

## **Masaaki Shirakawa: Toward development of robust payment and settlement systems**

Speech by Mr Masaaki Shirakawa, Governor of the Bank of Japan, at a symposium commemorating the 25th anniversary of the Center for Financial Industry Information Systems, Tokyo, 13 November 2009.

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### **I. Introduction**

It is a great pleasure to have this opportunity to speak at the symposium commemorating the 25th anniversary of the Center for Financial Industry Information Systems (FISC). Since its establishment in 1984, the center has greatly contributed to strengthening the safety of financial information systems and improving the sophistication and efficiency of financial services in Japan. FISC has served the industry through its wide-ranging activities, which include developing industry guidelines on information system audit and security, publishing annual reports on financial information systems in Japan, and organizing seminars on various topics. As the center marks its quarter-century milestone, I would like to express my respect and gratitude for the work it has done over the years.

The twenty-five years of FISC closely overlap with the history of the birth and evolution of the Bank of Japan Financial Network System (BOJ-NET). The Bank of Japan had just started developing the system when the center was founded in 1984. The system went live in 1988, followed by a number of improvements thereafter. These include the introduction of delivery-versus-payment (DVP) for Japanese government bonds (JGBs), the development of an out-of-region backup center in Osaka, a changeover from deferred net settlement (DNS) to real-time gross settlement (RTGS), and the introduction of liquidity-saving features into the RTGS system. These measures have contributed to enhancing the safety and efficiency of payment and settlement systems in Japan.

One major objective behind improvements in payment and settlement systems is to avert the negative impact of a financial crisis on the economy. As recent events in the global financial system have shown, unfortunately, financial crises occur repeatedly. While each crisis emerges in a different manner, there are certain common features: an overly optimistic outlook on the economy, followed by excessive leverage and liquidity, finally leads to a crisis; and unwinding of leverage and contraction of liquidity take place once the crisis is underway. Preventing the emergence of a bubble economy and the occurrence of a financial crisis is a challenge we must continuously tackle. However, considering the history of recurring "boom-and-bust" cycles, I must emphasize the importance of building a robust financial infrastructure that can absorb shocks in a flexible manner. This is especially relevant for payment and settlement systems, which form the bedrock of the financial infrastructure. Today, I would like to present to you the Bank's views on the challenges that need to be addressed to further strengthen the robustness of payment and settlement systems in Japan.

### **II. Performance of Japan's payment and settlement systems during the recent crisis**

The failure of Lehman Brothers in autumn 2008 triggered unprecedented disruptions in the global financial market. The aftermath of the disruptions challenged Japan's payment and settlement systems to prove its robustness against shocks. Overall, a favorable assessment can be made that the payment and settlement systems in Japan withstood the turmoil in the financial market, operating effectively as designed. At a minimum, unfavorable issues in payment and settlement systems did not trigger a chain of defaults among Japan's financial institutions. It is true that the financial crisis revealed some tasks that still need to be

addressed. Nevertheless, I would like to emphasize that the systems have demonstrated a high level of robustness, and praise the patient efforts that the relevant parties have made to improve the systems over the years. Chart 1 shows some major streams of ceaseless efforts. In order to correctly acknowledge the progress made to date, I will start by giving two examples.

#### **A. *Elimination of foreign exchange settlement risk***

First, the arrangement for eliminating foreign exchange settlement risk has functioned effectively. Settlement of foreign exchange transactions entails the risk, namely principal risk, that a party to a trade pays one currency, for example, the yen, but cannot receive the counter-currency, for example, the U.S. dollar – a risk that arises due to the time zone difference between the settlement systems for the two currencies. In order to resolve this problem, major banks around the world jointly invested to establish CLS Bank International (CLS; stands for continuous linked settlement) in New York, which began its settlement service in 2002. Major economies' central banks, including the Bank of Japan, played a key role in the establishment of CLS.

Under the CLS system, settlement of the two currency legs is carried out simultaneously on a payment-versus-payment (PVP) basis. Each participant holds an account for the two traded currencies at CLS, and the transfer of the two currencies is made on the two parties' accounts simultaneously only if the payer of each currency has sufficient funds or foreign-currency collateral for settlement in their accounts (Chart 2). Transfer of funds between CLS and its participants takes place on their accounts at the central banks, currency by currency. CLS deals with seventeen eligible currencies, and the CLS settlement process takes place during a five-hour window corresponding to the morning hours in Europe, early evening in Japan, and very early morning in the United States, respectively.

CLS has played a critical role throughout the recent financial crisis. On an average day, CLS settles 3 to 4 trillion U.S. dollars, which accounts for almost 60 percent of the foreign exchange settlements worldwide.<sup>1</sup> While the value further surged immediately following the failure of Lehman Brothers, CLS completed settlement of the significant amounts of payments in a stable manner.

The effective functioning of CLS was particularly important because, over the course of the recent global financial crisis, the functioning of the U.S. dollar funding market was severely impaired and non-U.S. financial institutions, including Japanese and European financial institutions, became increasingly dependent on foreign exchange swaps as a source of U.S. dollar funding. If CLS's PVP mechanism had not existed and financial institutions had confronted foreign exchange settlement risk under the rapid undermining of confidence in the soundness of financial institutions, they would have had much more difficulty in funding U.S. dollars through the foreign exchange swap market. Simultaneous multi-currency settlement in CLS acted as a bulwark to protect against the intensifying shock of the global financial crisis.

#### **B. *Ensuring settlement of JGB transactions***

A second example is that JGB transactions continued to be settled without serious problems despite the significant shock arising from the failure of Lehman Brothers Japan (LBJ). I will explain the JGB settlement process, focusing on a central counterparty (CCP) called Japan Government Bond Clearing Corporation (JGBCC).

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<sup>1</sup> See Bank for International Settlements, Committee on Payment and Settlement Systems (2008).

A CCP replaces a bilateral contract between parties with two contracts between the CCP and the individual party. Thus, the CCP becomes a buyer to every seller and a seller to every buyer. This brings two benefits. First, the CCP offsets a large number of obligations and claims across the participants, thereby reducing the amount of securities and cash needed for settlement. For example, in September 2009, an average of 35 trillion yen worth of JGB transactions was submitted to the JGBCC every day, but this came to a net 9 trillion yen or a quarter of the amount of the original transactions.<sup>2</sup>

Second, in the event of a participant's default, a CCP guarantees performance of delivery and payment obligations to other participants (Chart 3). In such an event, the CCP becomes unable to receive securities from the participant in default, which would result in the failure of delivery to other participants on the settlement day, the so-called "settlement fails." It would immediately attempt to purchase securities from the market and therefore resolve settlement fails.<sup>3</sup> For payment obligations, the CCP borrows funds to make payments to other participants as scheduled. It repays funds by liquidating the securities that were originally intended for delivery to the participant in default.

