An Evaluation of the First Six Months of New BOJ-Net with Queuing and Offsetting Mechanism

August 2009
7th Payment and Settlement System Simulation Seminar and Workshop

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RTGS-XG

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RTGS-XG

1. Overview of RTGS-XG Project

1-1. Next-Generation RTGS project

Objective: To further enhance the safety and efficiency of large-value payment systems in Japan

Sub-project A:

Introduce liquidity-saving features (LSF) into BOJ-NET FTS

→ Reduce liquidity burden (account balances and collateral) of individual financial institutions.

→ Achieve more efficient (i.e., less liquidity) and smooth settlement in BOJ-NET FTS.

Sub-project B:

Incorporate large-value payments currently handled by two private-sector DNS systems into the new BOJ-NET FTS (RTGS) with LSF

→ Introduce RTGS for all types of large value payments, thereby reducing systemic risk.

1. Overview of RTGS-XG Project

1-2. Phased implementation

Phase 1 (successfully launched on Oct 14 2008)

- Introduce liquidity-saving features into BOJ-NET Funds Transfer System (BOJ-NET FTS)
- Incorporate FXYCS* payments into BOJ-NET FTS

(FXYCS will fully convert to RTGS mode, abolishing the current DNS mode)

Phase 2 (planned on Nov. 2011)

(along with the launch of the sixth-generation Zengin System)

- Incorporate large-value Zengin payments into BOJ-NET FTS

The Zengin System will develop an interface for connection to BOJ-NET FTS.

* Foreign Exchange Yen Clearing system

1. Overview of RTGS-XG Project

1-3. Main features of new account (Q/O account)

- New accounts with queuing and offsetting facilities (Q/O account) are introduced
- One Q/O account for each users
- Available from 9:00 to 16:30

  The outstanding balances at 16:30 are transferred to Home account.

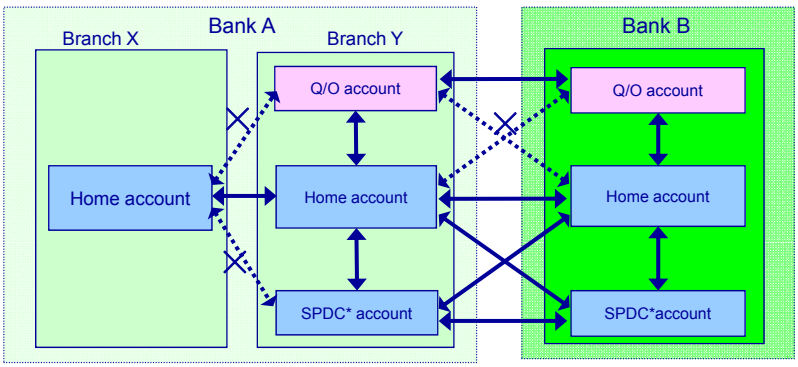
  Cut-off time for FXCYS transactions is 14:00

  Operation hours for Home account is 9:00 to 17:00 (19:00 for registered users)
- Liquidity for settlement can be transferred from Home account.

  Intraday overdraft is not provided for Q/O account (available for Home account).

1. Overview of RTGS-XG Project

1-3. Main features of new account (Q/O account)



*SPDC = Simultaneous Processing of DVP and collateralization (settlement account for JGB)

