BOJ Reports & Research Papers

Payment and Settlement Systems Report 2006

Payment and Settlement Systems Department

Bank of Japan

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Abstract

This report reviews developments in payment and settlement systems in Japan during 2006 and the first quarter of 2007. It also discusses the three issues that have emerged as a result of those developments, and the steps that have been taken to address them.

Overall, the BOJ-NET Funds Transfer System continued to achieve smooth processing of payments, with participants appropriately controlling the timing of their intraday payment flows, even in the context of a rapid increase in the value and volume of payments. Private-sector payment and settlement systems continued to achieve smooth processing of payments while maintaining an appropriate level of risk management.

At the participant level, it has become increasingly important to further improve the intraday management of liquidity and payment flows. At the system level, the growth in volume of payments and securities transfers has also highlighted the importance of enhancing operational and system capabilities.

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* This is an abridged English translation of the *Payment and Settlement Systems Report 2006* originally published in Japanese on July 18, 2007. The full report is available only in Japanese.

I. Introduction

Payment and settlement systems are fundamental to the functioning of the economy. Commercial and financial transactions can occur only if there is a high degree of confidence that payments will be made on a timely basis. A failure of payment and settlement systems to function smoothly could have a widespread adverse impact on the overall economic activity. Owners/operators of payment and settlement systems and their participants are therefore responsible for maintaining the smooth daily operation of those systems and for enhancing their safety and efficiency.

The Bank of Japan plays a number of roles in the area of payment and settlement. As a provider of settlement assets and an operator of payment and settlement systems, the Bank issues banknotes and provides funds transfer services via financial institutions' current accounts held with the Bank (BOJ accounts). In securities settlement, the Bank operates the Japanese Government Bond (JGB) Book-Entry System and the JGB Registration System. The Bank oversees payment and settlement systems in Japan in order to promote their safety and efficiency, and also participates in cooperative oversight of cross-border or multicurrency payment and settlement systems with other central banks concerned.

Payment and settlement systems have been subject to significant changes. Growing awareness of risks in payment and settlement systems has led to the introduction and enhancement of various mechanisms for reducing and managing risks. Continuous advances in information technology have facilitated automation of clearing and settlement processes, straight-through processing of payments, and delivery-versus-payment (DVP) for securities settlement. Furthermore, changes in financial markets, such as the greater diversity of market participants, the greater range of financial products, and globalization have affected the structure of payment and settlement arrangements.

This report reviews developments in payment and settlement systems in Japan during 2006 and the first quarter of 2007.[1] In 2006, the value and volume processed by payment and settlement systems in Japan increased or remained at a high level, affected by changes in monetary policy and economic expansion. Some systems, the BOJ-NET Funds Transfer

[1] For an overview of payment and settlement systems in Japan, see the section on Japan in Bank for International Settlements (2003), *Payment and Settlement Systems in Selected Countries*.

System and the BOJ-NET JGB Services in particular, marked the highest level of activity in terms of value and volume since 2001. This has posed additional challenges and increased the complexity in ensuring safety and efficiency of payment and settlement systems. At the participant level, it has become increasingly important to further improve the intraday management of liquidity and payment flows. At the system level, the growth in volume has highlighted the importance of enhancing operational and system capabilities.

The rest of the report is organized as follows. Section II discusses developments in payment and settlement activity during the period under review. Section III discusses the three issues that have emerged as a result of these developments, and the steps that have been taken to address them. The last part of the report sets out future priorities of the Bank.

II. Developments in Payment and Settlement Activity

This section describes activity in payment and settlement systems during 2006 and the first quarter of 2007.

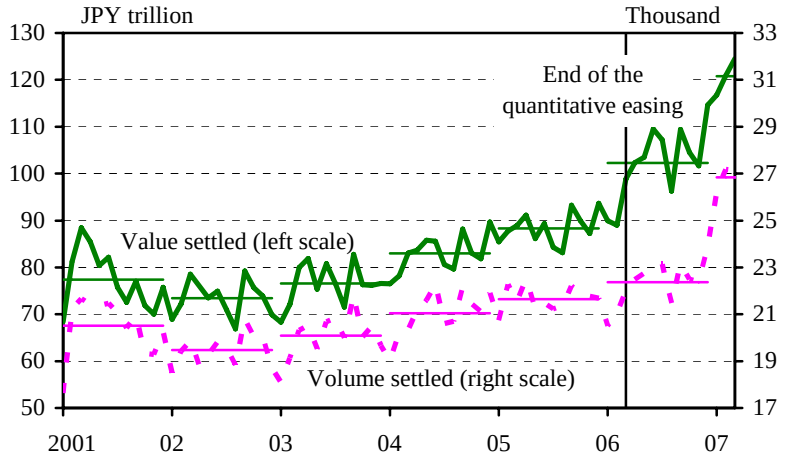
A. Payment Systems

The BOJ-NET Funds Transfer System is a real-time gross settlement (RTGS) system owned and operated by the Bank. It settles call loans, the cash legs of securities transactions, including those of JGBs, and the net positions of private-sector deferred net settlement (DNS) systems.

As shown in Chart 1, the daily average value and volume settled in the BOJ-NET Funds Transfer System, which had been increasing at a moderate pace starting from 2003 onward, showed significant growth after the end of the Bank's quantitative monetary easing policy in March 2006. Factors responsible for the growth include increased activity in JGB repo and other money markets following the end of the quantitative easing. In 2006, the system settled a daily average of JPY 102 trillion and 22 thousand transactions, representing year-on-year increases of 15.8 percent and 3.4 percent, respectively. The increase in the

value and volume settled continued in the beginning of 2007. On March 20, 2007, the system settled JPY 188 trillion, the highest daily value since its conversion to RTGS in 2001. The recent surge in volume was partly due to the introduction of the DVP mechanism for the settlement of dematerialized investment trusts in January 2007.

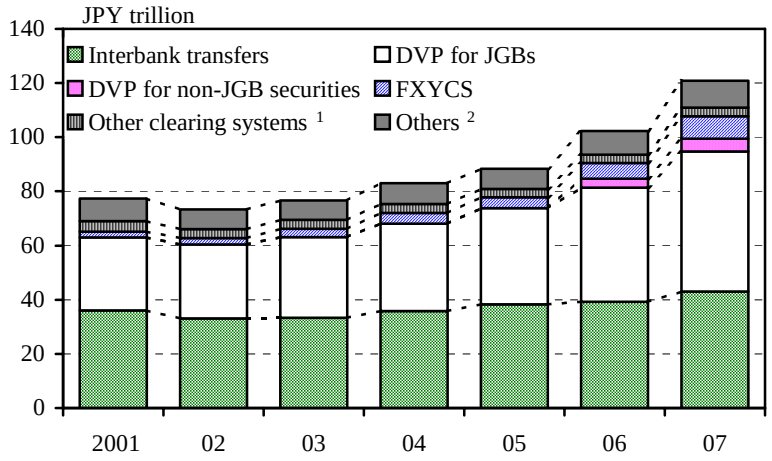
Chart 1:
Average Daily Value and Volume of Payments Settled in the BOJ-NET Funds Transfer System



Source: Bank of Japan.