A CCP cannot function well without appropriate risk management measures. A CCP needs to be equipped with contingency liquidity funding arrangements to continue the performance of payment obligations. Moreover, it needs to have adequate financial resources and loss-sharing arrangements among the participants, so as to be prepared for potential losses arising from the closing-out of a defaulter's outstanding positions.

JGBCC and other CCPs in Japan have been working to strengthen risk management measures. Thanks to these continuous efforts, the existing risk management controls have proved effective and the operations of CCPs have been ensured during the recent financial crisis. With LBJ's default, JGBCC had to fund significant amounts of liquidity very quickly. Nevertheless, it managed to raise funds from external sources using the existing liquidity arrangements. In addition, while JGBCC and other CCPs suffered losses from the closing-out of LBJ's outstanding positions, those losses were fully covered by collateral that LBJ provided.<sup>4</sup>

Having said that, there is still room for improvements in CCPs' risk management framework. Moreover, there is also a long-standing issue with respect to JGBCC. The netting ratio of JGBCC is not high, because not all major market players participate in JGBCC. Although it is fundamentally a matter between JGBCC and the participants, a higher netting ratio would benefit all market participants. From this perspective, the Bank expects CCPs in Japan to provide the lead in efficient and safe clearing business with strengthened risk management framework.

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<sup>2</sup> For monthly statistics of major payment and settlement systems in Japan, see the *Payment and Settlement Statistics* released on the Bank's web site (<http://www.boj.or.jp/en/index.htm>).

<sup>3</sup> After LBJ's failure, a chain of settlement fails has spread to the broad JGB markets via the CCP and other market participants who had bilateral contracts with LBJ. Since many institutional investors had little tolerance to settlement fails, market participants in general became concerned about the creditworthiness of counterparties, and the liquidity of repo market has shrunk. To address these issues, the securities industry is working to increase acceptance of settlement fails and reviewing the fails practice. See Bank of Japan, Financial Markets Department (2009b) (available only in Japanese). For the number and average duration of settlement fails, see *Figures on Settlement of Japanese Government Bonds* released on the Bank's web site (<http://www.boj.or.jp/en/index.htm>).

<sup>4</sup> See Bank of Japan, Payment and Settlement Systems Department (2009a) (available only in Japanese). It explains how payment and settlement systems in Japan coped with the failure of LBJ, and summarizes the lessons learned from the experience. Also see Bank of Japan, Financial Markets Department (2009a) (available only in Japanese) and Bank of Japan (2009b). They summarize what implications LBJ's failure had on Japan's money markets and identify challenges for Japan's repo markets.

Apart from use of a CCP, the industry had worked on the introduction of RTGS, the achievement of DVP for securities transactions, and the dematerialization of securities certificates. Those safeguarding measures are now taken for granted, but the fact that these mechanisms prevented initial disruptions to amplify the scale of the financial crisis through malfunction of payment and settlement systems should not be underestimated (Chart 1).

### **III. Challenges confirmed from the experience of the financial crisis**

As I explained, payment and settlement systems in Japan functioned well during the financial crisis. Nevertheless, there are several remaining challenges to the development of robust payment and settlement systems. The financial crisis provoked active debate on financial supervision and regulation, and opinions have not converged yet. Compared with this topic, some consensus has been reached on the way to strengthen the robustness of payment and settlement systems.

What is a robust payment and settlement system? It is a payment and settlement system capable of preventing the outbreak of a financial crisis even in the face of an extremely stressful shock to itself. To realize such a robust system, it is important to identify what determines the magnitude of systemic risk, that is, the factor that influences the probability of a certain shock leading to a financial crisis. In my view, the following three measures are essential to mitigate systemic risk in payment and settlement systems: (1) reducing the size of outstanding settlement positions of individual market participants; (2) taking appropriate measures depending on the state of interconnectedness embedded in payment and settlement systems; and (3) enhancing alternative arrangements for critical settlement functions. I will explain the challenges for Japan's payment and settlement systems, according to these three factors.

#### **A. Reducing the size of outstanding settlement positions**

The first challenge is to reduce the size of individual market participants' outstanding settlement positions. While the size of financial transactions is a given with respect to a payment and settlement system, the settlement risk of financial transactions can be reduced. The key in this regard is outstanding settlement positions or outstanding exposures arising from settlement activities. Please see Chart 4. The horizontal axis shows the time from trade execution to settlement, and the vertical axis shows the settlement value of financial transactions. The longer the time to settlement, in which participants are exposed to settlement risk, the more likely one could suffer losses from the default of the counterparty. Principal risk in securities and foreign exchange settlements can be eliminated using DVP and PVP mechanisms. However, market risk – a risk of loss arising from price movements during replacement of unsettled positions – increases as time to settlement lengthens. In an intuitive sense, the area inside the rectangle in this graph shows the size of risk exposures. Given the value of financial transactions or settlement on the vertical axis, a key point for systemic risk control is how to reduce the length of time on the horizontal axis.

If a time from trade execution to settlement is shortened, outstanding settlement positions will be reduced. Chart 5 shows the outstanding settlement positions where one unit trade is executed per day. In the next-day settlement system – the so-called T+1 settlement – outstanding settlement positions will be reduced to one third, compared with T+3 settlement. Moreover, if securities are delivered a day after the trading day, settlement fails, which may arise from the default of market participants, are likely to be resolved more quickly. In other words, a shorter settlement cycle contributes to reducing the risk of loss and liquidity burden arising from the replacement of unsettled positions.

In the United States and the United Kingdom, the government securities markets, where huge value is exchanged every day, have moved to T+1 settlement and have managed to reduce outstanding settlement positions. In Japan, market participants have initiated a

project that aims to achieve a shorter settlement cycle for the government securities market. A shorter settlement cycle not only reduces the size of outstanding settlement positions, but also makes government securities more attractive financial instruments. Government securities are highly liquid assets that are easily convertible to cash, but the securities with the T+1 settlement are more liquid and more favorable than those with the T+3. Government securities are extensively traded among a wide range of market participants including dealers, institutional investors, and foreign investors. The move to shorten the settlement cycle would require operational changes to the front, middle, and back offices of those market participants. While much work needs to be done on the market side, the Bank will provide extensive support to market participants' efforts.

