



# **BOJ** *Reports & Research Papers*

## **Payment and Settlement Systems Report 2009**

**Response to the Global Financial Crisis and Initiatives to Effect Improvements**

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**Payment and Settlement Systems Department  
Bank of Japan**

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Payment and Settlement Systems Department, Bank of Japan

P.O. Box 30, Nihonbashi, Tokyo 103-8660, Japan

Fax: +81-3-5355-6752

e-mail: [post.payment@boj.or.jp](mailto:post.payment@boj.or.jp)

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## Abbreviations

BOJ-NET	BOJ-NET Funds Transfer System
CCP	central counterparty
CSD	central securities depository
DNS	deferred net settlement
DVP	delivery-versus-payment
FSA	Financial Services Agency
FXYCS	Foreign Exchange Yen Clearing System
JASDEC	Japan Securities Depository Center
JDCC	JASDEC DVP Clearing Corporation
JGB	Japanese government bond
JGBCC	Japan Government Bond Clearing Corporation
JSCC	Japan Securities Clearing Corporation
JSDA	Japan Securities Dealers Association
LBH	Lehman Brothers Holdings
LBJ	Lehman Brothers Japan
PVP	payment-versus-payment
Q/O accounts	Queuing and Offsetting Accounts
RTGS	real-time gross settlement
RTGS-XG	Next-Generation RTGS
TBA	Tokyo Bankers Association

## Introduction<sup>1</sup>

The Payment and Settlement Systems Report provides an overview of developments in payment and settlement systems in Japan and identifies challenges to be addressed in the future. The report comprises three main points of focus:

- (1) A description of trends in transaction volume and value and progress in the reform of Japan's payment and settlement systems;
- (2) Identification of areas in which improvements can be made to enhance the safety and efficiency of Japan's payment and settlement systems and a description of how system operators and the Bank of Japan are addressing them;
- (3) An introduction to the Bank's work on payment and settlement systems with the aim of contributing to worldwide research on payment and settlement issues.

This report covers developments in major payment and settlement systems in Japan during the period of autumn 2008 to autumn 2009. The stress in the global financial market, which had been increasing since the subprime mortgage crisis in the summer of 2007, further aggravated following the bankruptcy of Lehman Brothers Holdings (LBH) in September 2008. In Japan, the collapse of Lehman Brothers Japan (LBJ) resulted in a significant amount of settlement failures in the delivery of securities and the payment of funds. Amid these events, market players acknowledged the importance of having robust payment and settlement systems that can flexibly absorb the shocks of financial crises and act as the bedrock for stable financial transactions.

The recent global financial crisis has tested the effectiveness of risk management measures that had been developed by payment and settlement systems over the years. Part 2 of the report explains how market players and relevant parties responded to the considerable scale of failures to settle and evaluates how existing risk management measures have worked during the crisis. It then sheds light on several remaining challenges identified from the experience of the crisis and gives an introduction to the Bank's oversight activities.

Part 3 provides an update on the Bank's Next-Generation RTGS (RTGS-XG) project, including an analysis of payment activity after the implementation of Phase 1 and an overview of planned enhancements in Phase 2.

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<sup>1</sup> This document is an abridged English translation of the *Payment and Settlement Systems Report 2009* originally published in Japanese on January 5, 2010.

# Table of Contents

<b>Executive Summary</b> .....	<b>i</b>
<b>Part 1: Developments in Major Payment and Settlement Systems</b> .....	<b>1</b>
A. Payment Systems .....	1
1. BOJ-NET Funds Transfer System .....	1
2. Payment Systems Operated by the Private Sector .....	6
a. FXYCS and CLS .....	6
b. Zengin System .....	7
c. Bill and Check Clearing Systems .....	8
B. Securities Settlement Systems .....	8
1. JGBs .....	8
2. Other Types of Securities .....	9
<b>Part 2: Response to the Global Financial Crisis and Initiatives to Effect Improvements</b> .....	<b>12</b>
A. Response to the Global Financial Crisis .....	12
1. Domestic Securities Settlement .....	13
2. Foreign Exchange Settlement .....	17
3. Evaluation of the Safety of Japan's Payment and Settlement Systems .....	18
4. Safety Enhancement Challenges and Efforts .....	21
a. Enhancement of CCP Functions .....	21
b. Shortening the JGB Settlement Cycle .....	22
c. Review and Establishment of Fails Practice .....	24
BOX: Benefits of Shorter Settlement Cycle for JGB Transactions .....	26
B. Oversight of Payment and Settlement Systems .....	28
1. The Role of the Central Bank in Payment and Settlement Systems .....	28
2. The Bank's Oversight Activities .....	29
<b>Part 3: Next-Generation RTGS Project</b> .....	<b>31</b>
A. Overview of the Next-Generation RTGS Project .....	31
B. Payment Activity after Phase 1 Implementation .....	32
C. Preparations for Phase 2 .....	36

## **Executive Summary**

### **Developments in Major Payment and Settlement Systems**

The value and number of transactions processed by major payment and settlement systems in Japan had remained broadly constant since the latter half of 2007, but decreased substantially following the bankruptcy of LBJ in September 2008 and remained at relatively low levels throughout 2009. The decline in payment and settlement activity reflected the sharp decline in trading activity in the call money market, the foreign exchange market, the Japanese government bond (JGB) repo market, and other financial markets as concerns about counterparty credit risk heightened following the outbreak of the global financial crisis.

### **Response to Global Financial Crisis and Initiatives to Effect Improvements**

The collapse of LBJ has tested the effectiveness of risk management measures that had been developed by payment and settlement systems over the years.

It is estimated that JGB and other financial transactions worth several trillion yen were suspended from settlement as a result of LBJ's bankruptcy. The counterparties to LBJ, both market players and securities clearing houses, liquidated their unsettled positions through close-out netting and other measures and acquired the securities and funds they could not receive from LBJ. The amounts of funds financed by LBJ's counterparties were huge, but thanks to the massive liquidity injection by the Bank, cash funding operations were carried out without difficulty and LBJ's failure to pay did not trigger a chain of defaults among market participants.

On the other hand, it took several days to acquire securities and the outstanding amount of settlement fails surged temporarily. This accumulation of settlement fails was gradually resolved as LBJ's counterparties acquired and delivered securities to cover their failed positions. As stated above, LBJ's bankruptcy was processed steadily in accordance with the close-out netting provisions of bilateral trading contracts or default procedures defined in the rules of securities clearing houses.

In the foreign exchange market, CLS functioned effectively and helped maintain the stable functioning of the market. The liquidity of the U.S. dollar funding market was severely impaired during the crisis 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. The payment-versus-payment (PVP) mechanism in CLS supported the proper functioning of the market by reducing the risks associated with the settlement of foreign exchange transactions. In other words, CLS effectively functioned as a bulwark against an amplification of shocks throughout the global financial system.

Overall, the risk management measures embedded in payment and settlement systems, including PVP and the delivery-versus-payment (DVP) mechanisms, functioned well during the LBJ bankruptcy event.

At the same time, the LBJ bankruptcy has revealed several challenges that need to be addressed. For example, one clearing house acting as central counterparty (CCP) had to finance a sizable amount of funds and securities and it took several days to finance these positions. Repo transactions in the JGB market have decreased due to the significant level of settlement fails. More specifically, three important challenges have been identified. They are: (1) enhancement of CCP functions; (2) shortening of the JGB settlement cycle; and (3) a review and establishment of fails practice. Market participants are already making efforts to tackle these challenges and the Bank is actively supporting these market efforts.

### **The Bank's Oversight Activities**

The Bank plays a number of roles with the aim of ensuring the safety and efficiency of both its own system and systems operated by the private sector. One such role is the oversight of private-sector payment and settlement systems. Oversight activities include monitoring the system's design, risk management, and operation, assessing the adequacy of the substance of these aspects, and inducing change where necessary.

The Bank has encouraged the operators of private-sector systems to make improvements as they establish new arrangements, enhance system functionality, and strengthen risk

management. The fact that payment and settlement systems in Japan have functioned well in the wake of the global financial crisis owes much to the efforts that the relevant parties have made over the years, which were partly driven by the dialogue that took place as part of the Bank's oversight activities. In light of the lessons learned, the Bank will further strengthen its oversight of payment and settlement systems.

### **Next-Generation RTGS Project**

The Bank operates a real-time gross settlement (RTGS) system for funds and JGB transfers. The RTGS-XG project of the BOJ-NET Funds Transfer System (BOJ-NET) aims to bring new levels of safety and efficiency to large-value payments in Japan. The project consists of two pillars: (i) introducing liquidity-saving features to the BOJ-NET; and (ii) shifting large-value payments in private-sector deferred net settlement (DNS) systems to BOJ-NET for settlement on an RTGS basis.

The project is being implemented in two phases. Phase 1, i.e., the introduction of liquidity-saving features into BOJ-NET and the shift of payments in Foreign Exchange Yen Clearing System (FXYCS) to RTGS, was successfully launched in October 2008. An analysis of payment activity after Phase 1 found that settlement time shifted to earlier in the day, while the liquidity required for settlement was reduced, indicating that the objective of the project has been achieved so far. Phase 2 implementation is scheduled for November 2011, with relevant parties currently engaged in system development and other preparations.

## **Part 1: Developments in Major Payment and Settlement Systems**

The value and number of transactions processed by major payment and settlement systems in Japan had remained broadly constant since the latter half of 2007, but decreased substantially following the failure of LBJ in September 2008 and remained at relatively low levels throughout 2009.<sup>1</sup> The decline in payment and settlement activity reflected the sharp decline in trading activity in the call money market, the foreign exchange market, the JGB repo market, and other financial markets as concerns about counterparty credit risk heightened in these markets following the outbreak of the global financial crisis.

### **A. Payment Systems**

#### **1. BOJ-NET Funds Transfer System**

The accounts that financial institutions hold with the Bank are used to settle a wide range of payments including those for interbank money market transactions, the cash legs of JGB and other securities transactions, and payments arising from derivatives transactions (Charts 1-1, 1-2). Those payments are processed on an RTGS basis by the BOJ-NET. The value and number of payments processed in BOJ-NET indicates the level of financial activity in Japan.