Chart 2 shows the value settled in the BOJ-NET Funds Transfer System with breakdown by the type of transaction. Of the 15.8 percent increase in the total value settled through the system in 2006, 7.4 percent comes from the cash legs of JGB transactions (DVP for JGBs[2]), and 3.6 percent from those of non-JGB securities such as dematerialized commercial paper and corporate bonds (DVP for non-JGB securities). Similarly, 3.3 percent comes from interbank transfers which are mostly related to call loans. The remaining 2.0 percent comes from payments arising from the Foreign Exchange Yen Clearing System (FXYCS).

Chart 2:
Average Daily Value of Payments Settled in the BOJ-NET Funds Transfer System by the Type of Transaction



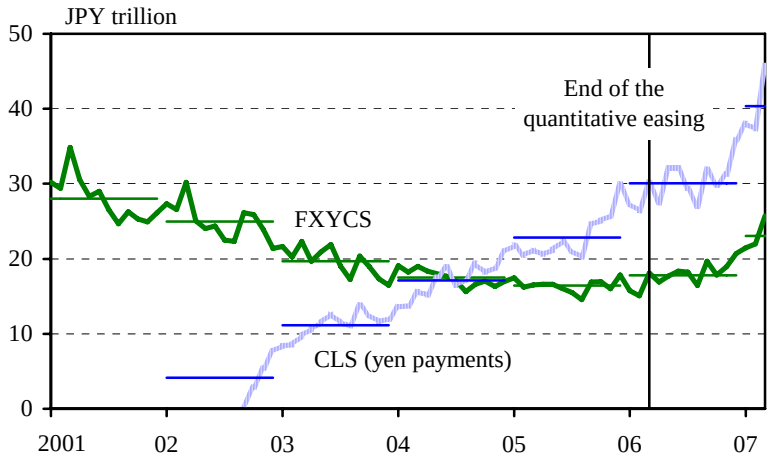
Notes: 1. The value of settlement of net positions arising from the Zengin Data Telecommunication System (Zengin System), bill and check clearing systems, and the Tokyo Financial Exchange (TFE).
2. Includes payments to and from the Bank of Japan.
Source: Bank of Japan.

There are two major private-sector payment systems used for settling the yen leg of foreign exchange transactions, namely, FXYCS and the Continuous Linked Settlement (CLS). FXYCS is operated by the Tokyo Bankers Association (TBA) and processes yen payments resulting from cross-border financial transactions, including foreign exchange transactions. CLS is a multicurrency settlement system that settles the two legs of a foreign exchange transaction on a payment-versus-payment basis.

[2] Refer to BOX 1 for the DVP mechanism for JGB transactions.

Chart 3 shows the daily average value of payments processed by FXYCS and CLS. The value processed by both systems increased as a result of the growth in foreign exchange market activity. During 2006, FXYCS processed JPY 18 trillion per day and CLS JPY 30 trillion, resulting in a growth of 8.6 percent and 31.7 percent year on year, respectively. The value processed by FXYCS had been declining since 2002 due to the migration of CLS-eligible transactions to CLS, but it started to increase in 2006 for the first time in five years. This is partly attributed to the completion of the migration of eligible payments to CLS. An expansion of activity in the euroyen market, which is also processed by FXYCS, has added to the growth. A further significant increase was observed in the value of payments processed by both systems in the beginning of 2007.

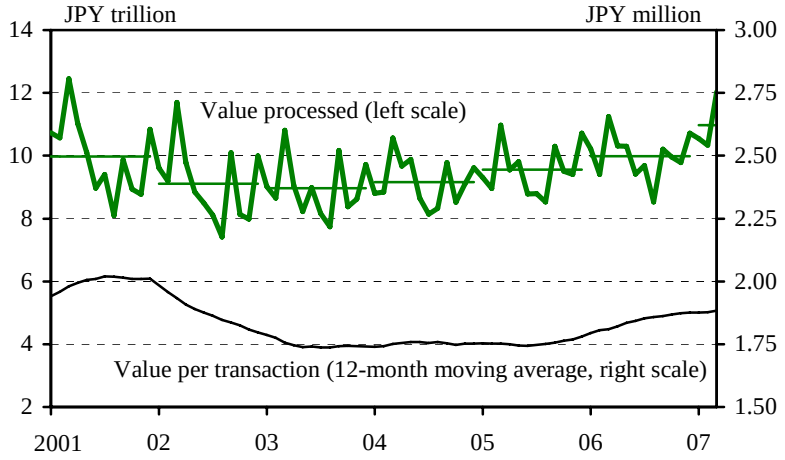
Chart 3:
Average Daily Value of Payments Processed by FXYCS and CLS



Sources: TBA; CLS.

The Zengin Data Telecommunication System (Zengin System) is an interbank clearing system for retail credit transfers, operated by TBA. As shown in Chart 4, the daily average value processed by the Zengin System increased slightly in 2006, continuing the upward trend observed since 2003. Since 2005, the average value per transaction increased at a moderate pace, indicating an increase in the share of large-value payments.

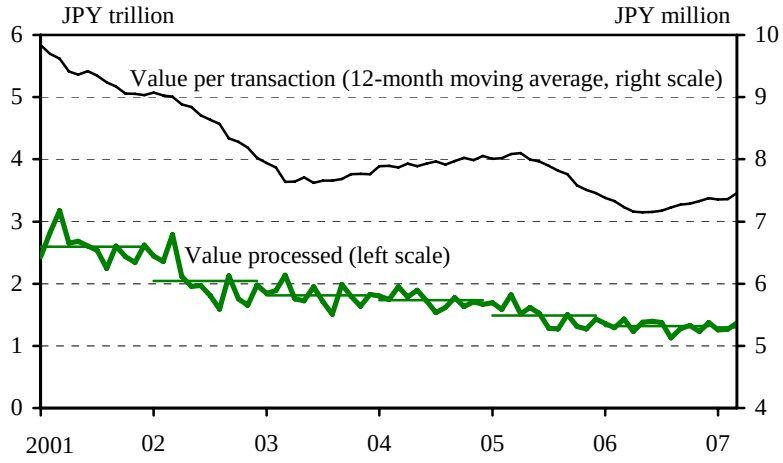
Chart 4:
Average Daily Value of Payments and Value per Transaction Processed by the Zengin System



Source: TBA.

Bill and check clearing systems (BCCSs) are arrangements for clearing bills and checks. The Tokyo Clearing House (TCH) is the largest of the BCCSs in Japan and processes over 70 percent of the total value of bills and checks exchanged at BCCSs. The daily average value processed by TCH continued to decline year on year (Chart 5). The decrease is attributed to a long-term shift away from bills and checks to credit transfers, which are usually processed by the Zengin System. Users prefer to avoid the cost of handling paper-based bills and checks and the cost of stamp tax placed on bills.