### ***B. Taking appropriate measures depending on the state of interconnectedness***

The second challenge is to take appropriate measures that consider the state of interconnectedness of settlement between market participants. In practice, the network of interconnections within the financial system is very complex. In a single financial market or a payment and settlement system, market participants are interconnected through trading and settlement activities. Moreover, market participants participate in multiple financial markets including money, bonds, equity, and derivatives markets, and settle their funds and securities transactions through multiple payment and settlement systems. This creates interconnectedness between payment and settlement systems by common participants.

While interconnectedness raises important issues for financial supervision and regulation, I will focus on the issue of interconnectedness within payment and settlement systems. Chart 6-1 illustrates the workings of a bilateral settlement network, with market participants represented by circles and obligations between market participants indicated by lines. This is a model of one hundred market participants settling transactions in a given payment and settlement system.<sup>5</sup> Suppose a financial institution goes bankrupt and fails to perform settlement obligations; depending on the size of default, this could lead to subsequent defaults of its counterparties at the ends of lines. The chart does not take into account the timing of each settlement, but the order of securities deliveries and payments is also an important factor under the RTGS environment.<sup>6</sup> For the bilateral settlement, it is important that individual participants have adequate management of counterparty risk; for example, collection of margins and the closing-out procedures in the event of a counterparty's default.

Chart 6-2 shows an image of settlement via a CCP. As you can see, the network complexity is resolved because a bilateral contract between parties is replaced with a set of new contracts with the CCP. On the contrary, risks are concentrated on the CCP. From this perspective, and based on the experience of LBJ's default, CCPs in Japan are reexamining their risk management, such as by reviewing contingency liquidity arrangements and strengthening stress testing schemes. It is not easy to reach a consensus among diverse

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<sup>5</sup> See Imakubo and Soejima (2008a) (available only in Japanese). It shows that the network of bilateral obligations within financial markets has a very complex structure. It notes that the settlement network in money markets in Japan has shifted from a "hub-and-spoke" model centered on money market brokers, to a "dual structure of core and periphery" model with small-world network property, and examines what implications the changes in network structure have on systemic risk. It also gives examples of empirical studies on financial networks with respect to the money market transactions in Italy, settlement in Fedwire, and interbank exposures in Switzerland.

<sup>6</sup> See Imakubo and Soejima (2008b) (available only in Japanese) and Bank of Japan (2009a) (Box 2-2). They verify how liquidity shock propagates within a network through a chain of settlement delays using the real settlement data of BOJ-NET. The former demonstrates that the contagion process of liquidity shock is strongly dependent on the network structure. The latter demonstrates that the liquidity saving features of the BOJ-NET Funds Transfer System significantly reduces the magnitude of contagion triggered by liquidity shock using a simulation approach.

participants in CCPs, but the Bank is confident that CCPs in Japan are making progress toward better risk management commensurate with the important roles of CCPs.

Chart 6-3 shows one example of the intermediate structure. The settlement via CLS, which I explained earlier, corresponds to this structure. This network model also has a weak point. In the CLS settlement, a large number of indirect participants settle their transactions through a relatively small number of direct participants. In this business model, a direct participant takes on significant credit and liquidity risks due to indirect participants for which they settle, and this issue was highlighted during the experience of the recent financial crisis. In relation to CLS, another issue is that some important transactions are not eligible for the five-hour settlement window of CLS and are settled outside CLS.<sup>7</sup> To address this point, CLS is exploring the possibility of setting up a second settlement window.

In sum, it is important that every payment and settlement system takes systemic risk reduction measures according to the state of interconnectedness and the network structure.

As a tangent to the main point, I will give you an example of an attempt to reduce systemic risk; namely, taking advantage of a CCP for the over-the-counter (OTC) credit derivatives market, which has attracted much attention recently. In the United States and Europe, several CCPs for credit default swaps (CDSs) have been established. Traditionally, CDS contracts traded in the OTC market were settled bilaterally between market participants, as shown in Chart 6-1. The global CDS markets have expanded rapidly since the early 2000s, creating a complicated web of obligations between market participants. Major dealers' back offices could not catch up with the expansion of CDS transactions, causing significant growth in a backlog of outstanding confirmations. As a result, it is said that regulatory authorities and market participants themselves faced difficulty understanding the size of the CDS market and the whole structure of counterparty risk that the participants were exposed to via bilateral transaction. The startup of CCPs for CDSs, as well as encouragement of the use of trade confirmation services and trade repository services, aimed to improve risk management and market transparency. Broad use of CCPs is also expected to promote standardization of OTC credit derivatives contracts.

It should be noted, however, that setting up a CCP and simplifying complex relationships alone does not eliminate systemic risk. The CCP becomes the single nexus of all counterparty risks, and consequently takes on significant risks. Therefore, it must be equipped with an adequately rigorous risk management framework, and special attention needs to be paid to the continuation of clearing operations under an extreme but plausible market condition. In fact, overseas central banks have been strengthening oversight of CCPs while encouraging the use of CCPs, as they are two sides of the same coin with respect to risk concentration into a CCP. In Japan, the setting up of a CCP for OTC credit derivatives market is becoming an important issue, so I would emphasize again the importance of an adequately rigorous risk management framework.

### **C. *Enhancing alternative arrangements for critical settlement functions***

The third challenge is to enhance alternative arrangements in the event of disruption to critical settlement functions. Critical settlement functions could be disrupted by various kinds of contingencies including failure of a financial institution, a natural disaster, and the outbreak of a pandemic. If a certain critical settlement function is disrupted due to those external shocks and no alternatives are available, it could potentially lead to the manifestation of systemic risk; in other words, a kind of financial crisis.

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<sup>7</sup> The same-day foreign exchange transactions are not eligible for the current settlement window of CLS. In addition, the out leg of in/out swaps – the measures used by CLS members to reduce liquidity risk in CLS settlement – is settled outside CLS.

For this reason, financial institutions and operators of payment and settlement systems have been making efforts to develop and improve backup systems. Within these efforts, the strengthening of utilities services including a backup communication network and power supply has been one major challenge. Furthermore, to enhance alternative arrangements for critical settlement functions, it is important to set up contingency staffing arrangements while securing a backup for hardware and software. As we all know, FISC has been making significant contributions in this area. Thanks to these contributions, steady progress has been made in the business continuity arrangements of financial institutions and payment and settlement systems during the last decade. I hope that relevant parties will make further efforts toward the development of robust payment and settlement systems.

