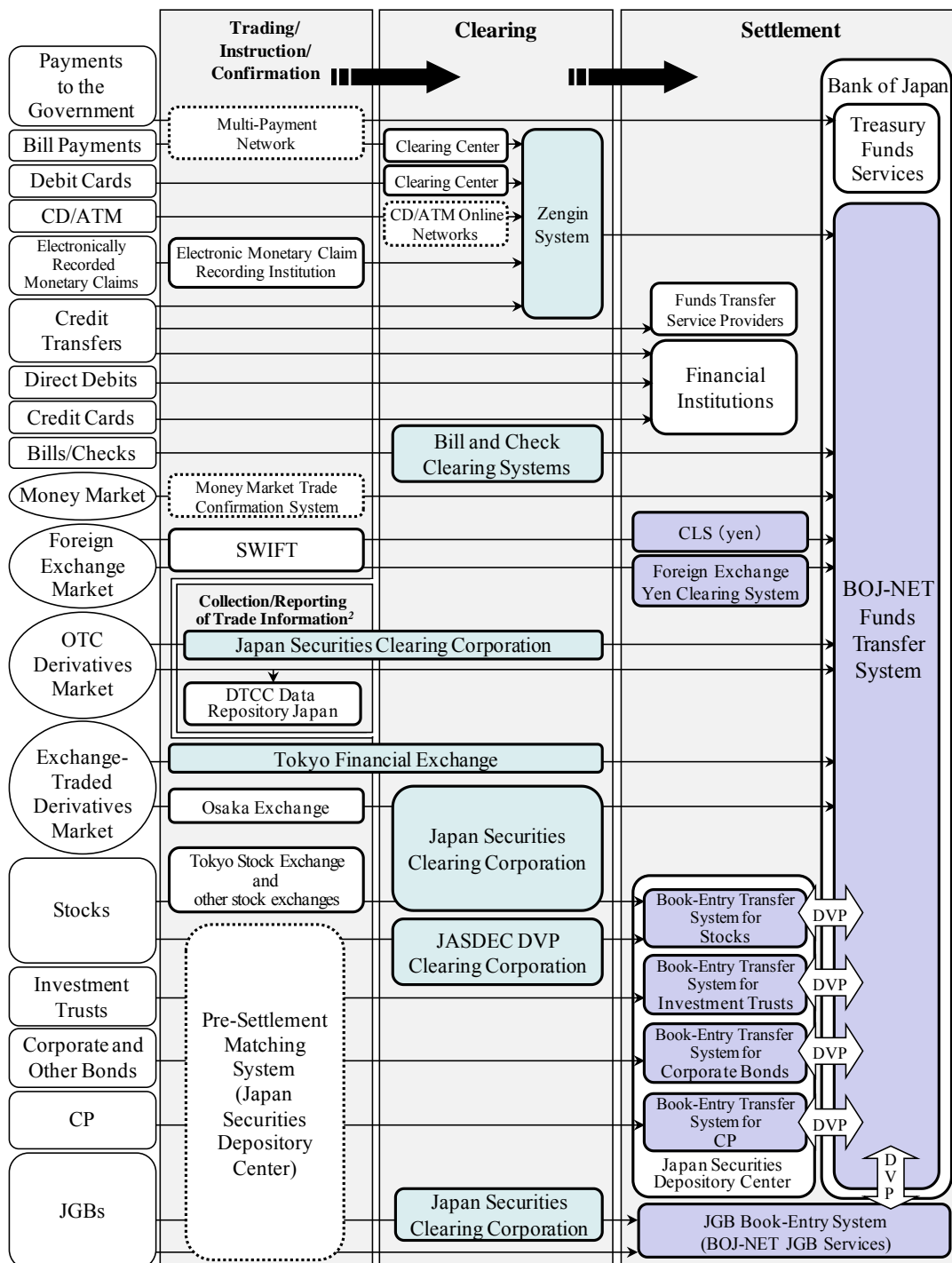
The Bank provides the payment and settlement infrastructures that form the basis of Japan's economy. It has also been working to make more effective use of the BOJ-NET. Furthermore, as a central bank, the Bank is firmly committed to ensuring the security and efficiency of payment and settlement activities, and it strongly supports improvement in the security and efficiency of various payment and settlement systems through oversight on these systems and dialogue with relevant parties.