Chart 5:
Average Daily Value of Payments and Value per Transaction Processed by TCH

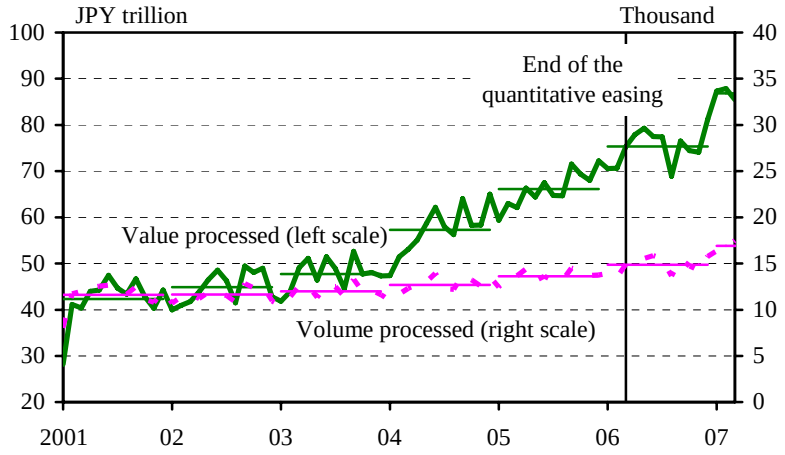


Source: TBA.

B. Securities Settlement Systems

The BOJ-NET JGB Services processes JGBs mostly through its JGB Book-Entry System. Chart 6 shows that the value and volume processed by the BOJ-NET JGB Services continued to grow, reflecting the higher level of issuance and the expansion of transactions including repo, while the pace of increase slowed down after the Japan Government Bonds Clearing Corporation (JGBCC) started operation in May 2005. The BOJ-NET JGB Services registered new records during 2006 with a daily average of JPY 75 trillion (in face value) and 15 thousand transactions, up 13.9 percent and 9.3 percent year on year, respectively. A further significant increase was observed in the beginning of 2007.

Chart 6:
Average Daily Value and Volume of JGBs Processed by the BOJ-NET JGB Services[1]

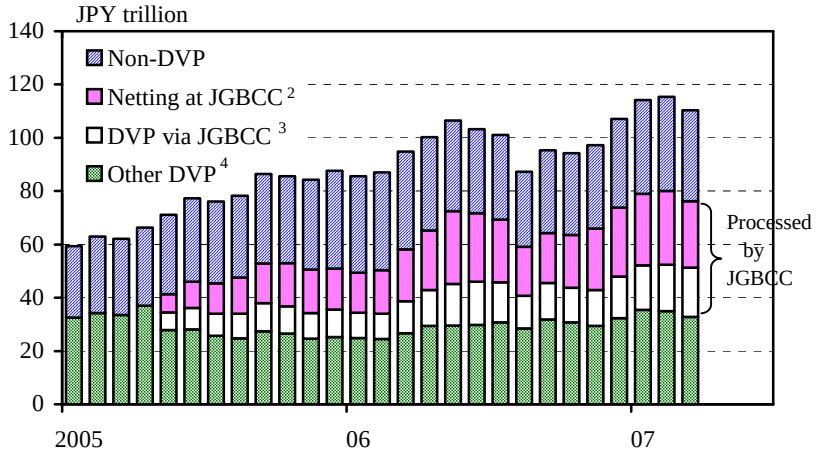


Note: 1. The total value (face value) and volume processed by the JGB Book-Entry System and the JGB Registration System.

Source: Bank of Japan.

Chart 7 shows that in 2006 the share of JGB transactions processed by JGBCC (in face value) as a proportion to the total JGB transactions stood at 31 percent,[3] representing an increase of 7 percentage points from the previous year. Without the netting effect of JGBCC, the total value of JGB transactions settled in the BOJ-NET JGB Services in 2006 would have been JPY 90 trillion with an increase of 20.4 percent.

Chart 7:
Average Daily Value of JGB Transactions Processed by the BOJ-NET JGB Services by the Type of Settlement Method[1]



Notes: 1. In face value.
2. The value of transactions netted out at JGBCC.
3. The value of DVP transactions processed through JGBCC.
4. The value of DVP transactions not processed through JGBCC.
Sources: JGBCC; Bank of Japan.

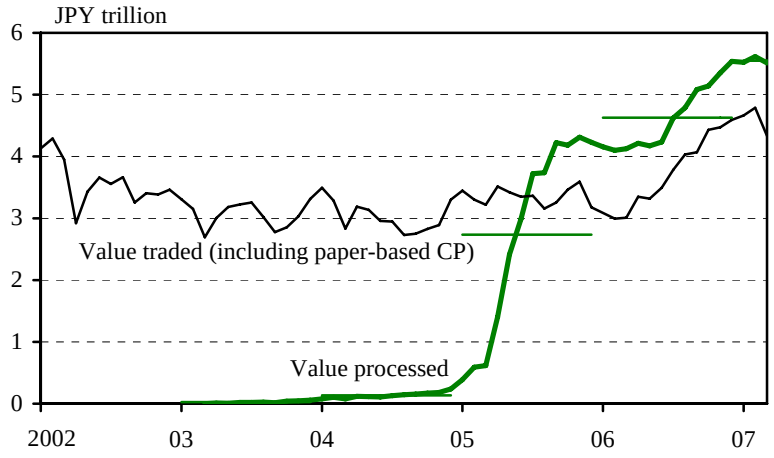
The Japan Securities Depository Center (JASDEC) is a central securities depository that operates book-entry systems for corporate and other bonds,[4] dematerialized CP, stocks, and investment trusts.

In 2006, the daily value and volume of dematerialized CP processed by JASDEC averaged JPY 4.6 trillion and 953 transactions, up 67.9 percent and 62.6 percent year on year, respectively. The significant growth reflects the higher level of issuance of dematerialized

[3] The estimated total value is calculated by adding JGB transactions processed through JGBCC and those not processed through JGBCC.
[4] Other bonds include municipal bonds, government-guaranteed bonds, and yen-denominated foreign bonds.

CP and the expansion of repo transactions during 2006 following the sharp increase in 2005, which was caused by the conversion from paper-based CP to dematerialized CP. A further increase, though at a slower pace, was observed in the beginning of 2007 (Chart 8).

Chart 8:
Average Daily Value of Dematerialized CP Processed by JASDEC

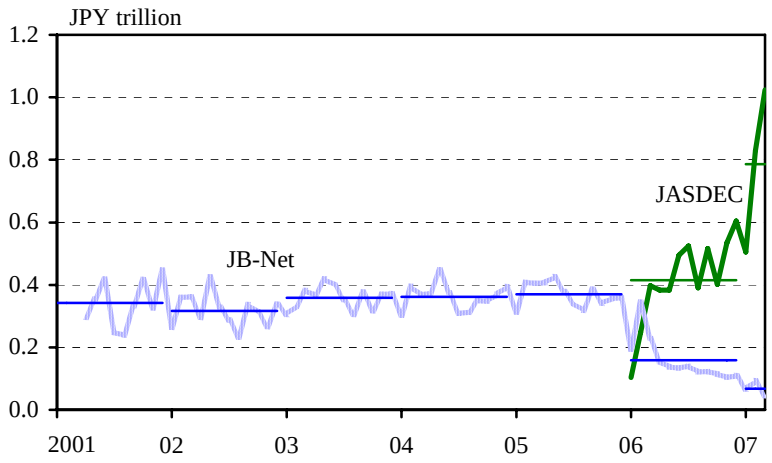


Sources: JASDEC; Japan Securities Dealers Association (JSDA).