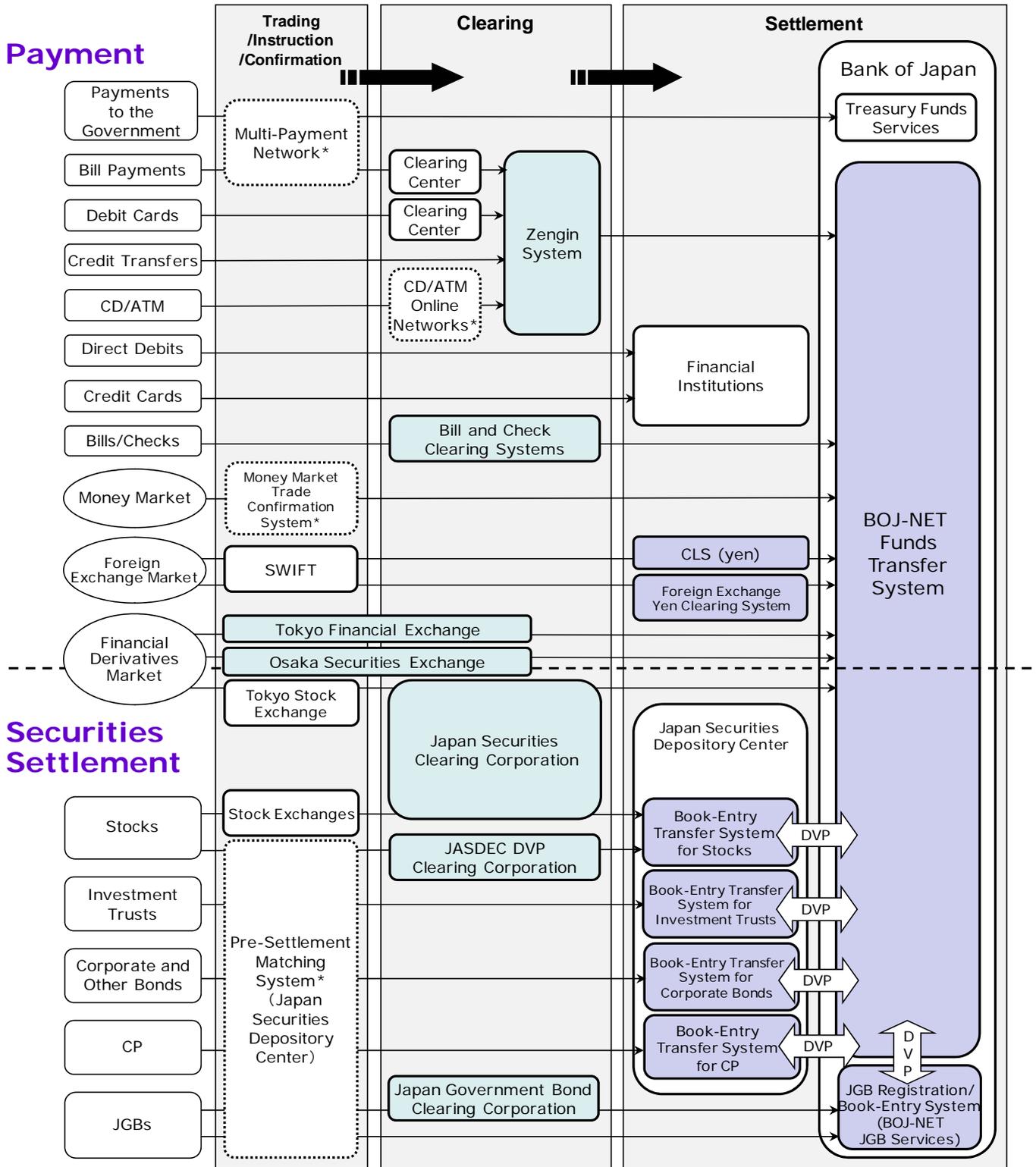
The daily average value of payments settled in BOJ-NET increased sharply immediately after the failure of LBJ in September 2008, partly due to the Bank's provision of a substantial amount of liquidity to the money markets (Chart 1-3). In 2009, the value of such payments declined as continued strains in the global financial market and the downturn in domestic economic activity led to a slowdown in financial market activity. Meanwhile, the number of payments settled in BOJ-NET nearly doubled in October 2008 following the implementation of Phase 1 of the RTGS-XG project.<sup>2</sup> With the launch of Phase 1, payments in FXYCS, which were previously settled primarily on a DNS basis, shifted to full RTGS in BOJ-NET.

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<sup>1</sup> The figures for 2009 are for the period between January 5, 2009 and October 30, 2009. All figures in this section are monthly averages of daily figures.

<sup>2</sup> See Part 3 for details of the RTGS-XG project.

**Chart 1- 1: Overview of Payment and Settlement Systems in Japan**



\* Systems surrounded by the dotted line are not used for all of the transaction.

**Chart 1-2: Average Daily Value and Number of Transactions Processed by Major Payment and Settlement Systems in Japan<sup>1</sup>**

Payment Systems	Value (trillion yen)	Number (thousand)
BOJ-NET Funds Transfer System	108.6	49.1
of which: interbank transfers	38.0	n.a.
DVP for JGBs	42.9	n.a.
CLS (yen payments)	27.1	83.2
Foreign Exchange Yen Clearing System (FXYCS)	12.2	24.6
Zengin System <sup>2</sup>	9.1	5,397
Bill and Check Clearing Systems <sup>3</sup>	1.0	103

Securities Settlement Systems	Value (trillion yen)	Number (thousand)
BOJ-NET JGB Services	80.7	15.7
Japan Government Bond Clearing Corporation (JGBCC) <sup>4</sup>	34.5	n.a.
Japan Securities Clearing Corporation (JSCC) <sup>4</sup>	1.9	n.a.
JASDEC DVP Clearing Corporation (JDCC) <sup>4</sup>	1.0	95.7
Japan Securities Depository Center (JASDEC) <sup>5</sup>		
of which: Stocks	n.a.	349.4
dematerialized CP	4.8	1.2
corporate and other bonds	0.7	1.7
investment trusts	0.8	16.7

Notes: 1. Figures are average daily value and number for October 2009.

2. Figures for the Zengin System show the value and number of payments cleared.

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

4. Figures for JGBCC, JSCC, and JDCC show the value of transactions cleared by the CCP. JSCC is a CCP for stock transactions executed on stock exchanges. JASDEC is a CCP for stocks traded between securities companies and their customers.

5. Figures for JASDEC show the total amount of issuance, transfer, and redemption made on the book-entry transfer system for each type of security.

Sources: Bank of Japan; TBA; CLS; JGBCC; JSCC; JDCC; JASDEC.

Chart 1-4 shows the breakdown of the value of payments settled in BOJ-NET by type of transaction. The value of interbank transfers, which include deliveries and returns of call money transactions, declined at the end of 2008 to the level observed before the end of the Bank's quantitative monetary easing policy (March 2006) and leveled out thereafter. The

value of the cash legs of JGB transactions settled on a DVP<sup>3</sup> basis also fell substantially as the repo market contracted (Chart 1-5),<sup>4</sup> remaining at a low level during 2009. The value of payments routed from FXYCS increased overall with the shift to RTGS in October 2008, but gradually declined, reflecting the decline in foreign exchange market activity (Chart 1-6).

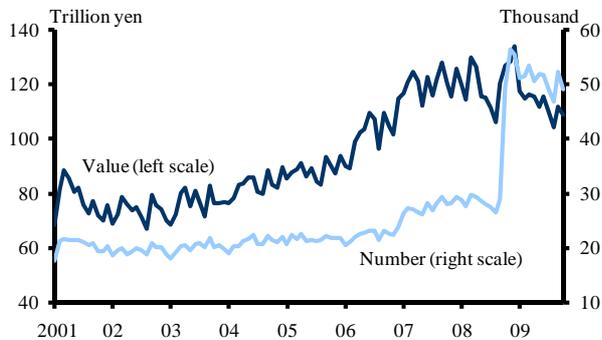
The breakdown of daily average value by type of institution (Chart 1-7) indicates that the value settled by city banks rose sharply in late 2008, followed by a moderate decrease in 2009. The surge in 2008 can be attributed to the increase in the value of open market operations conducted by the Bank and the launch of Phase 1 of the RTGS-XG project. The value settled by money market brokers also increased considerably in late 2008, reflecting the increase in the Bank's open market operations, and remained broadly stable thereafter. In contrast, settlement activity by securities companies peaked in the latter half of 2007 and declined significantly in 2008 and 2009, which was consistent with the downturn in JGB and stock market activity during the same period (Charts 1-5, 1-8). The value settled by foreign banks also saw a large drop as counterparty credit concerns escalated during the global market turmoil. Recent figures show that the value of settlement activity by foreign banks has declined to the level seen in 2005.

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<sup>3</sup> DVP eliminates the principal risk associated with settlement of a securities transaction by ensuring that a delivery of securities occurs if, and only if, payment occurs. A link exists between the BOJ-NET Funds Transfer System and the BOJ-NET JGB Services to facilitate DVP for JGBs.

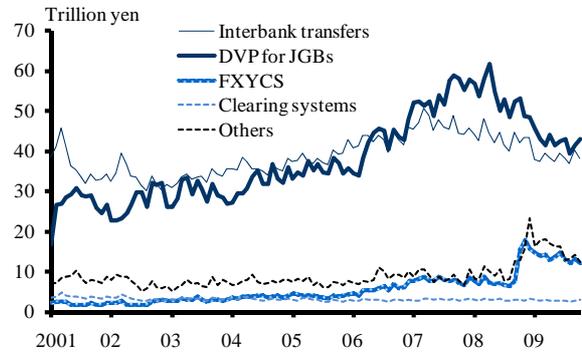
<sup>4</sup> JGB repo contracts take the form of either: (1) securities lending with cash collateral; or (2) securities sales with repurchase agreements.

**Chart 1-3: Average Daily Value and Number of the BOJ-NET Funds Transfers**



Source: Bank of Japan.

**Chart 1-4: Average Daily Value of BOJ-NET Funds Transfers by Transaction Type**

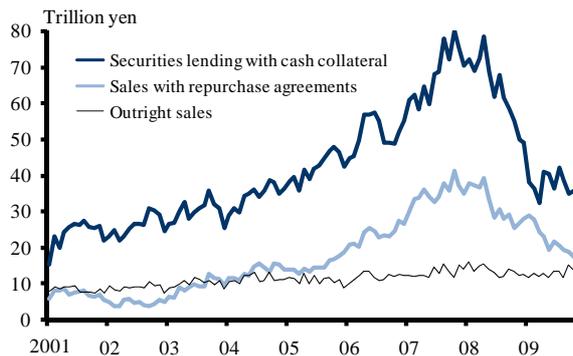


Notes: 1. "Clearing systems" are net positions arising from private-sector clearing systems (excluding FXYCS). "Others" includes payments made to and from the Bank for open market operations.

2. Since October 2008, all payments routed from FXYCS are settled on an RTGS basis.

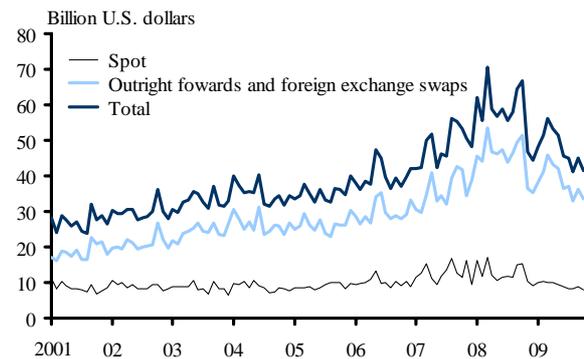
Source: Bank of Japan.

**Chart 1-5: Average Daily Value of JGB Trading Activity**



Source: JSDA.

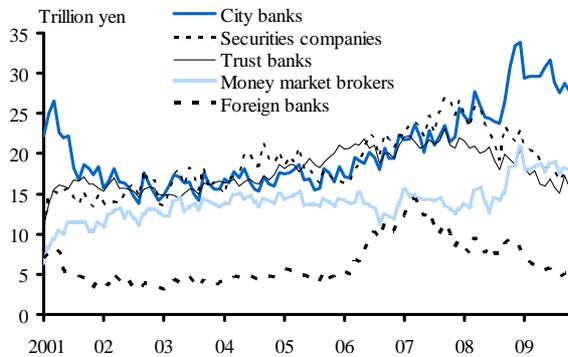
**Chart 1-6: Average Daily Value of Foreign Exchange Trading Activity**



Note: USD/JPY transactions executed via brokers in the Tokyo market.

Source: Bank of Japan.

**Chart 1-7: Average Daily Value of BOJ-NET Funds Transfers by Institution Type**



Source: Bank of Japan.

**Chart 1-8: Average Daily Value of Stock Trading Activity on the Tokyo Stock Exchange**



Source: Tokyo Stock Exchange.

## 2. Payment Systems Operated by the Private Sector

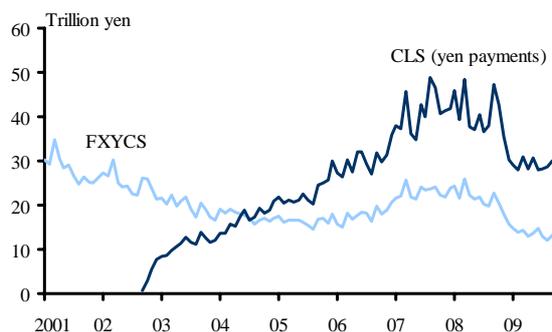
### a. FXYCS and CLS

Yen payments arising from foreign exchange transactions are processed primarily by FXYCS and CLS (Chart 1-1). FXYCS is operated by the Tokyo Bankers Association (TBA) and processes yen payments resulting from foreign exchange transactions, transactions in the euroyen market, and cross-border retail transfers. CLS is a cross-border payment system that settles foreign exchange transactions for the major currencies on a PVP basis.<sup>5</sup> Settlement service is provided by CLS Bank in New York.