#### **IV. The Bank's involvement in payment and settlement systems**

I would now like to turn to the involvement of the Bank in improving the safety and efficiency of payment and settlement systems. Among the various activities of the Bank in this area, today I will focus on the operation of BOJ-NET and oversight of private-sector payment and settlement systems.

##### **A. Improving the safety and efficiency of BOJ-NET**

I will start with the operation of BOJ-NET. As the central bank of Japan, the Bank is responsible for providing society with risk-free settlement assets in the form of banknotes and current accounts at the Bank in a safe and efficient manner. Transfer of funds across those accounts, as well as the transfer of JGBs, takes place over BOJ-NET, a settlement platform operated by the Bank. On an average day, BOJ-NET settles 50 thousand funds transfers worth 100 trillion yen and 15 thousand JGB transfers worth 80 trillion yen. BOJ-NET has continued to demonstrate extremely high operational stability and has ensured the smooth processing of such large transaction amounts.

Over the years, the Bank has worked to improve the functionality of BOJ-NET. One example of recent enhancements is the Next-Generation RTGS (RTGS-XG) project for the BOJ-NET Funds Transfer System. In 2001, the system was converted from a DNS system to a pure RTGS system, which settles transactions one-by-one on a real-time basis. An RTGS system, by its design, is effective in eliminating settlement risks associated with DNS, but at the same time requires relatively larger amounts of liquidity. The RTGS-XG project aims to reduce the amount of liquidity needed under RTGS while also expanding the benefits of RTGS to large-value payments that are currently settled in private-sector DNS systems, namely the Foreign Exchange Yen Clearing System (FXYCS) and the Zengin System (clearing system for domestic funds transfers).

The project is being implemented in two phases. Phase 1 is the introduction of liquidity-saving features into the BOJ-NET Funds Transfer System and the settlement of payments in the FXYCS through RTGS. This was successfully implemented in October 2008.<sup>8</sup>

The liquidity-saving features consist of centralized queuing and offsetting mechanisms (Chart 7). "Queuing" allows payment instructions to be held pending within the system. The "offsetting" mechanism searches among the newly entered and queued payment instructions for a set of instructions that can be settled simultaneously. Our estimate based on actual transaction data shows that the liquidity-saving features enable payments to be settled much earlier in the day using a lower amount of liquidity<sup>9</sup> (Chart 8).

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<sup>8</sup> For the details of payment activity after Phase 1 and a description of liquidity-saving features, see Bank of Japan (2009a) and Bank of Japan, Payment and Settlement Systems Department (2009b).

<sup>9</sup> The change in average settlement time is largely due to the shift of the FXYCS from DNS to RTGS.

The Bank is currently working in cooperation with the Zengin System to implement Phase 2 of the project, which aims to settle large-value payments in the Zengin System – defined as payments above 100 million yen – through RTGS (Chart 9). Implementation of Phase 2 is scheduled for November 2011 in coordination with the next upgrade of the Zengin System. With such implementation, virtually all large-value interbank payments in Japan will be processed on an RTGS basis.

Another example of enhancements to BOJ-NET is the planned development of the new BOJ-NET system. The current BOJ-NET system went live in 1988 and has been serving the industry with highly reliable and stable operation for more than twenty years. During this period, the environment surrounding the system has gone through significant change, including increasing interconnectedness among payment and settlement infrastructure and globalization of financial markets. The Bank believes that the new BOJ-NET system should have the capability to respond to ongoing and future developments in both payment and settlement industry and technologies supporting the industry, and that this should be achieved by migrating to the latest information processing technology, adopting a system architecture with greater flexibility for future changes, and enhancing accessibility from its participants and external systems to the new BOJ-NET systems and services.

The Bank decided to fully review the configuration of the BOJ-NET system, and last month released the principles guiding development of the new system and the implementation schedule.<sup>10</sup> This was done following a public consultation process, with many valuable opinions received from relevant parties. Some of the possible changes under the new BOJ-NET system include (1) expanding the range of transactions that can use the liquidity-saving features, (2) facilitating interoperability with other systems – for example, by adopting XML-based messages – and (3) improving connectivity with other securities settlement infrastructure. The Bank believes that the enhanced BOJ-NET system will underpin the activities of financial institutions in Japan as they pursue new opportunities in response to developments in financial markets and services. The Bank will continue to closely consult with relevant parties as it develop the detailed functionalities and specifications of the new system.

## ***B. Oversight of private-sector payment and settlement systems***

In addition to the operation of BOJ-NET, the Bank conducts oversight of private-sector payment and settlement systems. Oversight involves monitoring the design and operation of individual systems and encouraging improvements where necessary, with primary focus placed on systems that are systemically important. Oversight is widely recognized around the world as a critical function of central banks, although its legal basis may vary from country to country. Financial stability, together with price stability, supports sound development of the national economy. Central banks have attached importance to their oversight activities to ensure that payment and settlement systems do not become a source of instability, and to lay the foundation for further enhancement of the financial system.

One issue that the Bank has worked on over the years as part of its oversight activities is preparing arrangements for coping with participant default. In the international standard for systemically important payment systems prepared by central banks, it is considered best practice for multilateral netting systems to ensure completion of daily settlements on time, even in the event that the two participants with the largest settlement obligations in the system cannot fulfill their obligations. In many cases, this is achieved by using collateral, third-party guarantees, and/or contingency liquidity arrangements such as committed lines of credit. The Bank discussed the need to achieve such a high level of safety with operators of private-sector payment systems. In 2003, the Zengin System enhanced its risk management

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<sup>10</sup> See Bank of Japan (2009c). The public consultation document is available only in Japanese.

measures to meet the international best practice; the FXYCS followed in 2004. These efforts have enhanced the robustness of these systems against financial shocks.

The Bank also oversees securities settlement systems. After introducing DVP for JGBs as the central securities depository (CSD) for JGBs, the Bank worked with private-sector CSDs and stock exchanges to develop detailed plans for the introduction of DVP for other types of securities; namely, dematerialized commercial paper (CP), corporate and other bonds, investment trusts, and equities. The Bank was also involved in the development of CCPs for equities and JGBs, which went live one by one from 2003 to 2005. During the planning phase of these systems, the Bank provided its views on the system design in light of international discussions and standards on risk management.