As shown in Chart 9, the daily average value of corporate and other bonds processed by JASDEC increased at a high pace since it started a book-entry system for those securities in January 2006, averaging JPY 0.4 trillion and 746 transactions per day. This increase can be attributed to the migration of existing registered bonds to the new JASDEC book-entry system, in preparation for the upcoming abolition of current tax-relief measures relating to registered corporate bonds, to be implemented in January 2008. A further increase in value and volume settled was observed in the beginning of 2007.

In contrast, the daily value processed by Japan Bond Settlement Network (JB-Net) declined significantly in 2006 as a result of the aforementioned migration (Chart 9). JB-Net was an online network system that linked participants and registrars for the settlement of registered bonds. After almost ten years of operation, it ceased operations in April 2007 with the completion of the migration of existing bonds to the JASDEC book-entry system.

Chart 9:
Average Daily Value of Corporate and Other Bonds Processed by JASDEC and JB-Net

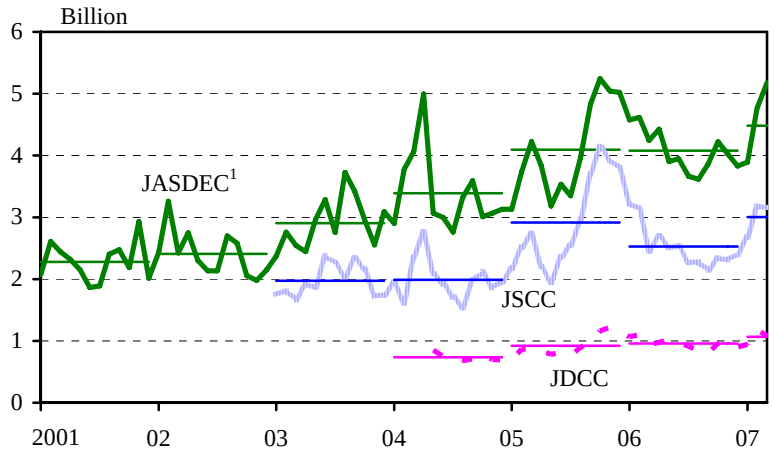


Sources: JASDEC; JB-Net.

Chart 10 shows the daily average number of stocks processed by JASDEC, the Japan Securities Clearing Corporation (JSCC), and JASDEC DVP Clearing Corporation (JDCC). JSCC provides clearing services for stocks and convertible bonds traded at the six stock exchanges in Japan (Tokyo, Osaka, Sapporo, Nagoya, Fukuoka, and Jasdaq), while JDCC provides clearing services for non-exchange trades of stocks and convertible bonds.

The number of stocks processed by JASDEC remained at a high level throughout 2006, although it decreased slightly from the previous year due to the slowing down of stock market activity. In 2006, the number of stocks processed by JASDEC averaged 4.1 billion, a decrease of 0.7 percent from the previous year. In the beginning of 2007, the volume showed a strong increase again. The number of stocks cleared through JSCC and JDCC followed a similar trend to those processed by JASDEC.

Chart 10:
Average Daily Volume of Stocks Processed by JASDEC, JSCC, and JDCC



Note: 1. JASDEC settles stock transactions processed by JSCC (exchange trades) and JDCC (non-exchange trades).
Sources: JASDEC; JSCC; JDCC.

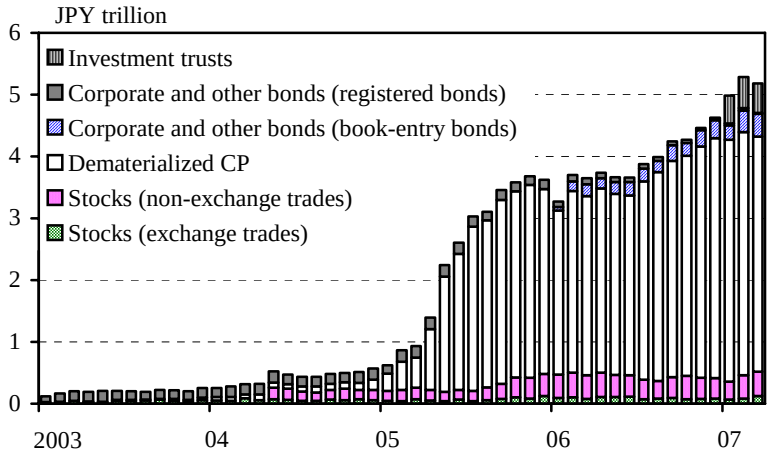
BOX 1: DVP Mechanism for Securities Settlements

In 1994, the Bank introduced DVP for JGBs by linking the BOJ-NET Funds Transfer System and the BOJ-NET JGB Services. The value settled through DVP for JGBs during 2006 reached JPY 42 trillion, an increase of 18.5 percent from the previous year.

Under the reform of securities settlement systems, the use of DVP expanded to various types of securities and transactions through the linking of securities settlement systems and the BOJ-NET Funds Transfer System. In 2006, the daily average value of securities transactions settled on a DVP basis (excluding DVP for JGBs) increased, mainly reflecting

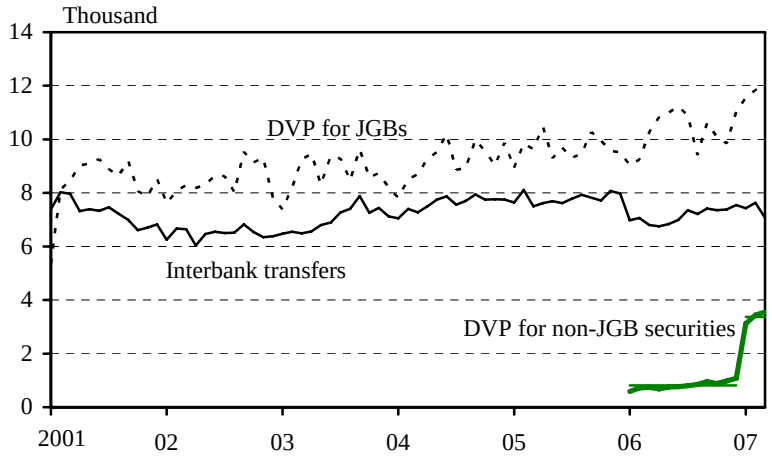
the increase in DVP for dematerialized CP (Chart B1-1). In addition, the volume of DVP settlements of non-JGB securities[5] during 2007 increased significantly following the start of the DVP mechanism for investment trusts (Chart B1-2).