Chart 1-9 shows that the value of yen payments processed by FXYCS and CLS declined markedly following the outbreak of the global financial crisis in late 2008. In 2009, the values remained broadly constant for both systems.

<sup>5</sup> PVP eliminates the principal risk associated with settlement of a foreign exchange transaction by ensuring that a transfer of one currency occurs if, and only if, a transfer of the counterpart currency takes place. Principal risk arises in foreign exchange settlement as there is often a time zone difference between the settlement arrangements for the two traded currencies. The CLS settlement process takes place during a five-hour window when the operating hours of the relevant RTGS systems overlap.

**Chart 1- 9: Average Daily Value of Payments Processed by FXYCS and CLS**



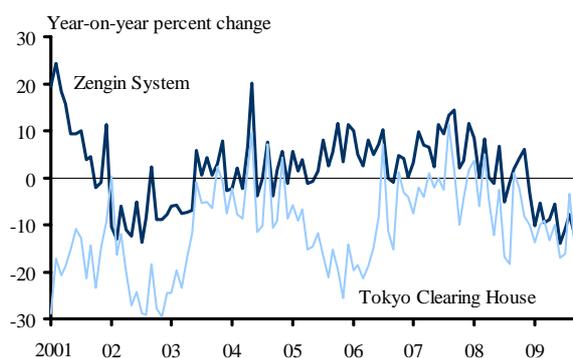
Sources: TBA; CLS.

### b. Zengin System

The Zengin Data Telecommunication System (Zengin System), which is operated by the TBA, is an interbank clearing system for domestic retail credit transfers. Net positions calculated by the Zengin System are settled across the accounts that participants hold with the Bank (Chart 1-1).<sup>6</sup>

The Zengin System had recorded steady increases in value since 2003, reflecting a moderate expansion of the domestic economy (Chart 1-10). As the domestic economy deteriorated in the latter part of 2008, however, the value processed by the system fell below the previous year's level and continued to weaken throughout 2009.

**Chart 1-10: Change in Average Daily Value of Payments Processed by the Zengin System and Bill and Check Clearing Systems**



Note: Figures for bill and check clearing systems are for the Tokyo Clearing House.

Source: TBA.

<sup>6</sup> The Zengin System has a two-tiered participation arrangement. Direct participants settle their positions through the accounts they hold with the Bank, while indirect participants appoint direct participants to settle on their behalf.

### c. Bill and Check Clearing Systems

Bill and check clearing systems enable financial institutions to present and clear bills and checks written by corporates and other entities at local clearing houses and to calculate their multilateral net positions. There is a long-term shift away from bills and checks in favor of credit transfers in the Zengin System as businesses seek to avoid the cost of stamp tax and the cost of handling paper-based bills/checks. As a result, the daily average value of bills and checks processed has been in a downtrend since around 1990 (Chart 1-10).

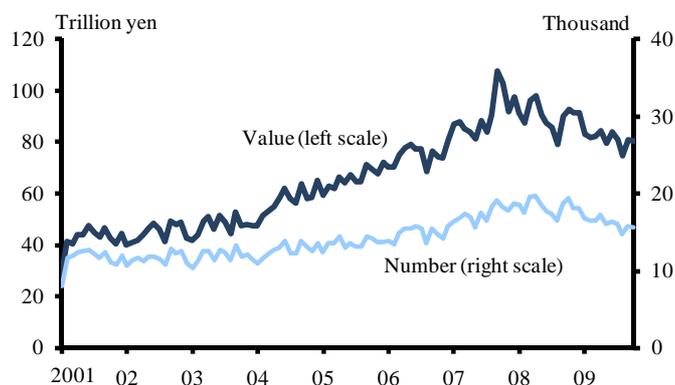
## B. Securities Settlement Systems

### 1. JGBs

The Bank acts as the central securities depository (CSD) for JGBs and operates the BOJ-NET JGB Services. The system provides a range of JGB settlement services for primary and secondary market transactions including the Bank's open market operations.

Chart 1-11 shows that the value and number of JGBs processed by the BOJ-NET JGB Services have continued to fall since the latter half of 2008 as JGB trading activity, especially repo trading, declined substantially during this period.

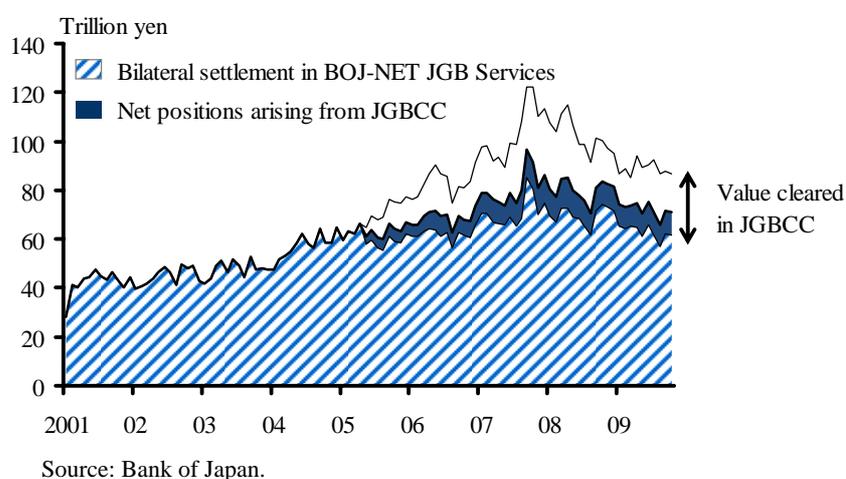
**Chart 1-11: Average Daily Value and Number of JGB Transactions Settled by BOJ-NET JGB Services**



Source: Bank of Japan.

As shown Chart 1-12, approximately 40% of JGB market transactions are cleared by the Japan Government Bond Clearing Corporation (JGBCC).<sup>7</sup> JGBCC replaces a contract between two parties to a JGB trade with two contracts: one between JGBCC and the buyer and the other between JGBCC and the seller. Cash and securities positions between JGBCC and participants are netted and settled on a DVP basis using BOJ-NET. Netting reduces the value of JGB transfers to roughly a quarter of the value of the original transactions.<sup>8</sup>

**Chart 1-12: Effect of Netting in JGBCC**



## 2. Other Types of Securities

The Japan Securities Clearing Corporation (JSCC) provides clearing services for stock transactions executed on stock exchanges, while the JASDEC DVP Clearing Corporation (JDCC) provides clearing services for stocks traded between securities companies and their customer financial institutions.<sup>9</sup> Both CCPs use the same CSD, the Japan Securities

<sup>7</sup> In October 2009, the average daily value of JGBs settled in the BOJ-NET JGB Services, excluding net positions arising from JGBCC, was around 62 trillion yen. This corresponds to "bilateral settlement" in Chart 1-12. During the same period, the value cleared by JGBCC was 35 trillion yen. The share of transactions cleared through JGBCC (36%) is calculated assuming that the sum of the above two figures represents the total value of JGB transactions.

<sup>8</sup> In October 2009, JGB transactions with a daily average value of 34.5 trillion yen were netted down to 9.5 trillion yen after clearing through JGBCC.

<sup>9</sup> JSCC provides clearing services for a range of other products including convertible bonds, real-estate investment trusts (REITs), exchange-traded funds (ETFs), exchange-traded JGB futures and options, and

Depository Center (JASDEC), for securities settlement (Chart 1-1). For settlement of payment obligations, JSCC uses accounts that it holds at cash settlement banks or at the Bank; JDCC uses an account that it holds at the Bank.<sup>10</sup>

The value of transactions cleared by JSCC and JDCC saw a significant decline in 2008 and remained low throughout 2009 (Chart 1-13). Both CCPs have maintained a high level of netting efficiency, with payment obligations reduced to 6-7 percent of the original amount for JSCC and in the range of 10-15 percent for JDCC.

Commercial paper (CP), corporate and other bonds,<sup>11</sup> and investment trusts are settled in a book-entry transfer system operated by JASDEC. Following the outbreak of the global financial crisis, the value of CP transactions settled in JASDEC remained broadly constant with some fluctuations (Chart 1-14). Settlement activity for corporate and other bond transactions declined in line with the contraction in trading activity (Chart 1-15).<sup>12</sup> The value of sales and repurchases of investment trusts continued to decline as the subprime mortgage problem emerged in the summer of 2007, after which it recovered somewhat in the spring of 2009 (Chart 1-16).

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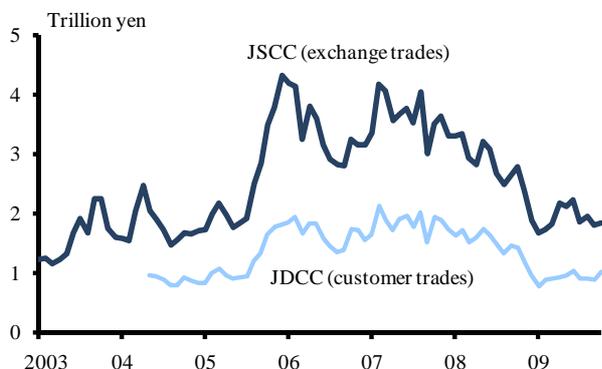
exchange-traded equity index futures and options. JDCC also provides clearing services for convertible bonds, REITs, and ETFs.

<sup>10</sup> Clearing participants in JDCC that do not have accounts with the Bank settle their payment obligations through settlement banks. In JSCC, net securities and cash positions are settled on a DVP basis. In JDCC, gross securities positions and net cash positions are settled on a DVP basis.

<sup>11</sup> Includes municipal bonds, bank debentures, specified corporate bonds issued by special purpose companies, agency bonds issued under the Fiscal Investment and Loan Program, and *samurai* bonds (yen-denominated bonds issued in Japan by non-Japanese companies).

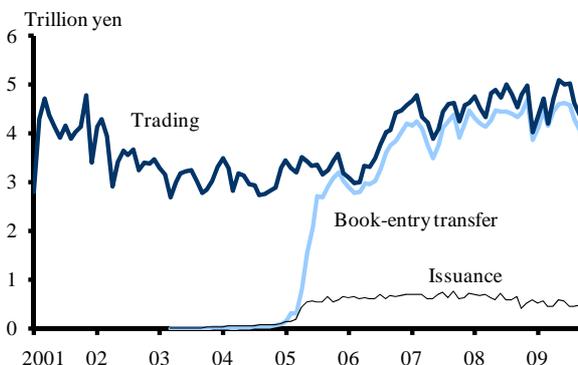
<sup>12</sup> The migration of registered bonds to the new JASDEC book-entry transfer system started with the launch of the system in 2006 and contributed to the increase in settlement activity during 2007. Since 2008, the value settled in JASDEC has declined, reflecting completion of the migration process and weakening trade activity.

**Chart 1-13: Average Daily Value of Stock Transactions Processed by JSCC and JDCC**



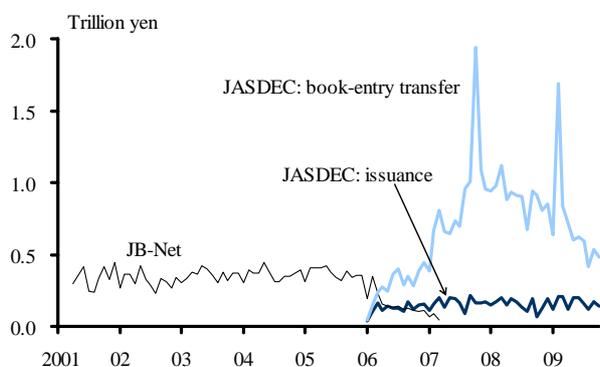
Note: The surge in 2005 reflects the increase in online stock trading by individual investors. See also Chart 1-8.  
Sources: JSCC; JDCC.