As I explained earlier, work is under way to address the lessons learned from the financial crisis. The Bank has already started discussions and initiated studies with system operators and market participants on the shortening of the JGB settlement cycle and improvements in liquidity arrangements in JGBCC. Other ongoing work includes a review of market practice on settlement fails and strengthening CCPs' risk management methodologies using stress testing.

Making changes to payment and settlement systems through the oversight process takes time. The Bank considers that long-term engagement through its effective oversight activities is critical to ensuring that financial transactions continue to be settled without any friction, even in the event of a crisis.

## **V. Closing remarks**

At the beginning of my speech, I touched upon some of the major developments in payment and settlement systems in Japan that have taken place over the past twenty-five years. Earlier in my career, I was involved in some of those initiatives in the late 1980s. At that time, RTGS, DVP, and dematerialization of securities seemed like a dream. After years of efforts, however, they have become reality. I am proud to have taken part in such an exciting period of Japan's payment and settlement system development. Looking back on the past quarter-century, I would like to conclude by offering three observations.

First, improvements in payment and settlement systems bring a very high return for the economy in the long run. To take a rather cynical view, over the years, financial institutions in Japan and overseas have been heavily beaten by a number of events – for example, the Latin American debt crisis, East Asian financial crisis, and the collapse of the mortgage and commercial real estate bubble – that resulted in large losses eating away at the reserves of past earnings. In contrast, investments in payment and settlement system reforms have constantly brought subtle but significant benefits to the economy and the financial system as a whole, although it is difficult to quantify such benefits at the level of individual institutions. An understanding that investments in forward-looking projects pay off can be gained simply by imagining what would have happened during the recent global financial crisis if RTGS, DVP, and various other projects were left untouched.

Second, because of such wide-ranging effects, it is critical that the relevant parties continue to plan and implement changes with a long-term perspective, taking into account developments in financial markets and technological innovation. In this context, in Europe, a big project called TARGET2-Securities is under way. Under this project, participating CSDs will outsource their securities settlement function to the centralized single platform operated by the Eurosystem. This is expected to enhance efficiency and reduce costs of cross-border transfer of euro-denominated securities, contributing to further development of the integrated market. In Japan, too, continuous efforts for improvement in view of future developments will be essential.

Third, effective implementation of forward-looking initiatives requires a deep understanding of and insight into the value of developing payment and settlement infrastructure, not only by

working-level experts but also by the senior management of financial institutions and infrastructure providers. At many firms, payment and settlement activities are usually categorized as "back-office" functions and a "cost center." However, improvements in payment and settlement procedures could have positive externalities, resulting in advances in industry practices and market growth with new opportunities for generating additional value. I hereby ask senior management officials to review their payments business in light of such possibilities and continue to support ongoing and future initiatives in this area.

I am sure that FISC will continue to play an important role in the various efforts toward development of a robust payment and settlement system.

Thank you for your kind attention.

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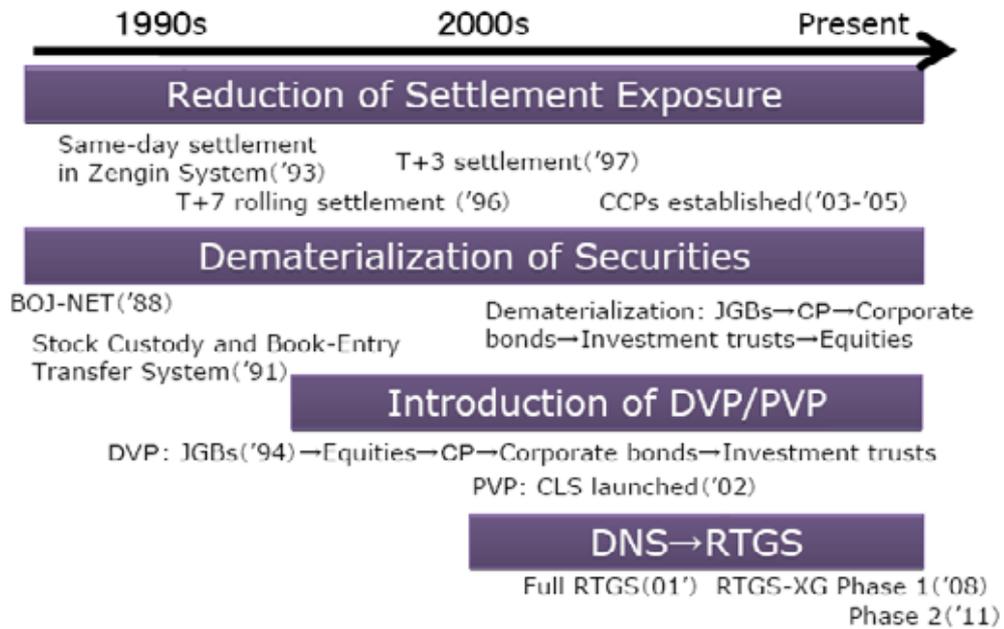
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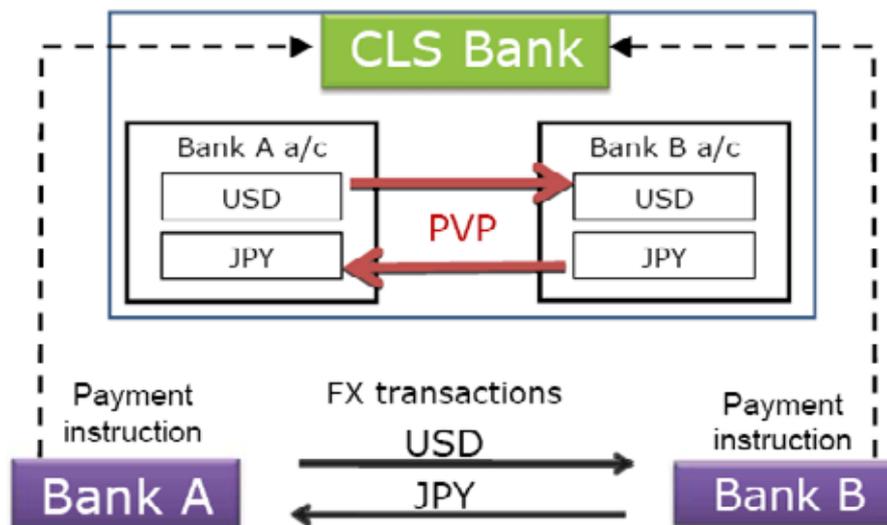
Graphs

(Chart 1)