Chart B1-1:
Average Daily Value of DVP Settlements (Excluding DVP for JGBs)



Sources: JSCC; JDCC; JASDEC; JB-Net.

Chart B1-2:
Average Daily Volume of DVP Settlements for Non-JGB Securities



Source: Bank of Japan.

[5] Non-JGB securities include CP, corporate and other bonds, and investment trusts processed by JASDEC.

III. Key Issues and Challenges

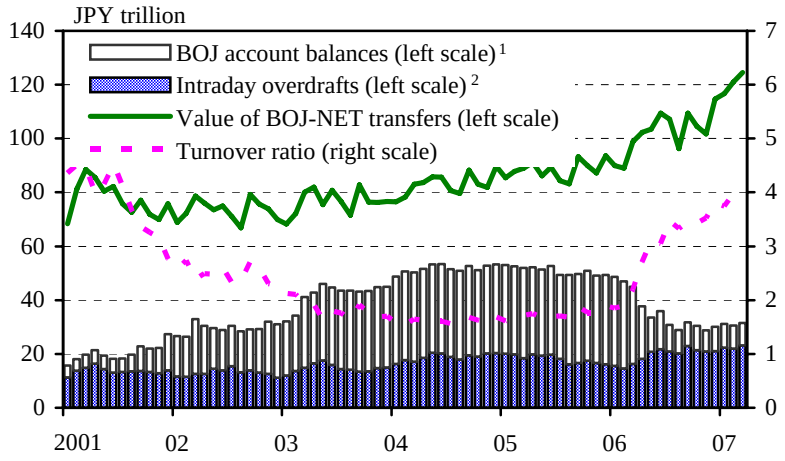
As illustrated in the previous section, during 2006 and the first quarter of 2007, the value and volume of payment and settlement activity showed significant increases. This presented new issues and challenges for systems and their participants in the area of liquidity management under RTGS, risk management in DNS systems, and operational reliability. Related developments in the environment surrounding payment and settlement systems have added to these challenges. This section discusses the three issues that have emerged and the steps that have been taken to address them.

A. Liquidity Management in the BOJ-NET Funds Transfer System

The total amount of liquidity used for settlement in the BOJ-NET Funds Transfer System consists of the total amount of overnight balances at BOJ accounts and intraday overdrafts provided by the Bank. Under the quantitative monetary easing policy, the outstanding balance at BOJ accounts was the operating target of the Bank's money market operations, and its target range was increased several times. During January 2004 to March 2006, the amount of overnight balances exceeded JPY 30 trillion (Chart 11). However, after the end of the quantitative easing in March 2006, with the reduction of overnight balances, the total amount of liquidity including intraday overdrafts, which exceeded JPY 50 trillion at its peak, declined to about JPY 30 trillion.

Chart 11 also shows the turnover ratio in the BOJ-NET Funds Transfer System. The turnover ratio is calculated by dividing the total value settled by the total amount of liquidity in the system. As a result of the decrease in the total amount of liquidity available for settlement, together with the increasing value of payments processed, the system's turnover ratio increased sharply soon after the end of the quantitative easing and continued to increase at a moderate pace. A higher turnover ratio indicates a higher reliance by participants on incoming payments from others as a source of funding, and increases the importance of intraday management of liquidity and payment flows by each participant.

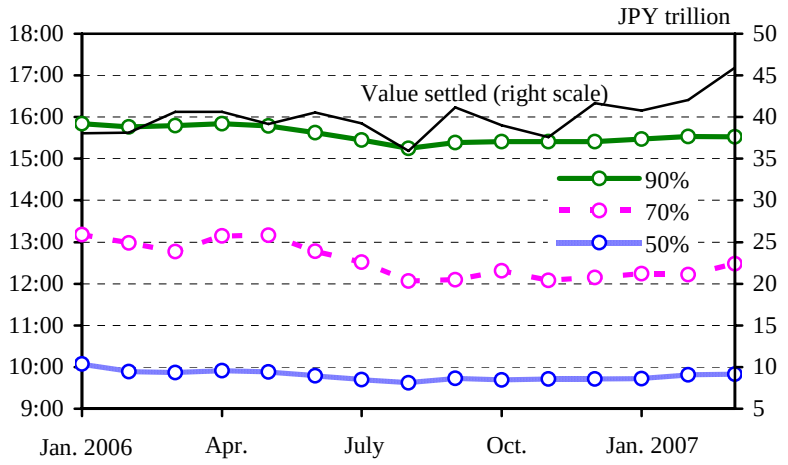
Chart 11:
Average Daily Value Settled and Liquidity Available for Settlement



Notes: 1. The daily average for each reserve maintenance period.
2. The daily average of intraday peak overdrafts.
Source: Bank of Japan.

Overall, the BOJ-NET Funds Transfer System continued to achieve a smooth flow of payments, despite the increase in the turnover ratio, with participants appropriately controlling the timing of their intraday payment flows. For the settlement of call loans, participants continued to observe the market guideline relating to the trading and settlement of call money transactions.[6] As a result, a large percentage of the day's interbank transfers were completed in the early morning (Chart 12).

Chart 12:
Timing of Interbank Transfers in the BOJ-NET Funds Transfer System[1]



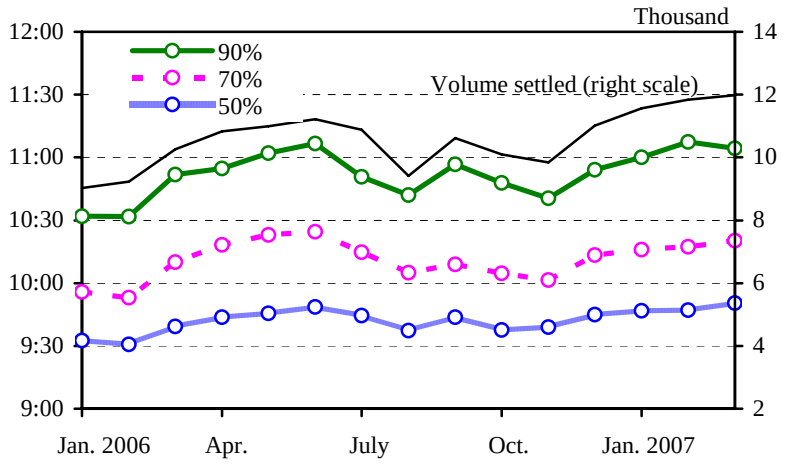
Note: 1. Shows the average times at which 90 percent, 70 percent, and 50 percent of the cumulative value of interbank transfers were settled in the BOJ-NET Funds Transfer System.

Source: Bank of Japan.

[6] The "repayment first rule" encourages borrowers to return call loans immediately after 9:00 and no later than 10:00. The "one-hour rule" encourages lenders of call loans to release the funds within one hour after a contract is made. These rules help relieve the uncertainty about the timing of incoming payments.