**Chart 1-14: Average Daily Value of CP Transactions Settled by JASDEC**



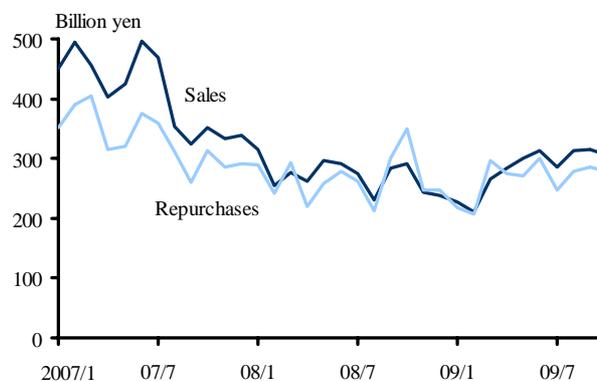
Notes: 1. The value of trading activity is the total for dematerialized and paper-based CP.  
2. Conversion from paper-based CP to dematerialized CP increased in 2005 as stamp tax relief on paper-based CP ended at the end of March 2005.  
Sources: JASDEC; JSDA.

**Chart 1-15: Average Daily Value of Corporate and Other Bond Transactions Processed by JASDEC and JB-Net**



Notes: 1. JASDEC's book-entry transfer system for corporate and other bonds started operating in January 2006. The Japan Bond Settlement Network (JB-Net), an online network system for registered bonds, ceased operating in April 2007. Both systems have linked with BOJ-NET to facilitate DVP.  
2. The spikes in October 2007 and February 2008 are each likely to reflect a change in custodian by a large investor.  
Sources: JASDEC; JB-Net.

**Chart 1-16: Average Daily Value of Investment Trust Transactions Processed by JASDEC**



Source: Bank of Japan.

## **Part 2: Response to the Global Financial Crisis and Initiatives to Effect Improvements**

This section explains how market players and relevant parties including CCPs responded to the considerable scale of settlement failures resulting from the collapse of LBJ in September 2008 and evaluates how the existing risk reduction measures in payment and settlement systems have worked during the crisis. It also highlights several issues that this experience has revealed and describes the activities of the Bank relating to oversight of payment and settlement systems.

### **A. Response to the Global Financial Crisis**

On September 15, 2008, LBH, the U.S. investment banking group, filed a petition under Chapter 11 of the U.S. Bankruptcy Code. In response, Japan's Financial Services Agency (FSA) ordered LBJ, a Japanese subsidiary of LBH, to suspend some of its operations. LBJ filed for bankruptcy protection with the Tokyo District Court on the next day and the Court decided on September 19, 2008 to commence civil rehabilitation procedures for LBJ.

This was the first case involving the bankruptcy of a major financial institution in Japan during the last decade or since that of Sanyo Securities in 1997 in which some of the institution's settlement obligations were not performed. It is estimated that transactions worth several trillion yen were suspended from settlement as a result of the LBJ bankruptcy.<sup>13</sup>

The operators of payment and settlement systems in Japan have worked over the years to introduce various risk management measures designed to address the possible default of a

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<sup>13</sup> Some of the securities and exchange-traded derivatives transactions executed by LBJ were suspended from settlement and went into close-out netting, while some were unwound between counterparties by conducting reverse transactions, both of which were conducted in accordance with clearing house default procedures or bilateral contracts between counterparties. To allow LBJ to process the return of customer assets and bilateral settlement of outstanding securities transactions, some exemptions from the suspension of payment and settlement operations were allowed in (i) the business restriction order issued by FSA; and (ii) the asset protection order issued by the Tokyo District Court with the filing of bankruptcy protection papers. LBJ, however, decided to suspend the settlement of all outstanding transactions (other than those that were subject to close-out netting) until it had made an accurate assessment of financial conditions because it was difficult to sort out complex transactions with counterparties from Japan and abroad in a timely manner. As a result, all outstanding transactions were not settled as planned from the morning of September 16, 2008.

market participant. In this context, the LBJ bankruptcy tested the effectiveness of such measures developed by payment and settlement systems.

## **1. Domestic Securities Settlement**

Securities transactions executed by LBJ with market participants are categorized as: (1) transactions settled bilaterally between LBJ and its counterparty; or (2) transactions settled via securities clearing houses acting as a CCP.

For bilaterally settled transactions, LBJ and its counterparties liquidated outstanding positions by terminating contracts or conducting close-out netting<sup>14</sup> in accordance with the terms of such contracts or based on bilateral negotiations where no default procedures had been agreed in advance. In parallel with the liquidation of positions, LBJ's counterparties replaced both securities and cash positions arising from the LBJ failure.

For transactions settled via securities clearing houses, the CCPs closed out LBJ's outstanding positions in accordance with their rules and procedures. In parallel with close-out netting, CCPs financed their cash positions that remained unpaid by LBJ, drawing down credit lines from commercial banks and obtaining finance via repo markets. CCPs made payments to non-defaulting participants as scheduled using these funds. In addition, CCPs also acquired securities they could not receive from LBJ and performed onward deliveries to non-defaulting participants.

More specifically, CCPs and market participants in Japan handled the LBJ settlement failures as follows:

- (1) It is estimated that JGB and other securities transactions worth several trillion yen to which LBJ was a counterparty were suspended from settlement as a result of the LBJ bankruptcy. These suspended transactions were liquidated by CCPs and other LBJ counterparties by termination of contracts or close-out netting.

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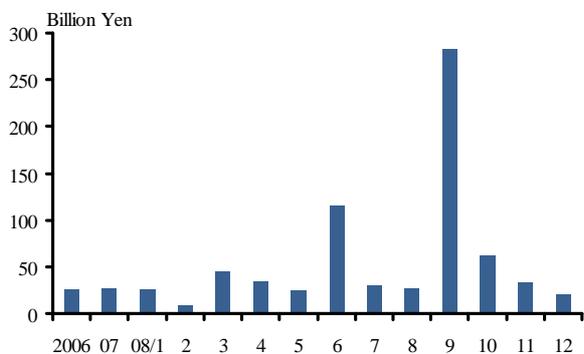
<sup>14</sup> A form of netting which offsets the present value of existing contracts between counterparties and settles these contracts by making a cash payment for the net position.

- (2) CCPs financed their cash positions that remained unpaid by LBJ by (i) using cash deposited with clearing funds; (ii) drawing down credit lines such as commitment lines from commercial banks; or (iii) conducting repo transactions with market participants. Market participants that bilaterally settled transactions with LBJ seemed to have financed their cash positions using various measures. The amounts of funds financed by CCPs and other LBJ counterparties were huge, but thanks to the Bank's massive liquidity injection, cash funding operations were carried out without significant difficulties. As a result, LBJ's failure to pay did not trigger a chain of defaults among market participants.
- (3) Following the LBJ bankruptcy, the amount of liquidity CCPs financed from commercial banks accumulated for a week. After a while, however, as CCPs sold securities they had originally planned to deliver to LBJ and made repayments to commercial banks, the amount of liquidity financed by CCPs started to decline and reached zero by the end of September 2008.
- (4) To cover positions arising from LBJ's failure to deliver securities, CCPs acquired securities and made onward delivery to non-defaulting participants. As the liquidity of any particular security is limited, it was difficult to repo securities immediately after the LBJ bankruptcy. In addition, due to the T+3 settlement cycle in Japan, it was also difficult to receive purchased securities immediately. As a result, unlike in the case of the cash legs, it took several days to cover impaired positions in securities.
- (5) Following LBJ's default on its settlement obligations, the delay in delivery of securities spread to the broader securities market. Market participants who could not receive securities from counterparties including CCPs on time were forced to delay the onward delivery of the same securities. Such failure to deliver securities on the scheduled day is called a "settlement fail." In active securities markets such as the JGB market, a securities broker buys and sells the same securities for the same settlement day, assuming it can receive and redeliver the same securities on the same day. Such back-to-back settlements aggravated the accumulation of settlement fails for several days following the LBJ bankruptcy. The daily average value of settlement fails is around 10-20 billion yen in normal

times, but it jumped to around 300 billion yen during September 2008 (Chart 2-1). The value of settlement fails also surged in stock markets (Chart 2-2).

- (6) This delay in the delivery of securities was gradually resolved towards the end of September 2008 as CCPs and market participants acquired and delivered securities to cover their failed positions. The incidence of settlement fails finally returned to normal in October 2008.
- (7) Looking at the intraday timing of JGB settlement, the settlement process was delayed for 1-2 hours for several days immediately after the LBJ bankruptcy (Chart 2-3). There were several cases in which the delay in securities settlement or the late determination of settlement fails impeded the management of cash and securities positions held by financial institutions.
- (8) In the event of a participant's default, the CCP has to replace its cash and securities positions as explained above. During this process, the CCP could suffer a loss when the purchasing/selling prices of securities move away from the original trading prices in an adverse direction. In addition, the CCP also has funding costs. To address this risk of incurring losses and costs, the CCP collects margin from the participants. All CCPs for securities transactions in Japan that suffered losses as a result of the LBJ bankruptcy were able to cover their losses by enforcing their rights to collateral pledged by LBJ in advance, and as a result did not need to allocate their loss among the participants.

**Chart 2-1: Average Daily Value of Settlement Fails in the JGB Market**

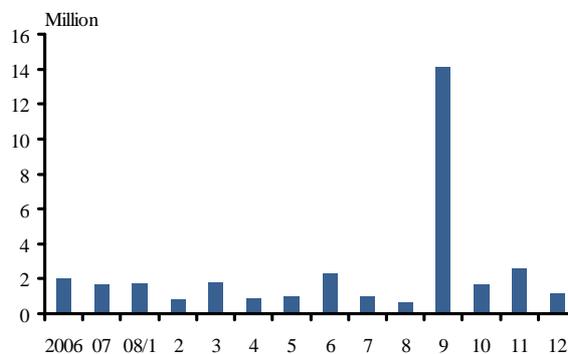


Notes: 1. Face value of failed JGB transactions submitted for DVP settlement on BOJ-NET.

2. Excludes LBJ transactions suspended from settlement after 16 September 2008.

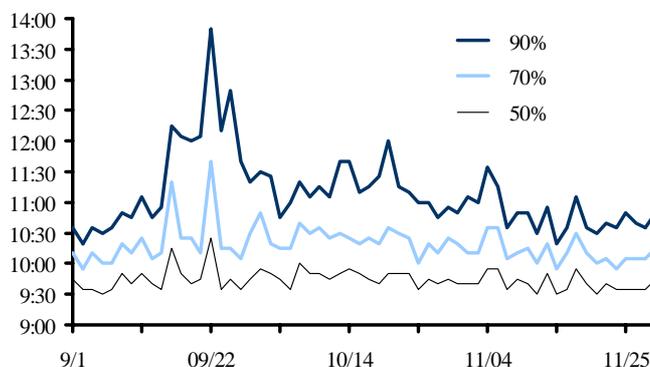
Source: Bank of Japan.

**Chart 2-2: Average Daily Value of Settlement Fails in Exchange Trading of Domestic Stocks**



Source: JSCC.

**Chart 2-3: Intraday Progress in DVP Settlement of JGB Transactions Around the LBJ Bankruptcy**



Note: This chart shows the time at which settlement of 50%, 70%, and 90% of the total number of transactions was completed. Under normal market conditions, settlement starts at 9:00 and over half of the daily value is settled by 10:00.

Source: Bank of Japan.

## 2. Foreign Exchange Settlement

CLS played a critical role in reducing foreign exchange settlement risk during the period of market turbulence.<sup>15</sup> As described in Part 1, CLS is a cross-border payment system that settles foreign exchange transactions for the major currencies on a PVP basis.<sup>16</sup> CLS settles transactions worth some 3-4 trillion U.S. dollars daily, which accounts for nearly 60 percent of foreign exchange settlements worldwide.<sup>17</sup>

In the days following the bankruptcy of LBH, some of the CLS members chose to rescind payment instructions for trades with LBH affiliates. In addition, CLS faced a record number of payments on September 17, which coincided with the quarterly settlement day for the International Monetary Market (IMM). Despite these events, CLS continued to perform the PVP processing as designed.