1. Overview of RTGS-XG Project

1-4. Liquidity saving features

Bilateral offsetting algorithm

run continuously throughout the day when one of the following events occurs

(i) a new payment instruction entering the system

(ii) an increase in balances of the Q/O account

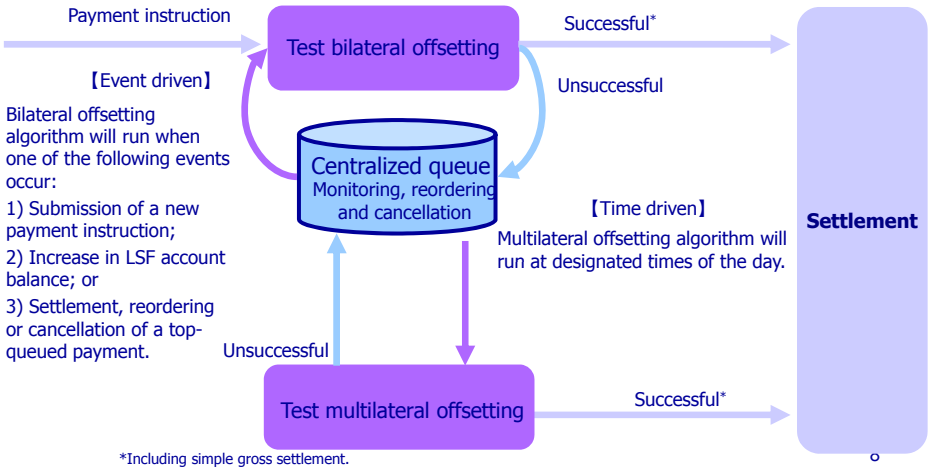
(iii) a change in the payment instruction at the top of the queue due to settlement, reordering , or cancellation

Multilateral offsetting algorithm

run 4 times a day (10:30,13:30,14:30,15:30)

1. Overview of RTGS-XG Project

1-4. Liquidity saving features



*Including simple gross settlement.

1 . Overview of RTGS-XG Project

RTGS XG

1-5. Market guidelines for Q/O account transactions

For call loan transactions

(i) Repayment first rule (by 10:00)

Borrowers of call loans should start repayment immediately after the opening of the system and complete the repayment by 10:00 at the latest.

(ii) One-hour rule

Lenders should release the funds within an hour after a contract is made.

Same as before

(iii) Lenders should submit the payment instruction for a new loan as soon as it acknowledges that the payment instruction for repayment of a former loan is placed in the queue.

New rule

For FXYCS transactions

(i) Throughput guideline (by 11:00)

65% of day's volume and 55% of value by 11:00

Nearly same as before

(ii) Cut-off time (at 14:00)

BOJ-NET will cancel all FXCYS payment instructions left on the queue at 14:00.

2. Basic statistics of BOJ-NET

RTGS XG

A number of users

at 14 Aug 2009

Online Users	Users with Q/O account	FXYCS members
349	**288**	**25**

1 euro = 130 JPY approx.

Average daily value/volume of settlements from 14-Oct-08 to 31-March-09*

Account type	Transaction type settled		Value (JPY trillion)	Volume (thousands)	Per transaction (JPY 100 million)
Home account	DVP (non JGB) Transactions with clearing systems,CLS,Gov't,BOJ		**28.4**	**10,315**	**27.6**
SPDC** account	JGB DVP		**46.4**	**10,823**	**42.9**
Q/O account	Account Total		**48.5**	**33,386**	**14.5**
		Of which money market (mostly call loan)	33.3	5,495	60.5
		Of which FXYCS	15.2	27,891	5.4
Total			**123.2**	**54,524**	**22.6**

*Same data coverage for all the following statistics unless otherwise stated

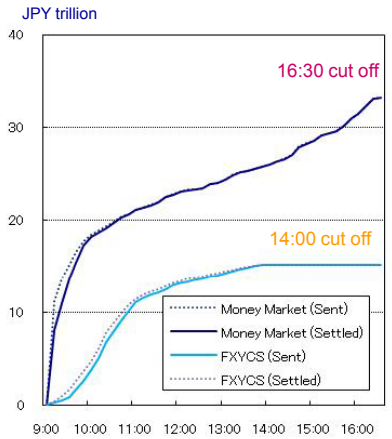
**SPDC = Simultaneous Processing of DVP and collateralization

3. Intraday Timing of Settlement

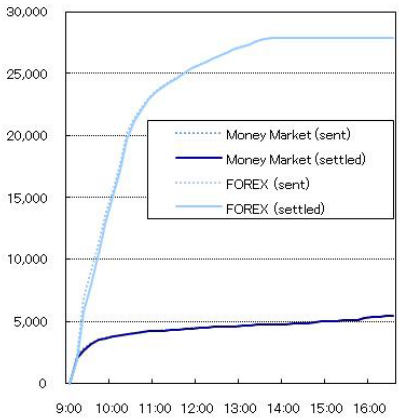
RTGS

3-1. Timing of submission and settlement

Value



Volume



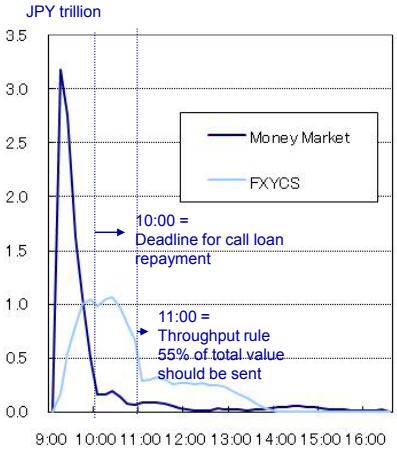
Solid line show the cumulative value or volume of payments settled. Dotted lines show that of payments sent.