Improvements in Payment and Settlement Systems



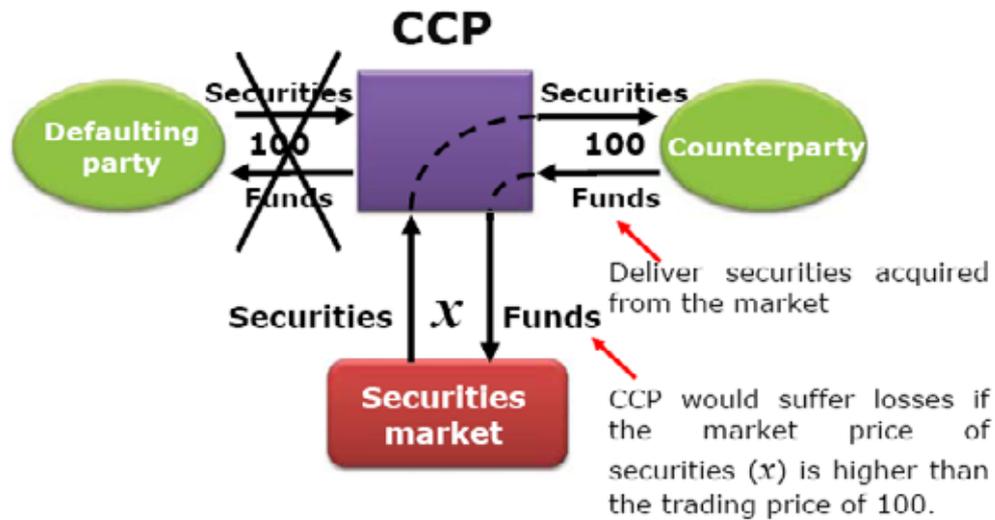
Settlement at CLS Bank (Chart 2)



CLS : Continuous Linked Settlement  
PVP : Payment versus Payment

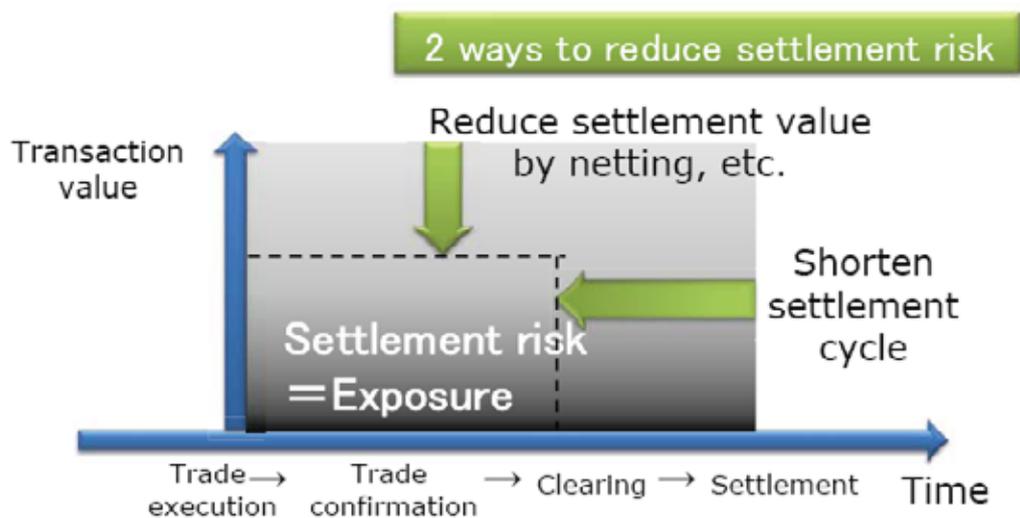
(Chart 3)

## Guarantee of Settlement by CCP



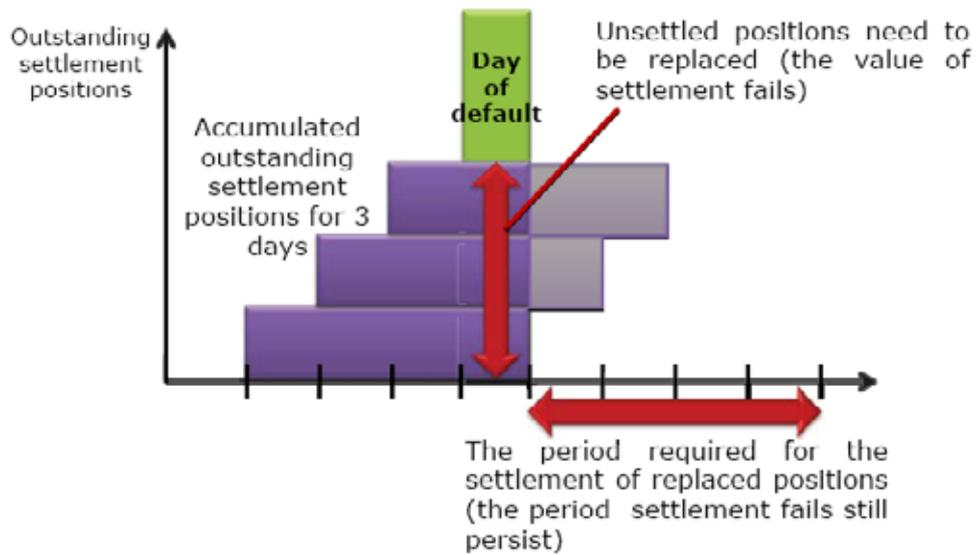
(Chart 4)

## Settlement Risk



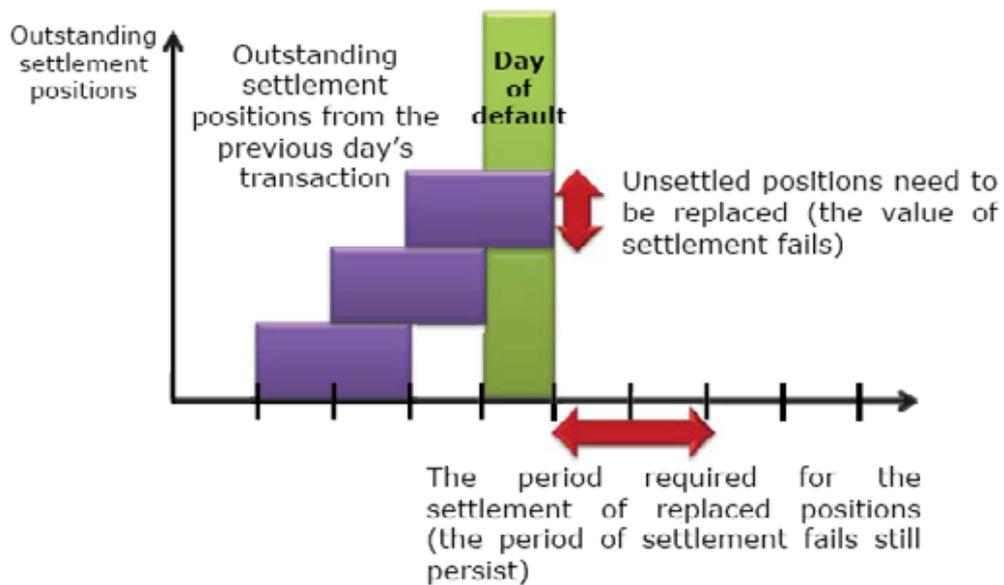
(Chart 5-1)