The effective functioning of CLS was particularly important because the liquidity of the U.S. dollar funding market became severely impaired over the course of the global financial crisis 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 the CLS PVP mechanism had not existed and financial institutions had faced foreign exchange settlement risk amidst escalating concerns over counterparty credit risk, they would have had much more difficulty in funding U.S. dollars. In other words, the PVP mechanism in CLS effectively functioned as a bulwark against an amplification of shocks throughout the global financial system.

One issue highlighted during the period of market stress was the risk associated with a tiered participation structure. In CLS, a significant number of indirect participants (user members and third parties) settle through a relatively small number of direct participants (settlement members). This structure concentrates the credit and liquidity risks of indirect participants in direct participants. Other possible areas for future work include the expansion of the PVP service to cover a wider range of currencies and same-day trades.

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<sup>15</sup> Lehman Brothers Inc. was an indirect member of CLS. The direct participant acting on behalf of Lehman Brothers Inc. continued to settle after the bankruptcy of LBH.

<sup>16</sup> See footnote 5 for a description of PVP.

<sup>17</sup> See “Progress in Reducing Foreign Exchange Settlement Risk” published by the Committee on Payment and Settlement Systems in May 2008.

### 3. Evaluation of the Safety of Japan's Payment and Settlement Systems

The collapse of LBJ resulted in a significant scale of settlement failures in the delivery of securities and the payment of funds. It did not, however, lead to the subsequent failures to settle payments or systemic disruptions in the overall financial system in Japan. It seems that the losses suffered by clearing houses and other LBJ counterparties were also limited. Japan's payment and settlement systems managed to avoid a situation in which global financial distress, as seen in the bankruptcy of a major global player, was amplified in the payment and settlement systems and spread to the broader financial system. The bankruptcy event demonstrated that a number of risk management measures developed by various parties related to Japan's payment and settlement systems work effectively (Chart 2-4).

Looking at the direct impacts of the LBJ bankruptcy on securities settlement, for example, the established use of DVP avoided the principal risk whereby parties that delivered securities to LBJ did not receive the corresponding funds, and vice versa.

In CCPs for JGBs and stocks, unsettled LBJ positions were processed according to the default procedures set out in their rules and service documents. This process revealed several challenges, for example, one CCP had to finance sizable funds and securities positions and it took several days to finance these positions. From an overall standpoint, however, the risk management measures embedded in CCPs' business procedures such as contingency funding plans and margin requirements functioned well, contributing to stable settlement processing.

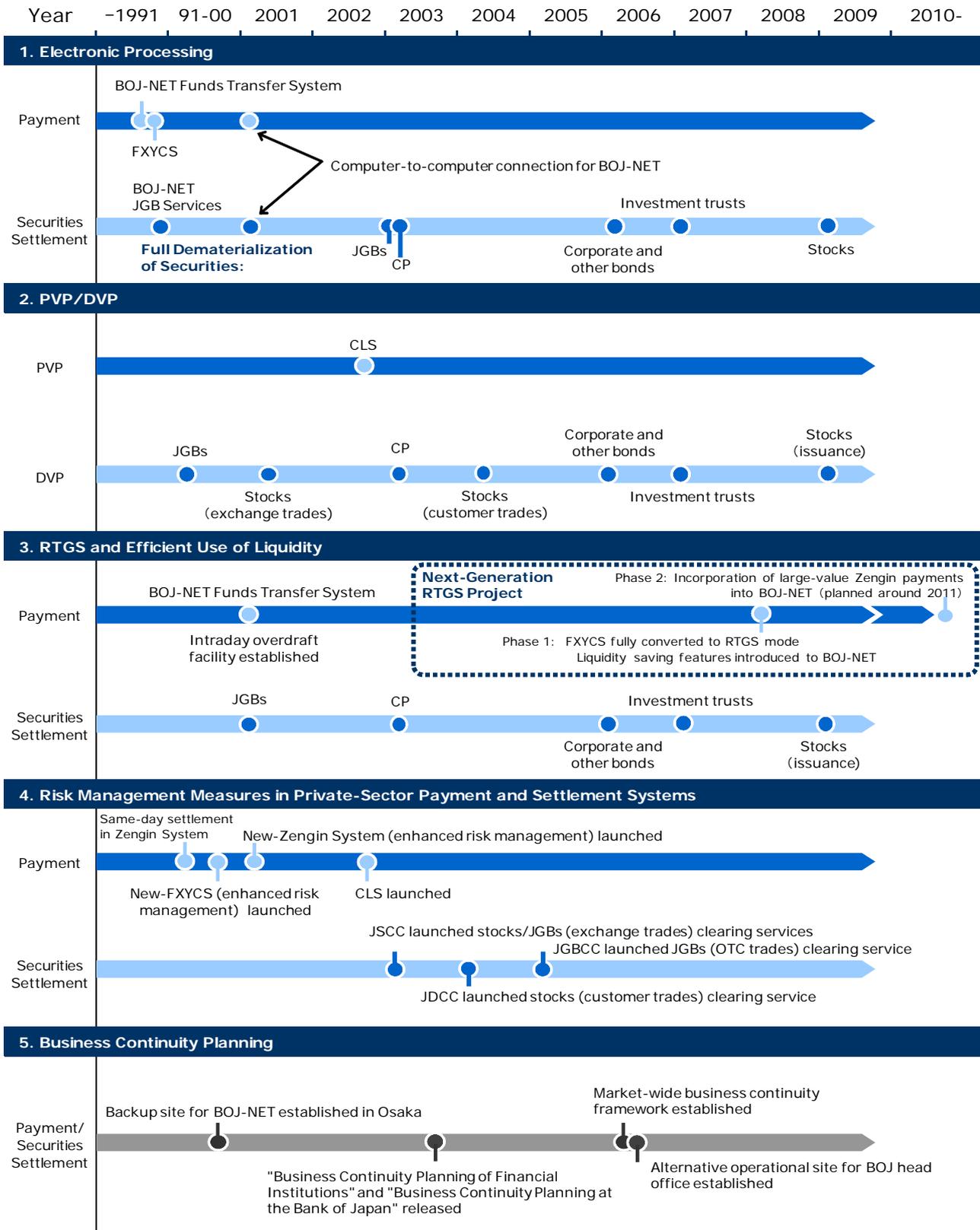
Turning to financial markets, the bankruptcy had a substantial impact. Settlement fails surged in JGB markets and some investors with growing concerns about settlement fails scaled back their trading activities in the repo market. In the event of a market participant's default, it is difficult to avoid a chain of settlement fails triggered by the initial default. It was natural to see a surge in settlement fails during the Lehman episode and CCPs and LBJ counterparties responded to settlement fails in an orderly manner according to default procedures. Overall, the clearing and settlement systems for JGBs are considered to have underpinned the sound functioning of the JGB market during the bankruptcy event.

On the other hand, it may be possible to mitigate the malfunctioning of the repo market in stress conditions if the magnitude of settlement fails and investors' concerns are reduced with

a shorter settlement cycle, as discussed later. These improvements through a shorter settlement cycle are challenges for the future, as is ensuring the further establishment of fails practice among market participants including investors.

In the settlement of other securities and foreign exchange transactions, largely due to the established use of DVP and PVP systems, the overall financial system escaped systemic disruptions stemming from certain deficiencies in the payment and settlement systems. In summary, it is considered that past efforts to develop safe payment and settlement systems contributed to the sound functioning of financial markets, in spite of the bankruptcy event.

**Chart 2-4: Improvements to Enhance Safety**

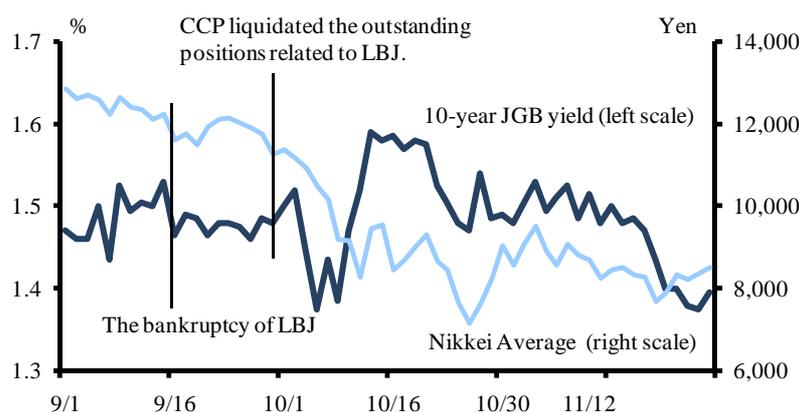


#### 4. Safety Enhancement Challenges and Efforts

As explained in Chapter 2-1, Japan's payment and settlement systems generally functioned well in the event of the LBJ bankruptcy. Nevertheless, the experience shed light on several remaining challenges. It should be noted that without the period of stable market prices that lasted for two weeks following the bankruptcy, market participants could have suffered much larger losses as a result of the default process (Chart 2-5).

This section elaborates on these remaining challenges based on the LBJ experience. The Bank will actively support market participants' efforts to tackle these challenges, making use of its expertise gained from past experience and its involvement in international discussions in the area of payment and settlement systems.

**Chart 2-5: Government Bond Yields and Stock Prices Around the LBJ Bankruptcy**



Sources: Bloomberg; Japan Bond Trading.

##### a. Enhancement of CCP Functions

The first challenge is to enhance the functions of securities clearing houses acting as CCPs.

In the aftermath of the LBJ bankruptcy, one CCP had to raise funds exceeding the size of pre-agreed commitment lines and financed funds from external sources as the need arose. In one particular case, it took time to process the funding operations. CCPs are therefore expected to review their contingency funding arrangements to ensure they have reliable and timely access to liquidity and make further enhancements if necessary. It is also desirable

for CCPs to institute arrangements for the reliable and timely acquisition of securities by arranging for counterparties to acquire securities, examining available markets with shorter settlement cycles such as the repo market, and enhancing their operational procedures and capabilities.

It is important to set up schemes to avoid loss-sharing among surviving participants. Loss-sharing occurs when the loss suffered by a CCP as a result of a participant's default is not covered by collateral pledged in advance by the participant in default. The CCP is expected to review the appropriateness of margin requirement models and to examine stress test scenarios for reasonableness. If the outcome of this work raises concerns about the adequacy of financial resources, the CCP is expected to increase them to an adequate level.

## **b. Shortening the JGB Settlement Cycle**

The second challenge is to shorten the settlement cycle for JGB transactions.

In trading and settling securities transactions, the longer the time-lag from execution to settlement, the longer unsettled transactions are exposed to settlement risk. Given a constant daily value of trading, this means that if a settlement cycle is longer, more unsettled positions will accumulate. If individual market participants' exposures and unsettled positions across the whole market are reduced by the shortening of the settlement cycle, this brings the following benefits (see numerical examples in BOX).

First, a shorter settlement cycle reduces the size and cost of fund-raising associated with a counterparty's default. When a market participant fails to receive the cash leg of a securities transaction due to the counterparty's default, the market participant raises funds from external sources. With a shorter settlement cycle, the amount of funds to be financed, which corresponds to unsettled positions, will be reduced. These funds can be financed by disposing of the securities which the defaulting party was supposed to receive. A shorter settlement cycle also helps the counterparty to liquidate securities and complete the repayment process within a smaller number of days.

Second, a shorter settlement cycle mitigates replacement risk. With a shorter settlement cycle, the amount of securities to be acquired or sold out, which corresponds to unsettled

positions, will be reduced. This helps to reduce the risk of losses resulting from the replacement of unsettled positions.