3. Intraday Timing of Settlement

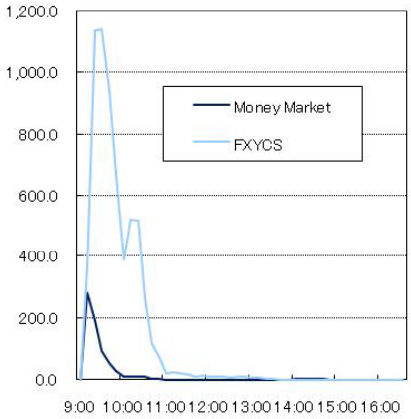
RTGS

3-2. Queued payment instructions

Value



Volume



The above lines show the outstanding value or volume of payment placed in the queue

3. Intraday Timing of Settlement

Participants control their payment submission pattern to meet the relevant industry guidelines.

- eg. Money market transaction from 9:00 to 10:00, FXYCS from 10:00 to 11:00

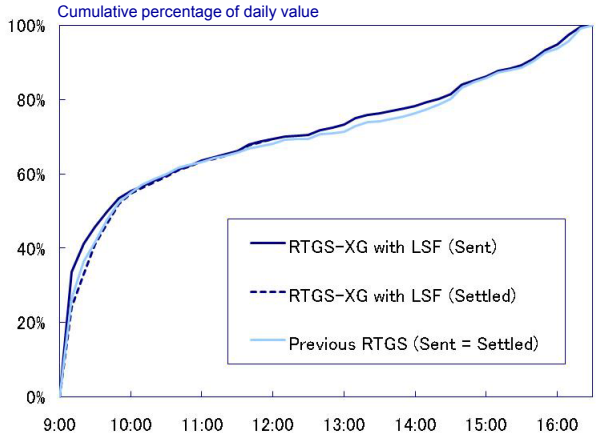
Participants prioritize payments based on time criticality (Money market > FXYCS) of each payment type.

Average time in queue (minutes)		
	Un-weighted average	Value-weighted average
Money market	1:25	3:18
FXYCS	2:15	8:14

3. Intraday Timing of Settlement

3-3. Change in intraday pattern of settlement

Money market transactions

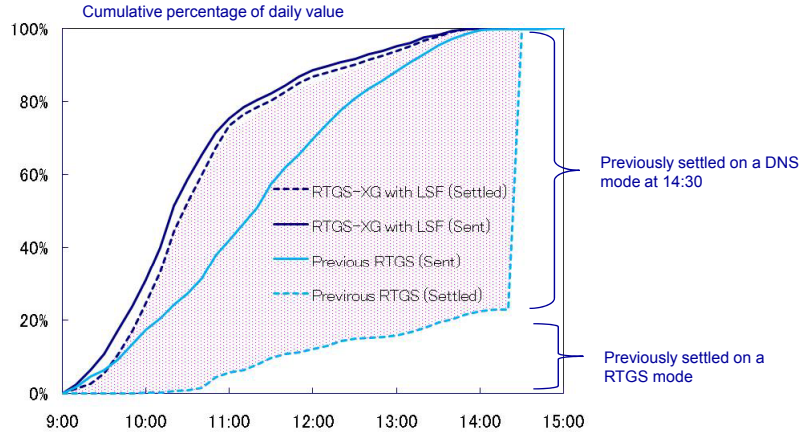


Figures for the previous RTGS are calculated using data from October 17,2007 to March 31 2008

3. Intraday Timing of Settlement

3-3. Change in intraday pattern of settlement

FXYCS transactions



Under previous RTGS, around 20 percent of FXYCS payments settled in a RTGS mode, and around 80 percent in the DNS mode. Settlement took place in the DNS mode at 14:30.