## Settlement Cycle: T+3



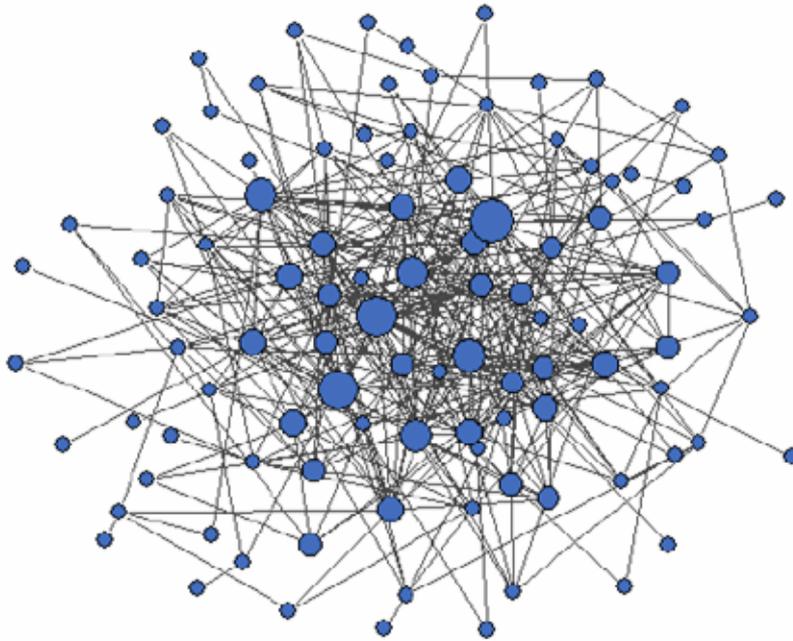
(Chart 5-2)

## Settlement Cycle: T+1



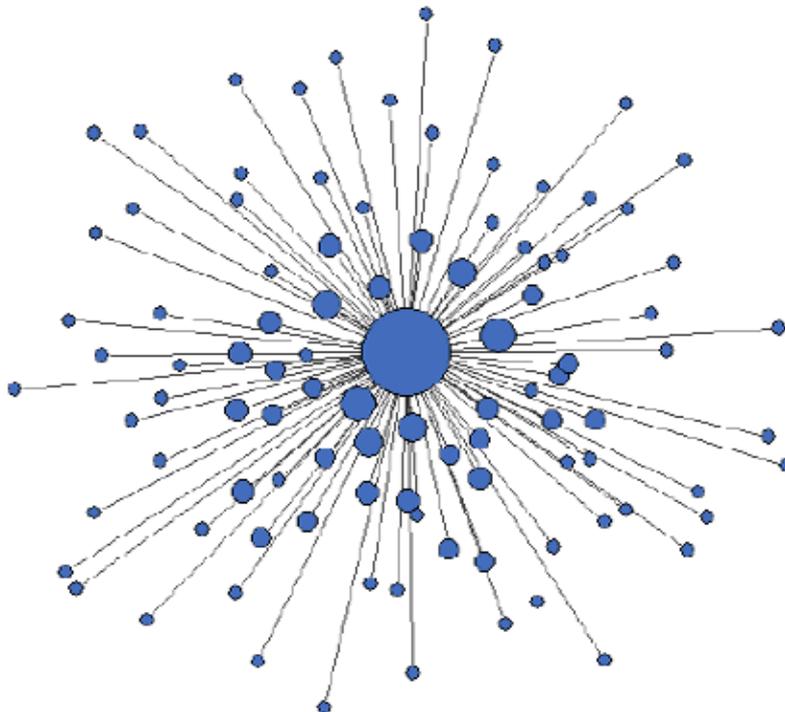
(Chart 6-1)

## Bilateral Settlement Network



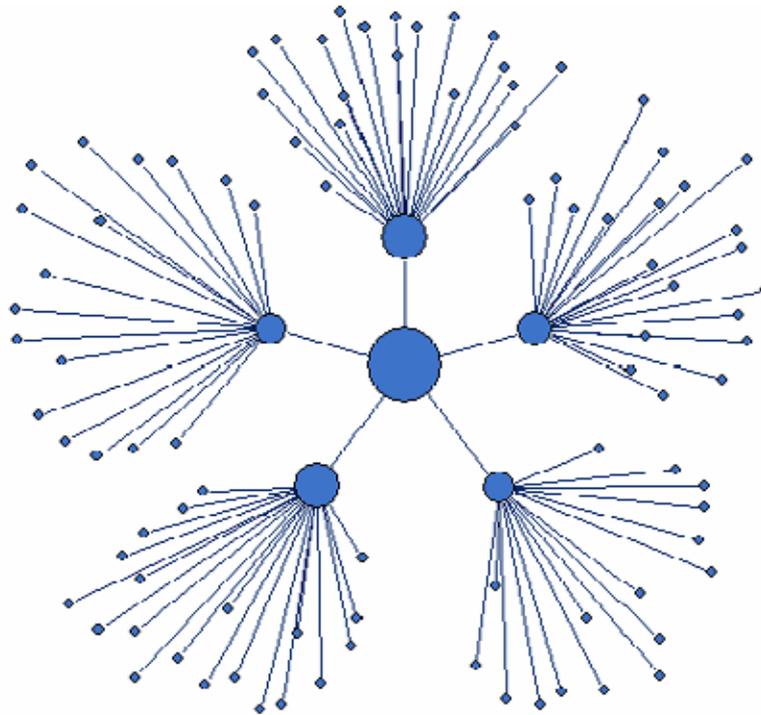
(Chart 6-2)