Third, a shorter settlement cycle helps to mitigate the degree of a chain of settlement fails and reduces the amount of failed positions that accumulate in the chain process. For example, when a counterparty needs to acquire securities due to a settlement fail, a shorter settlement cycle means that the counterparty can receive the securities earlier. This advantage also accelerates the resolution of settlement fails and moderates the chain of settlement fails, thereby easing investors' concerns over settlement fails.

As explained above, a shorter settlement cycle contributes to the reduction of settlement risks both through the reduction of unsettled positions and through the shortening of the position replacement period.

Lastly, a shorter JGB settlement cycle makes JGBs more attractive financial products. The improvement in the cashability of JGBs provides financial institutions with a safe and swift funding measure and offers investors more opportunity for shorter-term investments. It also facilitates further development of overnight and tomorrow next repo market.

In Japan, JGB transactions are settled three days after the trade date, while in the U.S. and the U.K., government bond transactions are settled on the day following the trade. A working group was set up in Japan by the Reform Promotion Center for Securities Clearing and Settlement System in conjunction with the secretariat of the Japan Securities Dealers Association (JSDA). The working group is studying the feasibility of shortening the settlement cycle for JGB markets. It is expected that the various initiatives being introduced to develop Japan's financial markets will make steady progress. The Bank will provide as much support as possible for these market initiatives.

### **c. Review and Establishment of Fails Practice**

The third challenge is to review and further establish fails practice.

It is difficult to avoid settlement fails resulting from the default of market participants. In the case of actively traded securities like JGBs, gridlock sometimes occurs in the looped settlements that take place among a number of players. Gridlock among looped settlements is hard to resolve in less time and some players may encounter settlement fails. In this way, settlement fails may even occur in normal market conditions. Nevertheless, an increase in settlement fails should be avoided as far as possible because it means that transactions remain unsettled; in other words, an increase in settlement fails leads to an increase in settlement risks. With the aim of balancing the control of settlement risks and ensuring market liquidity, the Bank believes that it would be desirable to establish an incentive mechanism to limit settlement fails while tolerating a certain level of fails.

Traditionally, some investors and financial institutions in Japan were reluctant to accept settlement fails due to a lack of knowledge on fails practice, or did not have the operational capability to process settlement fails. For this reason, when a surge of settlement fails was observed after the Lehman bankruptcy, some investors ceased engaging in new transactions due to concerns over the risk of settlement fails.

In the U.S. market where settlement fails often occur even in normal market conditions, a significant increase in settlement fails was observed under lower interest rate conditions. It was explained that the increase was related to a lack of incentives to avoid fails due to the fall in interest rates or the effective cost of settlement fails.<sup>18</sup> Following the collapse of LBH, settlement fails increased as interest rates fell with monetary easing. Market participants and relevant authorities with serious concerns about this situation initiated a review of fails practice and agreed to introduce fails charges for the party who fails to deliver securities. It can be seen as a measure designed to establish an incentive mechanism that limits settlement fails while tolerating a certain level of them.

In Japan, the Working Group concerning the Review of Fails Practice for Bonds Trading was

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<sup>18</sup> A party that fails to deliver securities bears the funding cost of holding the securities while not receiving the investment profits, i.e., accrued interest after the contractual settlement date. The accrued interest will be paid to the receiving party. The funding cost, therefore, is the effective cost of settlement fails.

set up under the JSDA Bonds Committee and has been discussing the review of fails practice with a view to further establishing fails practice across various market participants. The possible introduction of fails charges and other revisions of current practice are on the table for discussion.<sup>19</sup> Market participants shared the view that to further establish fails practice, it is important to deepen the understanding of fails practice at the management level of the various financial institutions that participate in the bond markets and develop operational capabilities to process settlement fails. Going forward, to enhance the safety of Japan's payment and settlement systems and ensure better liquidity in the bond markets, the Bank expects market efforts to proceed further and will actively support these efforts.

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<sup>19</sup> See the Interim Report of the Working Group concerning the Review of Fails Practices for Bond Trading released on November 2009 via the JSDA web site.

### BOX: Benefits of Shorter Settlement Cycle for JGB Transactions

A shorter settlement cycle for securities transactions brings both direct and indirect benefits. First, it directly reduces exposures to settlement risks, calculated by multiplying the “outstanding value of unsettled transactions” by “duration to settlement.” Second, it indirectly mitigates market malfunctioning by speeding up the replacement of unsettled positions and the resolution of settlement fails.

A shorter settlement cycle controls principal risk and other associated risks. Among these risks, principal risk can be eliminated by using a DVP mechanism. On the other hand, there remains the risk that a counterparty who suffers from a lack of cash due to fails has to raise funds, i.e., liquidity risk. The risk intensifies as the outstanding value of unsettled positions increases. A shorter settlement cycle helps to reduce such liquidity risk.

Chart A shows an example of a security seller’s action against a counterparty’s bankruptcy. Under the T+1 settlement cycle, unsettled positions are minimized, reducing the amount of funds financed to cover settlement failures. In addition, the funding period is also shortened. In this way, the T+1 settlement cycle contributes to the reduction of liquidity risk. This is a major benefit that leads to the containment of systemic disruptions in the event of bankruptcy.

#### Chart A: Security Seller’s Action

T+3 settlement

Date	Unsettled transaction			Replacement	Cash funding	
Transaction Settlement	Day 1-3 Day 1	Day 1-2 Day 2	Day 1-1 Day 3		Funding amounts	Cumulative amounts
<b>Day 1: Bankruptcy</b>	50	↓	↓		50	50
<b>Day 2</b>		50	↓	Trade execution	50	100
<b>Day 3</b>			50	↓ T+3	50	150
<b>Day 4</b>				↓	↓	150
<b>Day 5</b>				Repayments by resale		0

T+1 settlement

	Unsettled transaction	Replacement	Cash funding
Transaction Settlement	Day 1-1 Day 1		Funding amounts Cumulative amounts
<b>Day 1: Bankruptcy</b>	50		50 50
<b>Day 2</b>		Trade execution	↓ 50
<b>Day 3</b>		↓ Repayments by resale	0

1) Reduction of unsettled positions

2) Reduction of funding

Chart B shows an example of a security buyer's action against a counterparty's bankruptcy. Under the T+3 settlement cycle, securities transactions executed in the past three days accumulate and remain unsettled. Under the T+1 settlement cycle, on the other hand, only transactions executed on the previous day remain unsettled, reducing the amount of unsettled positions by one third in comparison with the case of the T+3 settlement cycle. This helps to minimize the amount of securities needed to replace unsettled positions, thereby reducing the risks associated with replacement.

### Chart B: Security Buyer's Action

#### T + 3 settlement

Transaction Settlement	Unsettled transactions			Acquisition	Settlement fails	
	Day 1-3 Day 1	Day 1-2 Day 2	Day 1-1 Day 3		Value of settlement fails	Outstanding positions
<b>Day 1: Bankruptcy</b>	100				100	100
<b>Day 2</b>		100		Trade execution T+3	100	200
<b>Day 3</b>			100		100	300
<b>Day 4</b>						300
<b>Day 5</b>				<b>Delivery of acquired securities</b>		0

1) Reduction of unsettled positions      2) Swift resolution of settlement fails

Settlement fails could accumulate for 4 days.

#### T + 1 settlement

Transaction Settlement	Unsettled transactions	Acquisition	Settlement fails	
	Day 1-1 Day 1		Value of settlement fails	Outstanding positions
<b>Day 1: Bankruptcy</b>	100		100	100
<b>Day 2</b>		Trade execution		100
<b>Day 3</b>		<b>Delivery of acquired securities</b>		0

Reduced to 2 days.

A shorter settlement cycle enables the early resolution of settlement fails, which in turn helps to avoid the occurrence of a chain of settlement fails and to moderate the accumulation of failed positions. As a result, it is expected that a shorter settlement cycle will ameliorate investors' concerns over settlement fails and contribute to the mitigation of market malfunctioning. As shown in Chart B, settlement fails that accumulate after Day 1 are resolved on Day 5 under the T+3 settlement cycle. Under the T+1 settlement cycle, however, the size of failed positions becomes smaller and settlement fails are resolved earlier, on Day 3.

The JGB market is outstanding in terms of the volume of trading and settlement in comparison with other securities markets. The JGB market stood out in terms of the

decline in market liquidity following the LBJ bankruptcy. Taking into account the importance of JGB transactions, it is considered that the benefits of a shorter settlement cycle would be much greater for the JGB market than for other securities markets.

### Reference: Settlement Cycles in Major Countries

	Japan	US	UK	Germany	France
<b>Government bond</b>					
<b>Outright</b>	T+3	T+1	T+1	T+2	T+3*
<b>(Repo)</b>	(T+2)	(T+0)	(T+0)	(T+1)	(T+2)
<b>Stocks</b>	T+3	T+3	T+3	T+2	T+3

Note: The settlement cycle for treasury bills in France (BTFs) is T+1 for outright and T+0 for repo.

## B. Oversight of Payment and Settlement Systems

### 1. The Role of the Central Bank in Payment and Settlement Systems

Payment and settlement systems have the potential to act as a channel for contagion. The failure or delay of a system participant to meet its obligations could trigger a chain of settlement failures among other participants that were planning to perform their obligations using the funds or securities received from that participant. Such disruption within the system could, in turn, further spread disruption to other payment and settlement systems or financial institutions. Similarly, an operational failure in a payment and settlement system, which may be caused by the malfunctioning of a computer system or human error, could have wide-ranging effects across payment and settlement systems.

Ensuring the safety of payment and settlement systems and reducing systemic risk provides an important foundation for pursuing the central bank's financial stability objective. Likewise, the safe and efficient functioning of payment and settlement systems contributes to the maintenance of public confidence in the currency and the effective implementation of monetary policy by ensuring that funds and securities transfers take place as planned.

In light of such interest in the safety and efficiency of payment and settlement systems, central banks in many countries engage in various efforts and discussions with system

operators and financial institutions in order to enhance both systems operated by the central bank and those operated by the private sector. The introduction of RTGS to funds transfer systems run by central banks is one of the outcomes of such initiatives. Many central banks have also worked to improve the functionality of the broader payment and settlement infrastructure by, for example, creating links between their systems and private-sector systems. The introduction of DVP for securities settlement and PVP for foreign exchange settlement are typical examples of such collaborative efforts. Moreover, central banks promote improvements in private-sector payment and settlement systems through their oversight of these systems.

## **2. The Bank's Oversight Activities**

While the primary responsibility for ensuring the safety and efficiency of payment and settlement systems lies with the operator of each system, central banks in many countries oversee private-sector systems as necessary. Oversight activities undertaken by central banks include monitoring of the system's design, risk management, and operation, assessing the adequacy of these aspects, and inducing change where necessary.

Like many other central banks, the Bank oversees payment and settlement systems with primary focus on those that are systemically important. In assessing the management of risks in these systems, the Bank uses as a benchmark the standards<sup>20</sup> developed by the Committee on Payment and Settlement Systems (CPSS).<sup>21</sup>

In addition to encouraging the operators of private-sector systems to make improvements, the Bank has supported such initiatives through various actions. For example, the Bank has supported a number of projects aimed at implementing DVP (for CP, corporate and other bonds, investment trusts, and stocks) by participating in the planning process and by creating

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<sup>20</sup> Internationally recognized standards developed by the CPSS include the Core Principles for Systemically Important Payment Systems (January 2001), Recommendations for Securities Settlement Systems (November 2001), and Recommendations for Central Counterparties (November 2004). The latter two were jointly developed by the CPSS and the Technical Committee of the International Organization of Securities Commissions (IOSCO). The CPSS and IOSCO are currently reviewing the application of the Recommendations for CCPs to clearing arrangements for OTC derivatives.

<sup>21</sup> The CPSS is a forum of central banks established in 1990 under the auspices of the Governors of the central banks of the Group of Ten countries to discuss policy issues related to payment and settlement systems. It now consists of central banks from 23 countries and regions.

links between private-sector systems and BOJ-NET. The Bank has also cooperated with other central banks in supporting the introduction of PVP for foreign exchange settlement, such as by opening an account for CLS Bank in 2002. Moreover, to establish CCPs and enhance their functions, the Bank participates in various discussions from the design stage and cooperates in the system implementation process such as running tests.