As innovations in information technology and in the field of payment, known as FinTech, are progressing, entities providing payment infrastructures have increased in number and become more diversified. The Bank will proactively take the role as a catalyst, promoting coordination and cooperation of relevant parties necessary for improvement of the security and efficiency of payment systems.

As Japan's central bank, the Bank will make the maximum contribution to improve the security and efficiency of Japan's payment and settlement systems, as discussed above. Through these activities, the Bank is determined to support the development of financial markets and sustainable growth of the economy from the perspectives of payment and settlement infrastructures.

Appendix 1. Overview of Payment and Settlement Systems in Japan

Chart B1-1 Payment and Settlement Systems in Japan¹



Notes: 1. Systems surrounded by a dotted line are used in some instruction, confirmation, and clearing activities.

2. The Japan Securities Clearing Corporation (JSCC) is required to collect and report data to relevant authorities for OTC derivatives transactions it has cleared. Transactions not cleared by JSCC are required to be reported to authorities either via the DTCC Data Repository Japan or directly by financial institutions.

Chart B1-2 Value and Volume of Transactions Processed by Major Payment and Settlement Systems in Japan¹

Payments	Value (tril. yen)	Year-on-year growth (%)	Volume (thousands)	Year-on-year growth (%)
BOJ-NET Funds Transfer System	135.6	8.4	69.3	1.3
of which: interbank transfers	45.6	16.6	—	—
DVP for JGBs	55.3	1.8	—	—
Large-value Zengin System payments	9.0	2.9	—	—
CLS (yen payments)	53.7	8.0	99.1	-8.6
Foreign Exchange Yen Clearing System	15.7	25.7	27.7	4.3
Zengin System ²	12.2	2.9	6,345.6	2.2
Bill and Check Clearing Systems ³	0.9	-12.0	84.4	-6.5

Securities Settlements	Value (tril. yen)	Year-on-year growth (%)	Volume (thousands)	Year-on-year growth (%)
BOJ-NET Book-Entry System	101.6	0.4	18.3	-4.3
Japan Securities Clearing Corporation (JGB OTC Transactions) ⁴	58.1	16.1	5.6	17.4
Japan Securities Clearing Corporation (Listed Products) ⁴	3.7	17.9	—	—
JASDEC DVP Clearing Corporation ⁴	2.0	25.7	119.7	5.5
Japan Securities Depository Center ⁵				
of which: stocks	—	—	458.3	8.0
dematerialized CP	6.7	8.5	1.4	4.7
corporate and other bonds	1.0	15.4	2.2	3.6
investment trusts	1.1	4.3	25.3	8.5

Notes: 1. Average daily value and volume for 2015.

2. Figures for Zengin System show the value and volume of payments processed.

3. Figures for bill and check clearing systems show the value and volume of bills and checks processed at the Tokyo Clearing House.

4. Figures for the Japan Securities Clearing Corporation (JSCC) and JDCC show the value of transactions processed by the central counterparties. Figures for JSCC (Listed Products) are for stock transactions executed on stock exchanges. Figures for JDCC are for stocks traded off exchange between securities companies and their customers.

5. Figures for stocks and investment trusts show the total amount of issuance, redemption and transfers. Figures for dematerialized CP and corporate and other bonds show the total amount of underwriting, redemption, redemption by purchase and transfers.

Sources: Japan Securities Clearing Corporation; Japan Securities Depository Center; Japanese Bankers Association; Japanese Banks' Payment Clearing Network; JASDEC DVP Clearing Corporation; and Bank of Japan.

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