Chart 13 shows that the pace of DVP for JGBs slowed down during the period of March to July 2006. This occurred because some participants' operations could not keep up with the surge in JGB settlement volume, which caused delays in payments of the cash legs of JGB transactions by those participants. From the third quarter of 2006, those participants' processing capacity, one of the causes of the delays, was enhanced and the degree of delays in settlement was reduced.

Chart 13:
Timing of DVP for JGBs in the BOJ-NET Funds Transfer System[1]

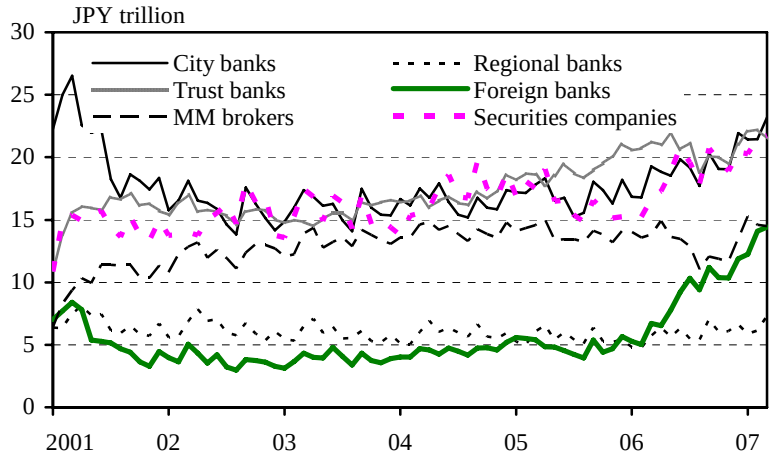


Note: 1. Shows the average times at which 90 percent, 70 percent, and 50 percent of the cumulative volume of JGB transactions were settled in the BOJ-NET Funds Transfer System.

Source: Bank of Japan.

Changes were also seen in the range of institutions participating in the market and in the structure of the payment network. These changes led to an increase in the value of payments settled in the BOJ-NET Funds Transfer System by foreign banks and securities companies (Chart 14). These institutions have faced higher constraints in raising intraday liquidity due to the limited holding of eligible collateral assets.

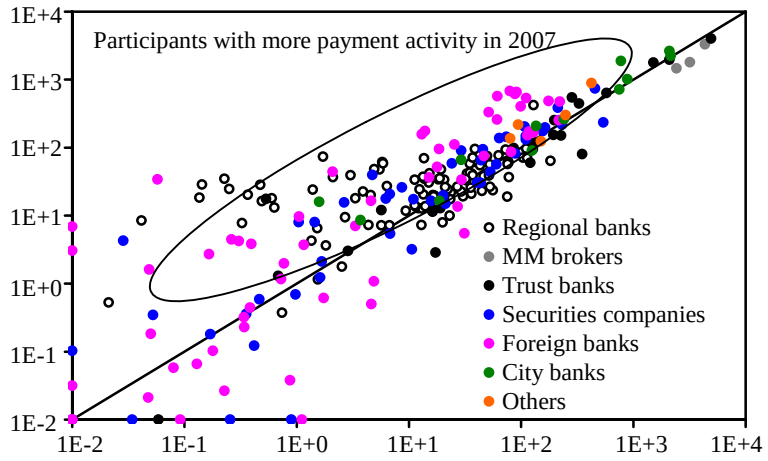
Chart 14:
Value of Payments Settled in the BOJ-NET Funds Transfer System by the Type of Institution



Source: Bank of Japan.

Chart 15 compares the daily average value of interbank transfers made by each participant during January 2006 and January 2007. The chart shows that a large number of participants made more payments in January 2007, which was particularly the case for foreign banks and securities companies (see the number of points above the 45-degree line). To meet increasing demand for liquidity, foreign banks and securities companies expanded the use of intraday overdrafts (bar graph in Chart 16). In addition, in order to save liquidity costs associated with repayment of call loans in the early morning, some foreign banks entered into call loan transactions with a later repayment time. Some also increased the use of euroyen loans, which are processed by FXYCS.

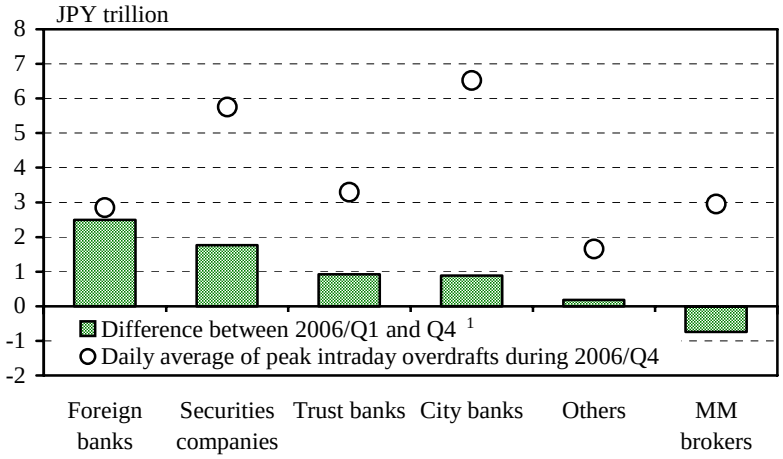
Chart 15:
Value of Interbank Transfers Settled by Each Participant[1]



Note: 1. The vertical axis shows the average daily value (JPY billion) of interbank transfers for January 2007, and the horizontal axis shows that for January 2006.

Source: Bank of Japan.

Chart 16:
Use of Intraday Overdrafts by the Type of Institution



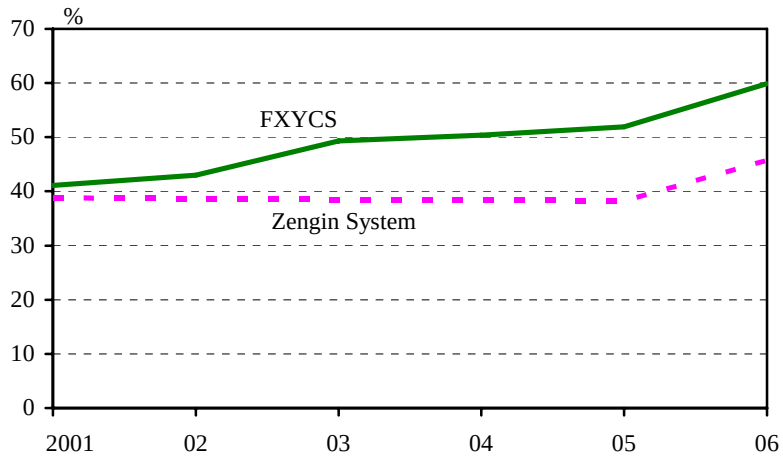
Note: 1. Positive values indicate an increase in the use of intraday overdrafts.
Source: Bank of Japan.