3. Intraday Timing of Settlement

3-3. Change in intraday pattern of settlement

Value-weighted average time of submission and settlement

	Previous RTGS		RTGS-XG with LSF	
	Sent	Settled	Sent	Settled
Money market	11:11:21	11:11:21	11:08:55	11:12:13
FXYCS	11:18:52	13:54:14	10:34:16	10:42:30
Total	11:14:43	12:10:25	10:58:04	11:02:55

1. Figures for the period before the start of Phase 1 are calculated using data from October 17, 2007, to March 31, 2008.
2. Before Phase 1, all money market payments settled on an RTGS basis without the queuing mechanism. For those payments, the cumulative percentage of payments submitted is identical to the percentage of payments settled. Also, before Phase 1, around 20 percent of FXYCS payments settled in the system's RTGS mode, and around 80 percent in the DNS mode. For those payments, the cumulative percentage of payments submitted equals the percentage of payments settled at 14:30, when the settlement takes place in the DNS mode.

3. Intraday Timing of Settlement

RTGS

3-3. Change in intraday pattern of settlement

a) Money market transactions

No significant change in the timing of settlement

The market guidelines for coal loan had already been well observed before introducing Q/O facilities.

b) FXYCS transactions

Both the timing of submission and settlement shifted significantly earlier

- Obvious results from changing settlement mode from DNS (14:15) to RTGS
- More importantly

  The removal the sender net debit cap existed in DNS mode allowed participants to send payment earlier in the day

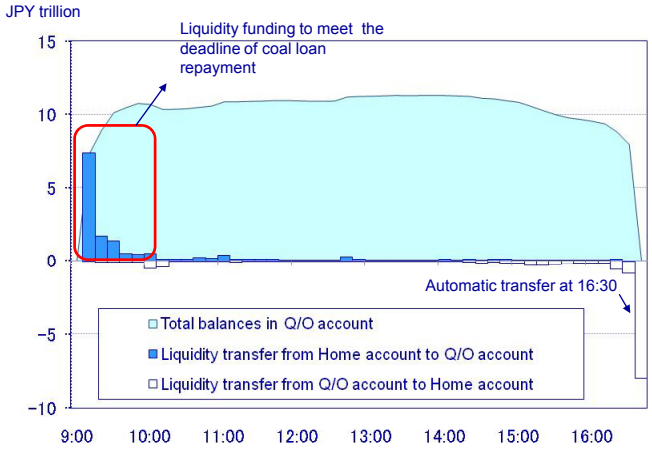
  Under DNS system, participants could not fully comply with the throughput guidelines because of the sender net debit cap.

4. Efficiency in Liquidity Usage

RTGS

4-1. Liquidity transferred to Q/O account

Intraday level of liquidity in Q/O accounts

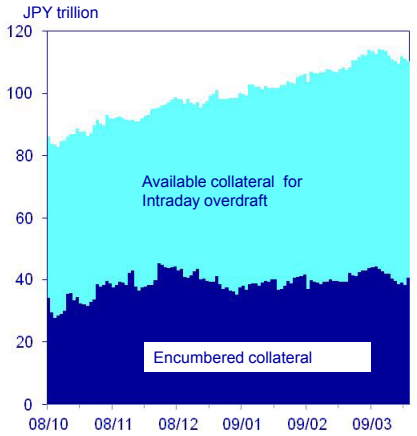


4. Efficiency in Liquidity Usage

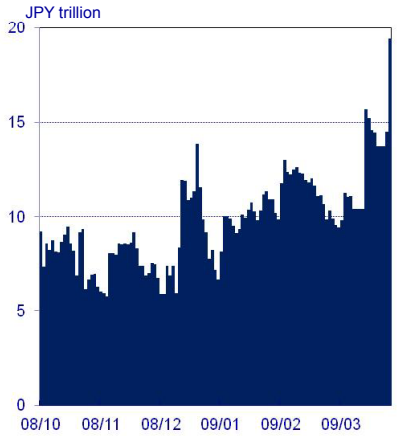
RTGS

4-2. Total available liquidity for settlement

Collateral pledged for BOJ



Outstanding O/N balances in Home account



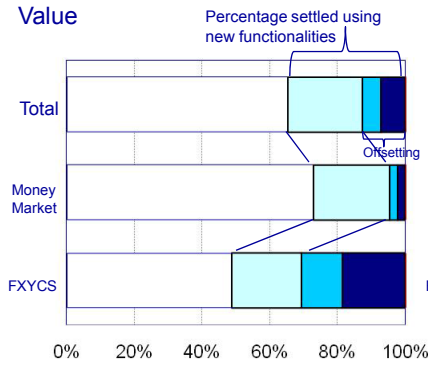
The liquidity above are also used for settlement in the other two accounts (Home account and SPDC account).