As mentioned in the previous chapter, payment and settlement systems in Japan have functioned in a stable manner in the wake of the LBJ bankruptcy. This achievement owes much to the efforts that the relevant parties have made over the years to strengthen risk management, efforts which were partly driven by the dialogue that took place as part of the Bank's oversight activities.

As financial markets become increasingly global, interdependencies between payment and settlement systems have become tighter.<sup>22</sup> Developments that have led to increased interdependencies have helped to strengthen the global payment and settlement system by reducing several cost and risk factors, while at the same time increasing the risk that a disruption in one system could spread rapidly and widely across systems.

In light of such developments, and drawing on the lessons from the global financial crisis, a number of countries are working to enhance the oversight framework for payment and settlement systems. As cross-border and cross-currency interdependencies between systems increase, the need for international cooperation in oversight and crisis management is also growing. The Bank will further strengthen its oversight of payment and settlement systems in cooperation with other central banks and authorities and in view of international discussions in this area.

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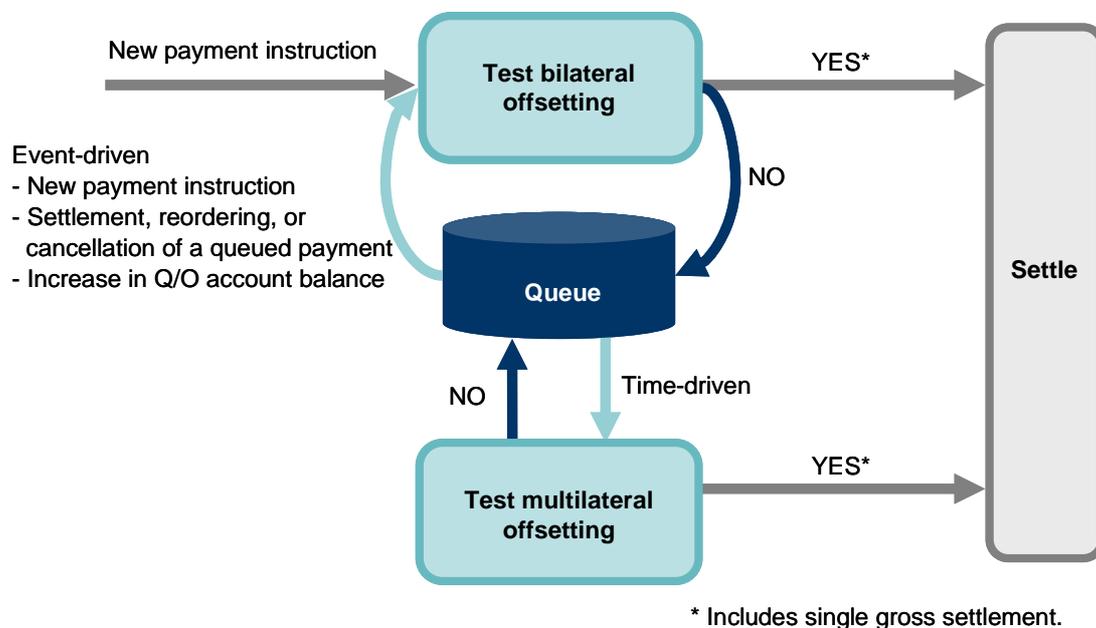
<sup>22</sup> Developments that have contributed to tighter interdependencies include: (i) the participation of large financial institutions in multiple systems across borders; (ii) the development of direct linkages between CCPs, large-value payment systems, and securities settlement systems along with the introduction of DVP systems and CCPs; and (iii) the use of common third-party service providers (e.g., in telecommunication networks, trade confirmation, and risk measurement).

## Part 3: Next-Generation RTGS Project

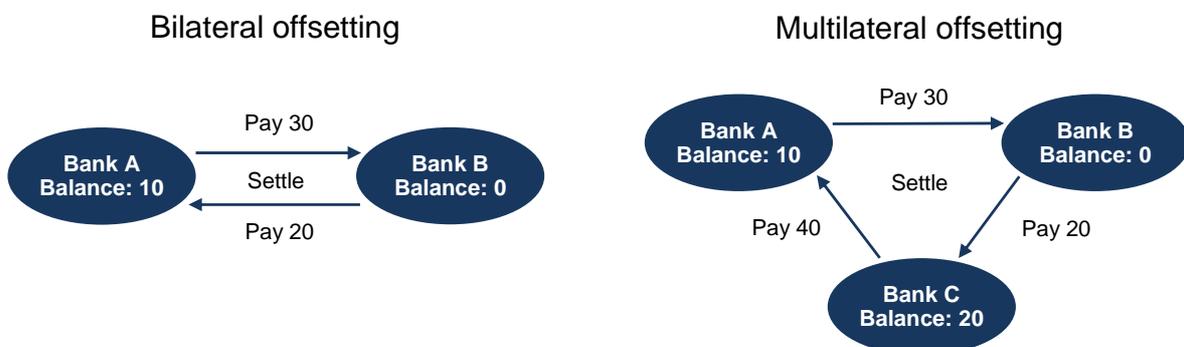
### A. Overview of the Next-Generation RTGS Project

The RTGS-XG project of BOJ-NET is aimed at bringing new levels of safety and efficiency to large-value payments in Japan. The project consists of two pillars: (1) introducing liquidity-saving features into BOJ-NET (Charts 3-1, 3-2); and (2) shifting large-value payments in two private-sector DNS systems, i.e., the FXYCS and the Zengin System, to BOJ-NET for settlement on an RTGS basis (Chart 3-3).

**Chart 3-1: Settlement Processing with Liquidity-Saving Features**

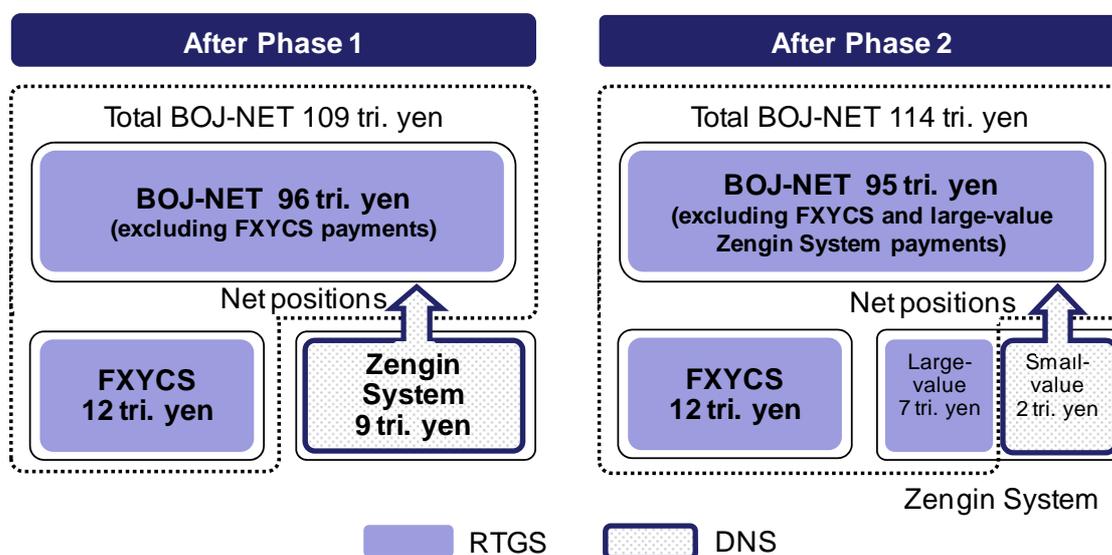


**Chart 3-2: Bilateral and Multilateral Offsetting**



Note: In the examples given above, payment instructions cannot be settled individually but can be settled when taking into account incoming payments as a source of liquidity.

**Chart 3-3: Shift of Large-Value Payments to RTGS**



Note: Figures are daily average values processed in October 2009.

The project is being implemented in two phases, with the introduction of liquidity-saving features into BOJ-NET and the shift of FXYCS payments to RTGS taking place in Phase 1 and the shift of large-value Zengin System payments to RTGS taking place in Phase 2. Phase 1 was successfully launched in October 2008. Phase 2 implementation is scheduled for November 2011, together with the next upgrade of the Zengin System, with relevant parties currently engaged in system development and other preparations.

## B. Payment Activity after Phase 1 Implementation

While Phase 1 went live amid the global market turmoil, both the Bank and the participating financial institutions achieved a smooth transition and the system has functioned well to date.<sup>23</sup> The value-weighted average settlement time for payments settled across Queuing and Offsetting Accounts (Q/O accounts) is illustrated in Chart 3-4.<sup>24</sup> It shows that the

<sup>23</sup> For an analysis of payment activity after the implementation of Phase 1, see "BOJ-NET Funds Transfers after the Implementation of Phase 1 of the Next-Generation RTGS Project," Bank of Japan Review 2009-E-4, July 2009.

<sup>24</sup> The liquidity-saving features, i.e., queuing and offsetting mechanisms, are provided on a new type of account called a Q/O account which participants hold separately from their Home Accounts.

average settlement time remained constant at around 11:00, regardless of fluctuations in the daily value of payments settled. Delay in payment flows was not observed even on days when the value and number of payments surged, such as on the last business day of each month and on high-value days for JGB settlement. This suggests that participants are following the guidelines for call money transactions and foreign exchange transactions even on high-value days.<sup>25</sup>

**Chart 3-4: Daily Settlement Value and Average Settlement Time in Q/O Accounts**

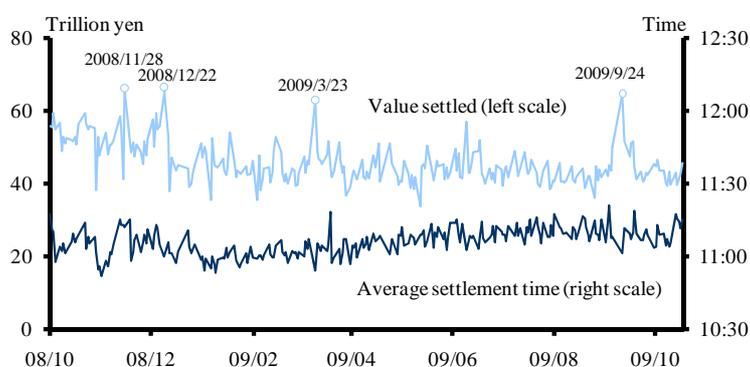
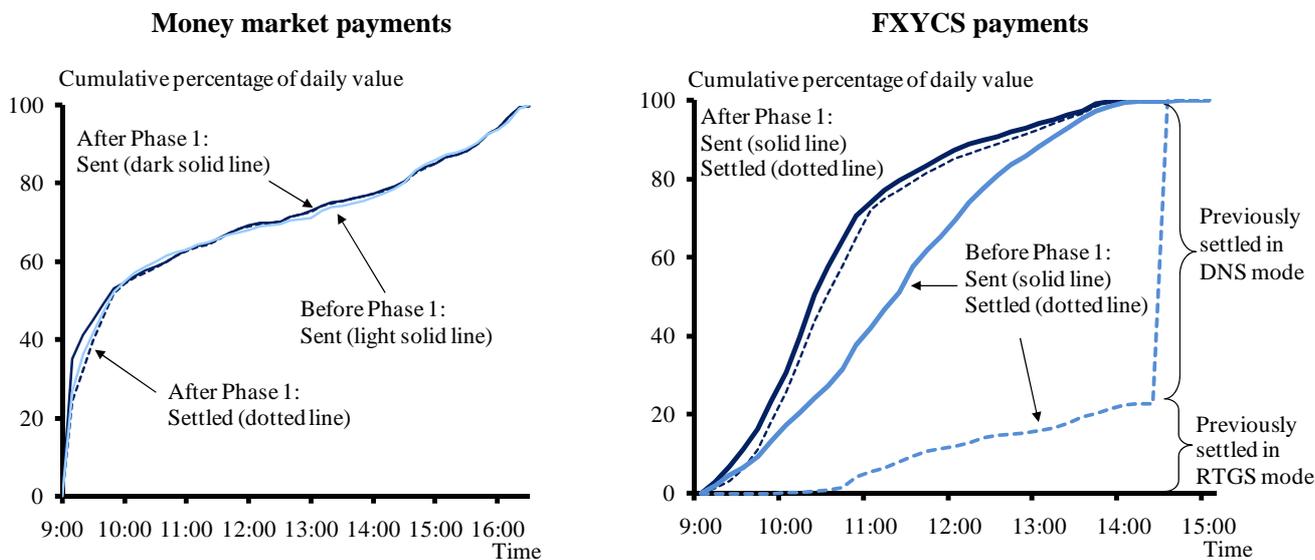


Chart 3-5 compares the intraday patterns of payment submission and settlement before and after the implementation of Phase 1. The settlement timing of payments routed from FXYCS has shifted to significantly earlier in the day with the changeover from a dual-mode system (DNS and RTGS) to full RTGS. Earlier settlement represents a reduction in intraday settlement exposure, indicating that the safety of large-value payments has been enhanced as intended by Phase 1.