B. Risk Management in DNS Systems

DNS systems have the possibility of unwinding all payments submitted to the system in the event of a failure to settle by a participant, which can be a source of systemic risk. FXYCS and the Zengin System, both of which are DNS systems, have mechanisms in place to manage such risk within the system. For example, both systems place a sender net debit cap on the maximum level of exposure that each participant can pose to the system. In sending payment instructions, each participant makes sure that its net short position stays within the cap. Both systems also have committed lines of credit from liquidity providers in order to ensure the timely completion of daily settlements in the event a participant fails to meet its settlement obligation.

In FXYCS and the Zengin System, payments became more concentrated on a small number of participants as a result of a series of mergers among major participants and an increase in cases of outsourcing of payment processing by foreign banks to major Japanese banks (Chart 17). With the growth in the overall value of payments, there were increasing cases where those participants temporally could not send payment instructions to these systems because they had reached their sender net debit caps. This resulted in a delay in throughput in the two systems.

Chart 17:
Share of Top Three Participants in the Total Value Processed by FXYCS and the Zengin System



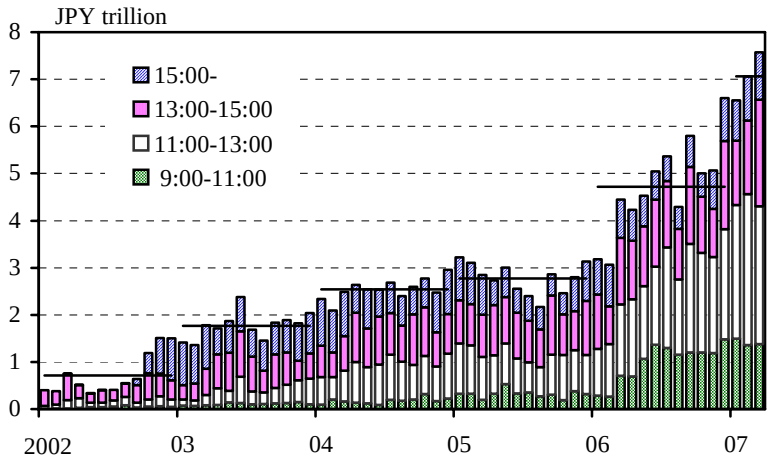
Source: TBA.

One solution for avoiding such delays would be to raise the sender net debit caps. However, such a raise would require an increase in the value of collateral deposited by participants and in the value of liquidity commitments, and would not be a suitable solution for participants due to both liquidity and collateral constraints (see BOX 2 for more details on liquidity provision arrangements). Accordingly, a different approach was taken by both systems. Both systems introduced steps that require participants reaching the cap to bear the additional liquidity burden in order to reduce delays in sending payment instructions. With those steps, which are explained below, both systems have achieved smooth processing of payments while maintaining an appropriate level of risk management.

FXYCS has an RTGS mode as an alternative to the DNS mode. Participants with large net

short positions route some portion of their payments to the RTGS mode, which is not subject to exposure control, in order to keep their net short positions in the DNS mode within their sender net debit cap. This mitigated the delay in throughput in the DNS mode.[7] Chart 18 shows the value settled through the FXYCS RTGS mode at different times of the day. The chart shows that there was a marked increase in the share of RTGS payments sent during 2006, which resulted from the further concentration of payments on the top participants. Due to the larger liquidity cost associated with RTGS, previously the use of RTGS had been limited to certain occasions, for example, settlement of payment instructions received after the cut-off time of the DNS mode (13:45) and pay-ins and pay-outs for CLS settlement (15:00-18:00).

Chart 18:
Average Daily Value of RTGS Payments Processed by FXYCS by the Time of the Day



Source: Bank of Japan.

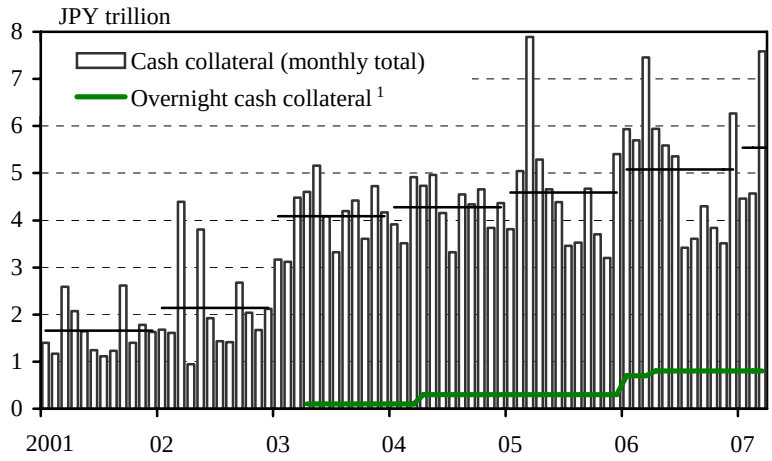
The Zengin System only has a DNS mode; therefore, participants' net short positions for all payments sent to the system have to be kept within their sender net debit caps. In the Zengin System, participants potentially reaching the cap deposit intraday cash collateral[8]

[7] The throughput guideline in FXYCS requires participants to send 65 percent of daily value and 55 percent of daily volume by 11:00. The average level of throughput in the FXYCS DNS mode at 11:00 in December 2006 was 34 percent by value and 70 percent by volume. In order to achieve the targets, participants are encouraged to send their payment instructions, especially those for large-value payments, earlier.

[8] When depositing cash collateral, unlike securities collateral, the liquidity providers' commitment value does not have to be raised, since cash collateral can be used immediately as liquidity in case of

with TBA in order to temporally raise their sender net debit caps. This has become a common practice to avoid delays in sending payment instructions. Moreover, some participants deposit overnight cash collateral the day before the last business day of each month, the peak volume day, in order to send their payment instructions in advance. Chart 19 shows the monthly value of cash collateral deposited with TBA. As shown in the chart, the value of cash collateral increased yearly.

Chart 19:
Value of Cash Collateral Deposited with TBA



Note: 1. The value of cash collateral that was deposited the day before the last business day.
Source: TBA.

a failure by a participant to meet its settlement obligation.

BOX 2: Liquidity Provision Arrangement

In 2006, the total of liquidity commitment in private-sector payment and settlement systems reached over JPY 4 trillion (Chart B2-1). This was almost equivalent to the total amount of liquidity providers' BOJ account balances. Some liquidity providers have committed to provide liquidity that is larger than their BOJ account balances. This means that they need to rely on overnight loans and other sources of funding in order to meet their commitments.

Chart B2-1: Liquidity Providers' Commitments[1]

Liquidity providers	Value of commitment (Apr. 2006 – Mar. 2007)					Outstanding balance of BOJ accounts (Jan. 2007)
	FXYCS	Zengin System	CLS	Other	Total	
Banks	774.6	2,306.5	200.0	489.0	3,770.1	3,694.3
Others	25.4	231.6	0.0	97.0	354.0	220.8
Total	800.0	2,538.1	200.0	586.0	4,124.1	3,915.1

Note: 1. Values are in JPY billion.

Sources: TBA; CLS; TFE; JDCC; JSCC; JGBCC.