4. Efficiency in Liquidity Usage

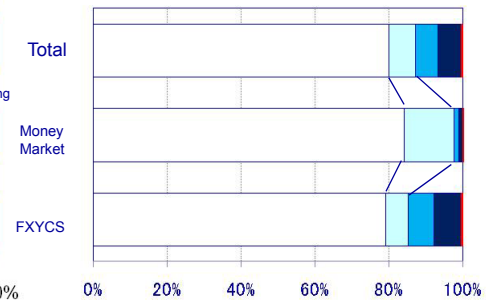
RTGS

4-2. Shares of daily value/volume by settlement method

Value



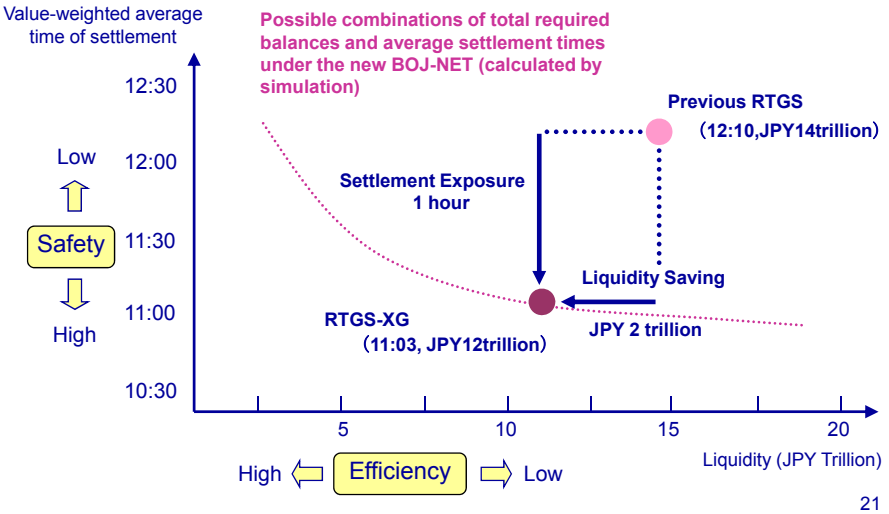
Volume



- Single gross settlement (upon entry)
- Single gross settlement (queued)
- Bilateral offsetting (upon entry)
- Bilateral offsetting (queued)
- Multilateral offsetting

4. Efficiency in Liquidity Usage

4-3. Safety and Efficiency



4. Efficiency in Liquidity Usage

4-3. Safety and Efficiency

Intraday level of liquidity in Q/O accounts

Sufficient amount of liquidity is transferred to Q/O accounts immediately after the opening of the system

The level of total available liquidity for settlement

The provision of ample liquidity by BOJ in response to the recent financial turmoil supports smooth settlement, but weakens the incentive for participants to use the LSF.

Safety or Efficiency

More than 85% of total value is settled by a simple RTGS upon entry.

= Under the current market circumstances, participants put more emphasis on safety (strict compliance with market guidelines) than on liquidity saving.

5. Resilience against liquidity shock

RTGS

5-1. Simulation setup and main assumptions

Simulator setup

BoF PSS2 with customized user-modules that can emulate BOJ-NET settlement algorithms

Stress scenario

One day disruption of the most critical participant

The systemically most important participant is identified by simulating failures of every participant beforehand.

The disrupted participant cannot send payment instructions for whole day, but can receive payment from other undisrupted participants.

Behaviour of non-disrupted participants

No-change in the behaviours of non-disrupted participant

From the analysis of past payment data of BOJ-NET during the actual participant-level operational incident, it seems there was no significant change in the behaviours of undisrupted participants.