## Centralized Network: CCP



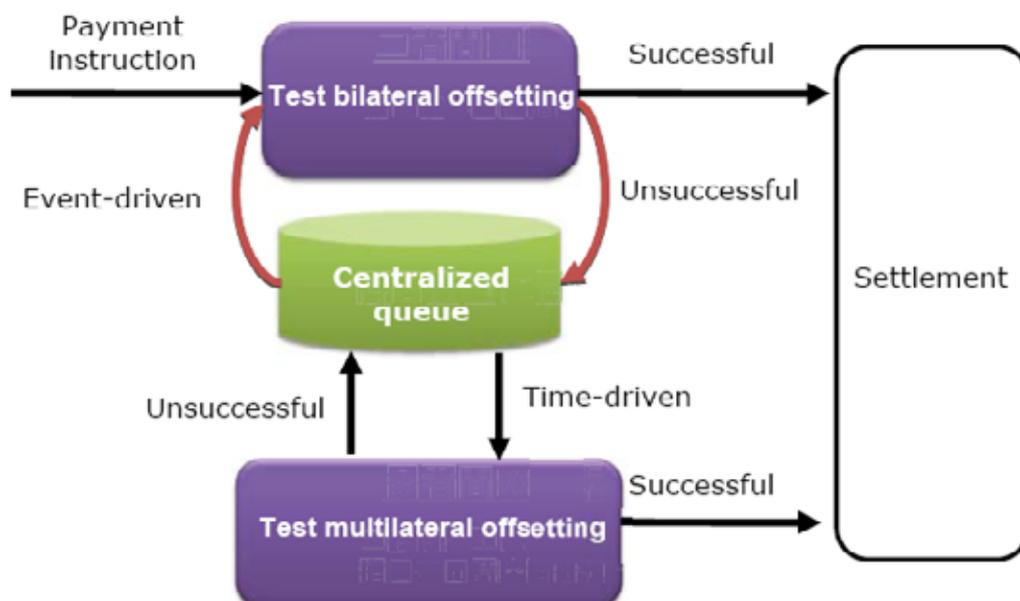
(Chart 6-3)

## Hierarchized Network



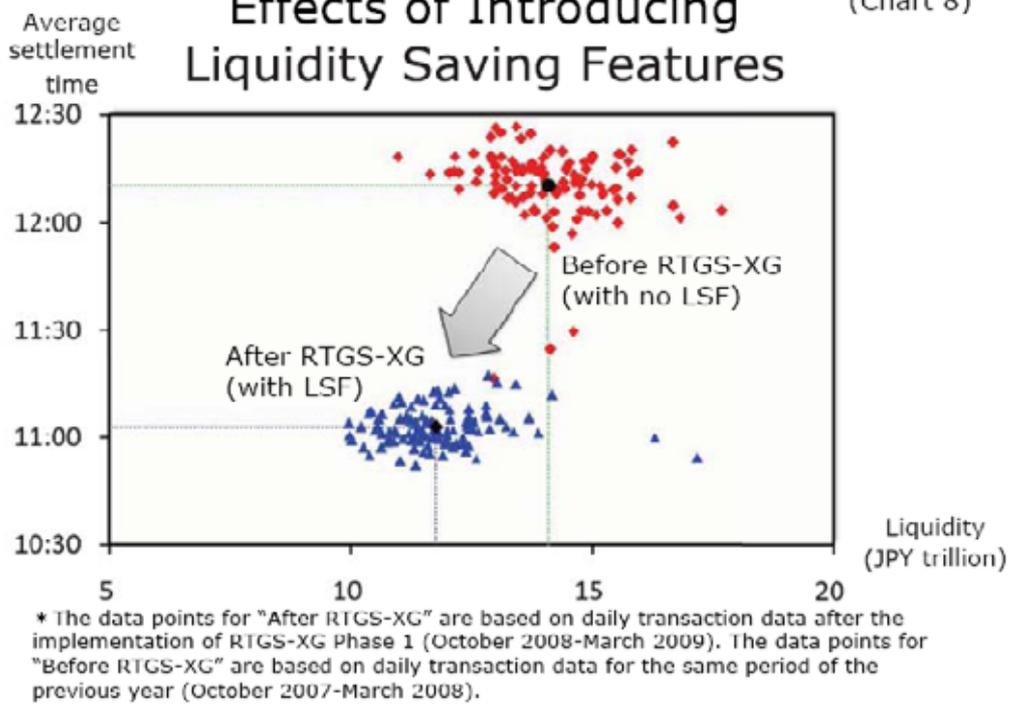
(Chart 7)

## Liquidity Saving Features



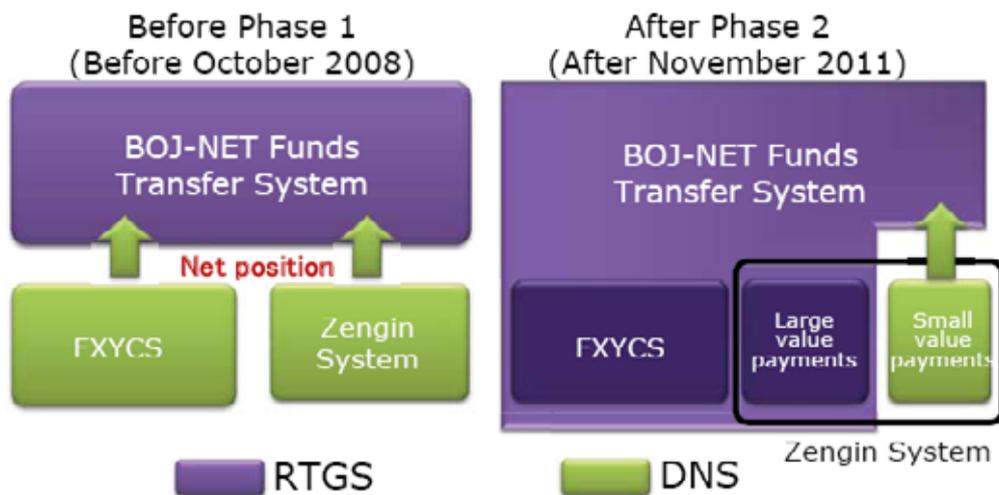
## Effects of Introducing Liquidity Saving Features

(Chart 8)



(Chart 9)

## Next-Generation RTGS Project



FXYCS : Foreign Exchange Yen Clearing System

Zengin System : Interbank clearing system for domestic funds transfers