<sup>25</sup> The market guidelines for the trading and settlement of call money loans require that market participants: (1) return call money loans no later than 10:00; (2) deliver forward-dated call money loans no later than 10:00; and (3) deliver same-day call money loans as soon as possible and no later than one hour after trade execution. The throughput guidelines in FXYCS require participants to submit and settle payment instructions that account for 65 percent of daily volume and 55 percent of daily value by 11:00.

**Chart 3-5: Change in Intraday Patterns of Payment Submission and Settlement**

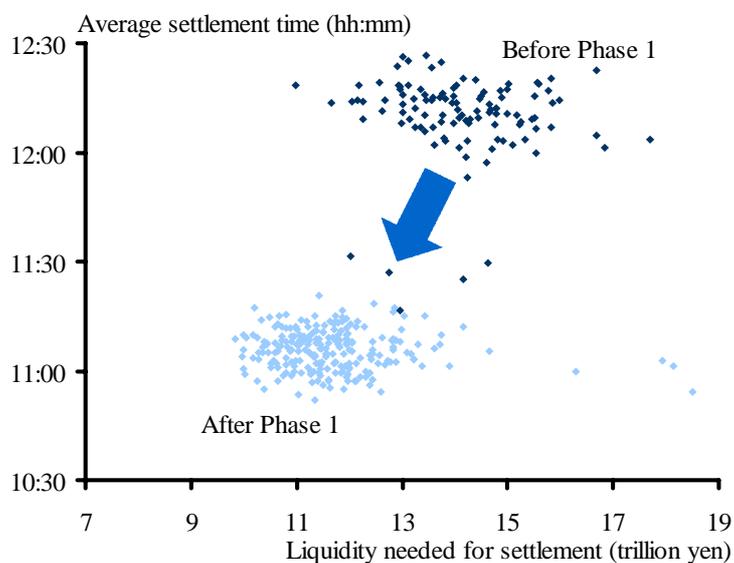


- Notes: 1. Figures are calculated using data from October 15, 2007 to March 31, 2008 for the period before the start of Phase 1 and from October 14, 2008 to October 30, 2009 for the period after the start of Phase 1.
2. Before Phase 1, all money market payments were settled on an RTGS basis without the queuing mechanism. For these payments, the cumulative percentage of payments submitted is identical to the percentage of payments settled. After Phase 1, a time lag exists between submission and settlement where payments are queued before they are settled (see Chart 3-1 for the settlement process for Q/O accounts).
3. Before Phase 1, around 20 percent of FXYCS payments were settled in the system's RTGS mode, while around 80 percent were cleared in the DNS mode with settlement taking place at 14:30. After the start of Phase 1, the timing of settlement has shifted to significantly earlier in the day due to the change in settlement method and the earlier submission of payment instructions by participants.

The other objective of the project was to enhance the efficiency in settling large-value payments. The extent to which this was achieved can be measured by the amount of reduction in the liquidity needed for settlement. Since the launch of Phase 1, roughly 15 percent of the daily value of payments settled in Q/O accounts has been offset against incoming payments. A comparison of the value of liquidity needed for settlement before and after Phase 1 indicates that approximately 2 trillion yen were saved through the implementation of Phase 1 (Chart 3-6).<sup>26</sup>

<sup>26</sup> The amount of liquidity needed for settlement for the period before Phase 1 is calculated as the total of the daily peak debit position for each participant based on actual transaction data. The amount for the period after Phase 1 is calculated as the total of the daily peak value of Q/O account balances for each participant. While the latter directly measures the account balance used for settlement in Q/O accounts, the former does so indirectly by using flow data on payment instructions because comparable data are not available. The data points in Chart 3-6 reflect differences in daily settlement value and the pattern of

**Chart 3-6: Average Settlement Time and Liquidity Needed for Settlement**



- Notes: 1. The chart plots the daily average settlement time and the daily peak amount of liquidity needed for settlement for all money market and FXYCS payments. Figures are calculated using data from October 15, 2007 to March 31, 2008 for the period before the start of Phase 1 and from October 14, 2008 to October 30, 2009 for the period after Phase 1.
2. Before Phase 1, all money market payments and around 20 percent of FXYCS payments were settled on an RTGS basis and around 80 percent of FXYCS payments were settled on a DNS basis. The reduction in average settlement time can mainly be attributed to the shift of FXYCS payments to RTGS (see Chart 3-5).

Overall, the analysis of payment activity indicates that the measures taken under the RTGS-XG project have reduced the aggregate liquidity needed for settlement while extending the risk reduction benefits of RTGS to a wider range of payments, thereby achieving, for Phase 1, the objective of enhancing both the safety and efficiency of large-value payments. It should be noted that a large number of participants continue to set aside liquidity in excess of the required amount calculated, which suggests that there is room for these participants to take further advantage of the liquidity-saving features. It is expected that participants will use the new functionalities effectively as financial conditions change.

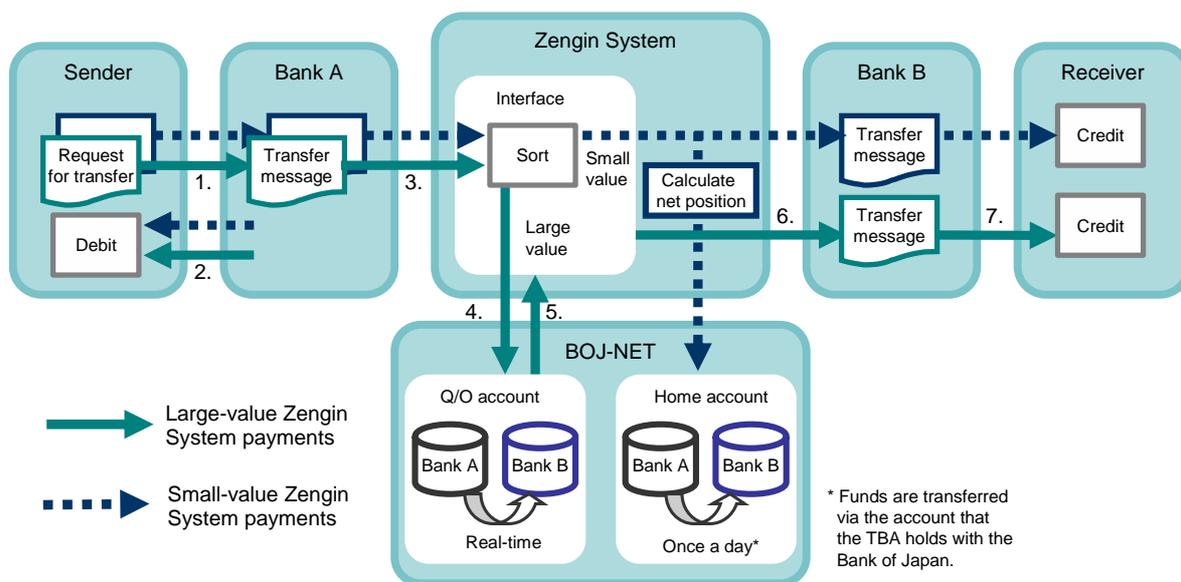
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intraday payments. Two distinct groups of points show that the amount of liquidity required for settlement (horizontal axis) has been reduced following the launch of Phase 1. The average amount of liquidity required before and after Phase 1 is 14 trillion yen and 12 trillion yen, respectively, indicating a potential liquidity saving of 2 trillion yen.

### C. Preparations for Phase 2

With the implementation of Phase 2 in November 2011, large-value retail payments processed in the Zengin System will be routed to BOJ-NET via a newly constructed interface connecting the two systems, with settlement taking place in BOJ-NET on an RTGS basis (Chart 3-7).<sup>27</sup> For the purpose of the project, a payment in the Zengin System is considered "large-value" if it is equal to or larger than 100 million yen. Payments of less than 100 million yen will continue to be settled on a DNS basis.

**Chart 3-7: Settlement Process for Zengin System Payments after Phase 2 Implementation**



1. The Sender instructs its Bank A to make a payment to the Receiver at Bank B.
2. Bank A debits the Sender's account.
3. Bank A sends a transfer message to the Zengin System.
4. The Zengin System identifies a "large-value" payment and routes the interbank settlement information to the BOJ-NET.
5. The Bank of Japan debits Bank A's Q/O account and credits Bank B's Q/O account.
6. The Zengin System sends the full transfer message to Bank B.
7. Bank B credits the Receiver's account.

<sup>27</sup> The Zengin System will take a subset of the information necessary for interbank settlement from the transfer instruction submitted by the sending bank and route the subset to BOJ-NET for RTGS processing. Once the Zengin System receives confirmation from BOJ-NET that settlement has taken place, it will send the full transfer message to the receiving bank.

According to the figures for October 2009, large-value payments accounted for less than 1 percent of the payments processed in the Zengin System in terms of the number of payments, but accounted for around 70 percent in terms of value. These payments, which currently settle at 16:15 on a DNS basis, will become final during the course of the day, resulting in a further reduction of intraday settlement exposure in large-value payments.

Preparations for Phase 2 implementation are underway for both BOJ-NET and the Zengin System. The Bank has started the system development process for changes to BOJ-NET after defining the business requirements and system specifications in September 2009. One of the changes that will be made to BOJ-NET is to enable the system to open thirty minutes earlier than the current opening time of 9:00 on high-volume days. This will prevent the crediting of customer accounts by the Zengin System member banks from being delayed due to the shift to RTGS.<sup>28</sup> TBA, the operator of the Zengin System, selected the vendor charged with developing the 6th generation system in May 2008. In October 2008, TBA released to member banks the general specifications of the new system. System design specifications and a testing schedule were further announced in 2009.

Going forward, market participants will consider whether changes to market guidelines and other practices will be necessary in order to ensure smooth settlement after the migration of large-value Zengin System payments to RTGS. The Bank will continue to coordinate closely with TBA and other relevant parties to facilitate the transition.

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<sup>28</sup> In the Zengin System, payments tend to be concentrated on the last day of each month. In addition to enhancing its own processing capacity, the Zengin System has worked to alleviate the processing burdens on member banks by allowing the sending bank to send transfer instructions to the receiving bank via the Zengin System on days prior to or in the early morning (before 9:00) of the specified settlement date. This has allowed receiving banks to credit their customer accounts at around 9:00 on the settlement date. After the shift of large-value Zengin System payments to RTGS, however, transfer instructions will be delivered to the receiving bank only after settlement takes place in BOJ-NET, which could delay the crediting of customer accounts on high-volume days. In order to address this issue, the Bank will allow the Zengin System to request that BOJ-NET be opened up to thirty minutes early on the last business day of each month.