5. Resilience against liquidity shock

RTGS

5-1. Simulation setup and main assumptions

Liquidity level (L(α))

Compare 5 liquidity levels from “upper bound” to “lower bound”

$$L(\alpha) = UB - \alpha(UB - LB), 0.0 \le \alpha \le 1.0$$

UB is the peak debit position during the day; LB is the net debit position for all payments to be settled on that day; α is set in five patterns in increments of 0.25.

Payment system design

Compare simple RTGS (previous BOJ-NET) to RTGS with offsetting facilities (new BOJ-NET)

For a comparison, we assume previous BOJ-NET has a simple centralized FIFO queue, as even under previous RTGS, participants control the timing of submitting payments by utilizing queuing facilities in the participants’ internal system.

Criteria of contagion effect

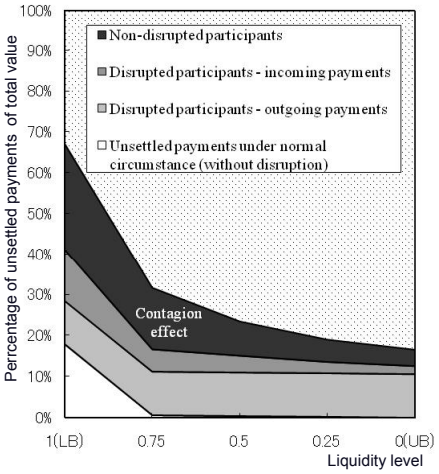
a) Value/Volume of unsettled payments of non-disrupted participants