Liquidity providers need to ensure that they have the ability to raise additional liquidity in a timely fashion in emergency situations. At the same time, at the individual system level, further improvements are needed to reduce the amount of liquidity commitments. Under the Bank's ongoing next-generation BOJ-NET Funds Transfer System (RTGS-XG) project, large-value payments currently processed by FXYCS and the Zengin System will be incorporated into the new BOJ-NET Funds Transfer System.[9] As a result, in FXYCS, the risk management required under DNS, including the liquidity provision arrangement, will be abolished. In the Zengin System, the size of sender net debit cap and the size of commitment lines are expected to be reduced significantly, because large-value payments, which tend to increase the participants' net short positions, will migrate to the BOJ-NET Funds Transfer System.

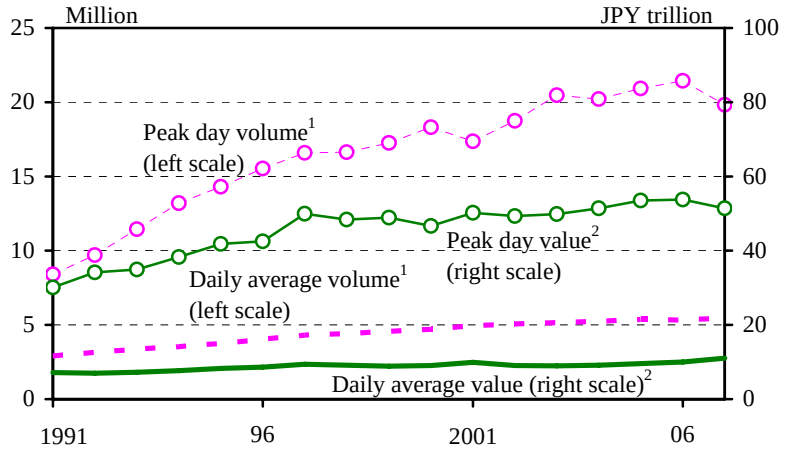
[9] For more details about the project, refer to Bank of Japan (2006), "Japan's Next-Generation RTGS."

C. Operational Reliability

During 2006, in response to the growth in volume settled, some payment and settlement systems took steps to expand their operating hours and to enhance their system performance and capacity.

In the Zengin System, partly due to business practices, payments are increasingly concentrated on the last business day of each month. As a result, the gap between the volume processed on peak days and that on regular days has widened (Chart 20). Concentration of payments also occurs within the day, during the first two to three hours from the opening of the system, placing further pressure on the system's processing capacity. To mitigate the concentration of payments at peak times, starting from May 2006, the Zengin System has moved up the opening time by one hour from 8:30 to 7:30 on the last business day of each month. Furthermore, an expansion of the system's file capacity is planned for 2007 in order to meet the increasing daily volume of payments.

Chart 20:
Peak and Average Daily Value and Volume of Payments Processed by the Zengin System

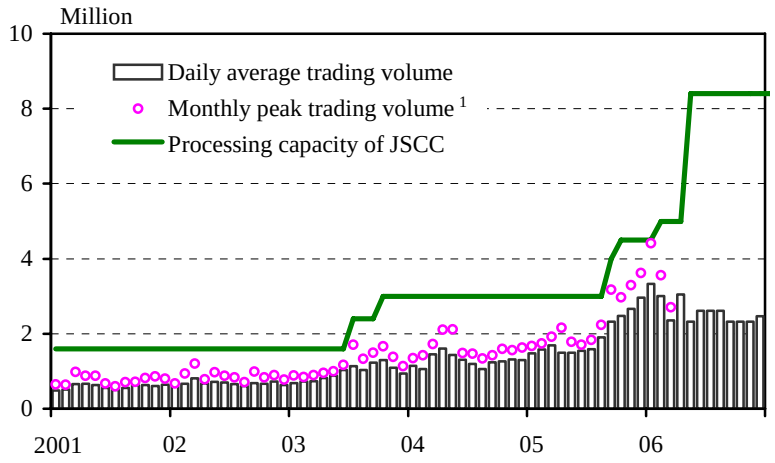


Notes: 1. Payment instructions are counted based on the date settled in the Zengin System.
2. Payment instructions are counted based on the date submitted to the Zengin System.
Source: TBA.

Chart 21 shows the average and peak number of trades executed at the Tokyo Stock Exchange (TSE) and the processing capacity of JSCC, the clearing system for exchange-traded stocks. The number of orders and trades handled by TSE increased

significantly in the second half of 2005. On January 18, 2006, TSE announced that it would shorten the trading session for the day to 14:40, as the number of transactions was about to exceed the system capacity of JSCC. From January 19 to April 21, the afternoon trading session was shortened by shifting back the opening time by 30 minutes. In May 2006, the clearing system's processing capacity was expanded, with sufficient room for future increases in trading activity.

Chart 21:
Peak Trading Volume Processed in TSE and the Processing Capacity of JSCC



Note: 1. Data after April 2006 are not available.
Source: TSE.

IV. Future Tasks for the Bank of Japan

As seen in the previous sections, in 2006, the value and volume processed by payment and settlement systems in Japan increased or remained at a high level, affected by changes in monetary policy and economic expansion. This has raised additional challenges and increased the complexity in achieving safety and efficiency of payment and settlement systems.

In light of the developments in trading and settlement activity, the Bank will continue to encourage participants and owners/operators of payment and settlement systems to enhance

the level of risk management and operational and system capabilities. In addition, the Bank will continue to work on the development of arrangements and infrastructure to address the three issues identified in the previous section.

A. Liquidity Management in the BOJ-NET Funds Transfer System

The Bank will introduce liquidity-saving features into the BOJ-NET Funds Transfer System under the RTGS-XG project. The liquidity-saving features will allow participants to efficiently recycle liquidity within the system, achieving a smooth flow of payments even with a higher turnover ratio.

In order to recycle liquidity efficiently, it is also important that the functioning of the money market be enhanced. Through various initiatives, the Bank will continue to support the efforts by market participants to increase liquidity in the market.

B. Risk Management in DNS Systems

As mentioned in BOX 2, under the RTGS-XG project, large-value payments currently processed by FXYCS and the Zengin System will be incorporated into the new BOJ-NET Funds Transfer System. As a result, the FXYCS DNS mode will be abolished along with the associated risk management measures. The migration of large-value payment flows is also likely to lead to a reduced sender net debit cap and reduced liquidity commitments in the Zengin System.

Nevertheless, the liquidity provision arrangements will continue to play an important role in risk management in the payment and settlement systems. The Bank will continue to encourage operators of those systems to maintain the effectiveness of liquidity provision arrangements by ensuring that liquidity providers can meet their commitments in emergency situations.

C. Operational Reliability

It is expected that the volume of payments settled in the BOJ-NET Funds Transfer System will continue to increase along with further growth in money market activity, the planned implementation of the RTGS-XG project, and the expanded use of DVP. The Bank will

continue to monitor and ensure that the systems maintain sufficient processing capacity to support the projected volume. The Bank will also continue to encourage private-sector systems to take necessary measures to plan for the expected increase in volume.