b) Value-weighted settlement delay for payments of non-disrupted participants

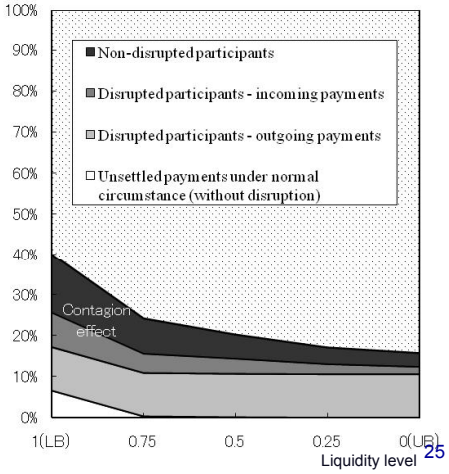
5. Resilience against liquidity shock

5-2. Value of unsettled payments

RTGS without offsetting mechanism



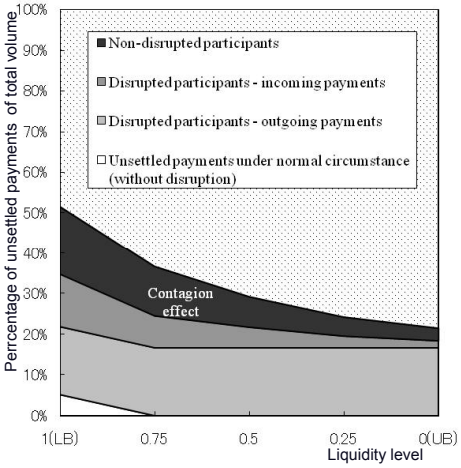
RTGS-XG with offsetting mechanism



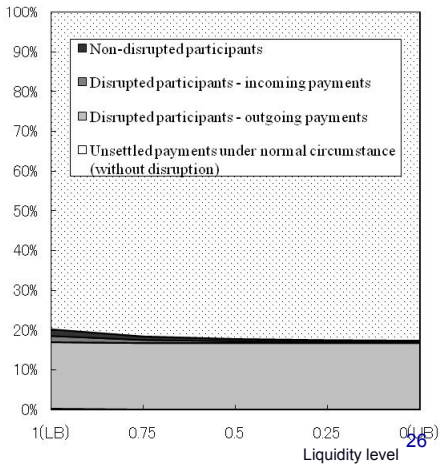
5. Resilience against liquidity shock

5-3. Volume of unsettled payments

RTGS without offsetting mechanism



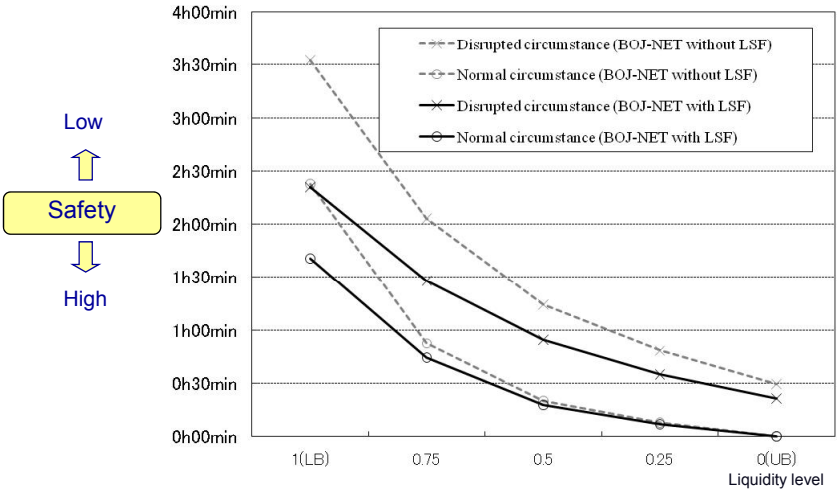
RTGS-XG with offsetting mechanism



5. Resilience against liquidity shock

5-4. Settlement delay (value-weighted)

Value-weighted average time in queue for payments of non-disrupted participants



5. Resilience against liquidity shock

5-5. Simulation results (wrap up)

Failure to settle outgoing payments by disrupted participants
= 10% of total value, 18% of total volume

Results when α=1 (the most stressed scenario)

	Previous RTGS	RTGS-XG
Value	39%	22%
Volume	30%	4%
Settlement delay	3:32:07	2:20:27

* Value/Volume of unsettled payments of non-disrupted participants

* Settlement delay (value-weighted average time in queue for payments of non-disrupted participants

6. Conclusion

RTGS

By introducing queue and offsetting facilities,

Intraday timing of settlement

For money market = No significant change

For FXYCS = Shifted earlier both in submission and settlement

Previous DNS mode for FXYCS seems to be inefficient

Liquidity requirement

Liquidity become somewhat more efficiently recycled in the new system.

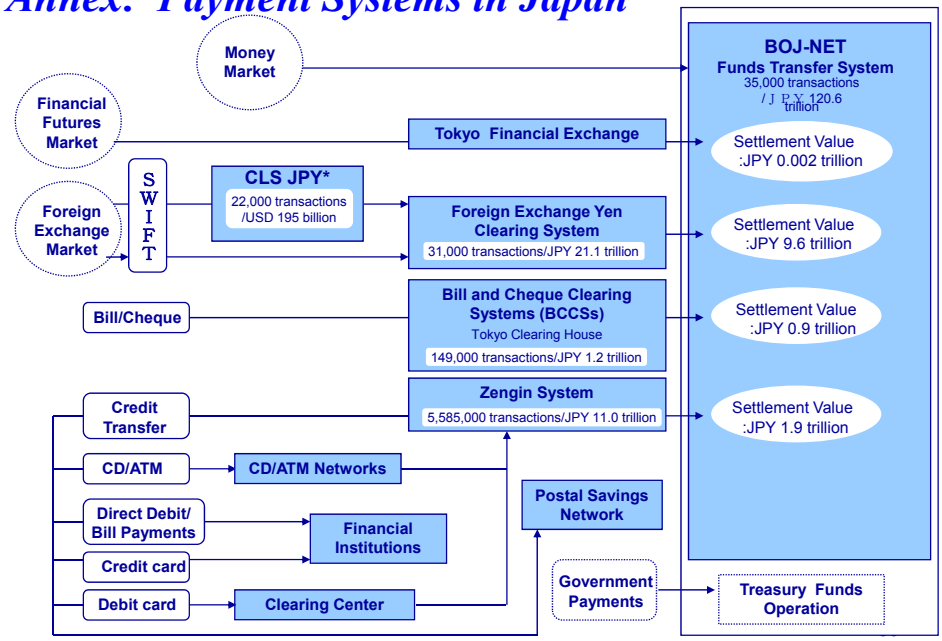
though it seems participants place more emphasis on payment speed with strictly complying with the market guidelines rather than further economizing liquidity usage.

Resilience against liquidity shock

Likely to lessen systemic effect of a participant-level disruption.

Annex: Payment Systems in Japan

※Daily average for 2008.



*Daily average for 2007.